

/kwo/ and /y/ in Taiwan Mandarin: Social Factors and Phonetic Variation*

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This article studies three phonological variants of /kwo y/ and the acoustic properties of /o/ and /y/ in 1,159 Taiwan Mandarin face-to-face interviews from social perspectives. Language shift from Southern Min and Hakka towards Taiwan Mandarin, leading to dialect loss, is updated by quantitative evidence derived from a series of sociolinguistic analyses. Social factors including gender, age group, educational level, internet use, and childhood residence significantly correlate with the use of three /kwo y/ variants: the standard form, /w_o/ merger, and /y/ delabialization. The latter two variants are typical Southern Min-accented Mandarin pronunciation. However, results of acoustic analysis of /o/ and /y/ suggest that the influences of Southern Min are significant only in the group with the largest Southern Min exposure. That is, for Taiwan Mandarin in its current form, dialect mixing is progressing due to intensive contact with Southern Min. But it is not a stabilized end form of change, yet.

Key words: Interview speech, phonological variants, sociolinguistics, vowel quality

1. Introduction

1.1 Language contact and social factors

Much attention has been paid to sociolinguistic research in recent decades covering topics in social stratification, language contact, change, and variation (Chambers & Schilling 2013; Labov 1966; Trudgill 1974; Weinreich 1968). Language contact in a multilingual society may lead to diverse processes of language change (mixing, diffusion, leveling, simplification, reallocation, etc.). Triggered by dialect contact, koinéization processes contain leveling out of minority and otherwise marked speech forms, and simplification that involves a reduction in irregularities, as pointed out by Trudgill (1986:107). With a focus on the behavior of individual speakers, various kinds of processes involving language change and variation are primarily motivated through the speakers' accommodation to the community (socially motivated linguistic adaptation) and/or to the recipients in face-to-face interaction (spontaneous reaction in verbal channel) (Trudgill 1986). The socially triggered adaptation is equivalent to the concept of accent convergence and divergence,

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as proposed by Giles (1973), which is determined by the speakers' intention of being associated with or dissociated from a particular speech community. In other words, the attitude, positive/negative or high/low prestige, towards the accent of a language may be decisive. As defined in Kerswill (2002:669), koinéization is '... a contact-induced process that leads to quite rapid, and occasionally dramatic, change'; 'the new dialect' or 'the interdialect' may be regarded as variations at different stages of language change.

Concerned with the linguistic outcomes of language contact and change, previous studies have analyzed social effects on phonological variants (Britain 1997; Chambers 2013; Sankoff 2013) and phonetic properties of particular groups of words in a language (Foulkes et al. 2010; Hay & Drager 2007; Labov 2006). Britain (1997) regards the emergence of a 'Canadian Raising' type of allophonic variation of [ai] as a variation resulting from dialect mixing. Williams & Kerswill (1999) examine dialect leveling of three British towns by migration pattern, economic status, geographical distance, social class and network type, and affective factors, for example identification with the peer group. Similarly, in respect of phonetic properties, sex, age, and city size, are also found to affect vowel fronting of /uw/ and /ow/ in North America (Labov 2006). Likewise, Chambers (2013) identifies sex, age, and social class as factors that affect language variation and change, in which the merger of /hw/ and /w/ is a nation-wide variation in Canadian English, though it may progress and diffuse at varying paces among different regions. That is, in addition to the commonly investigated social factors relevant to the speakers themselves (e.g. age, sex, education, economic status), socially related factors such as geographic location and dialect background also need to be considered if language diffusion is to be studied.

1.2 Taiwan as a multilingual society

Taiwan has four main ethnic groups. Being a multilingual society, the majority of people speak more than one language. To briefly summarize the ethnic groups in Taiwan, Southern Min people (73.3% of the population; see Huang 1993) migrated to Taiwan between the 17th and 19th centuries, mainly from southern Fujian Province in China (Feifel 1994). Their native language is the Southern Min dialect group of Chinese, consisting of more than one dialect variety with discrepancies in the sound system. Mainland Chinese (13% of the population; see Huang 1993) came from different provinces in Mainland China after the Second World War. Most of the older generation also speak their native Chinese dialect, but they usually use Mandarin for communication when in public. Hakka people (12%) came from Guangdong Province to Taiwan at about the same time as the Southern Min did, but in smaller numbers. They speak varieties of Hakka. Although Hakkaphones are not the majority in Taiwan, in places they do outnumber other speaker groups, as in Taoyuan,¹ Miaoli, and Hsinchu counties (Huang 1993). Finally, the aboriginal Austronesians make up 1.7% of the population in Taiwan (Huang 1993).

Mandarin Chinese is the official language of Taiwan. It is often distinguished as Taiwan Mandarin or Taiwanese Mandarin, in contrast with Beijing Mandarin (Putonghua) in the PRC.

¹ For the city names mentioned in this article, we follow the official guidelines of the Ministry of the Interior of Taiwan regarding the romanization of placenames (<http://placesearch.moi.gov.tw/translate/>).

Details about the sociopolitical history of Mandarin Chinese becoming the official language in Taiwan are presented in Tsao (1999) and Heylen (2005). Historical, linguistic, political, and social factors have gradually distinguished the two varieties in pronunciation, stress pattern, word use, and sentence structure (Chang 1998; Feifel 1994; Kubler 1985; Li 1985). For political reasons, the Nationalist government has aggressively promoted Mandarin Chinese as the official language of Taiwan since 1949 to establish a sense of solidarity in the country (Huang 1993). The use of dialects in schools, public places, and institutions was strictly prohibited. It was called the ‘Mandarin Language Policy’. Although this language policy was abandoned in 1987 (Feifel 1994; Sandel 2003; Tse 2000), the consequences of this policy on language shift from dialects towards Mandarin has been obvious (Chan 1994; Sandel et al. 2006; Young 1989). Based on the results of 823 surveys, Young (1989) reported a clear trend of language shift from Southern Min and Hakka in favor of Mandarin at work and in the private domain, as well as a trend of dialect loss in succeeding generations. In a survey of 58 parents of elementary school children, Sandel et al. (2006) found that language shift towards Mandarin Chinese was occurring among parents and children faster in cities than in rural areas. In particular, children in urban areas spoke less in native dialects with other children, while children in the rural areas spoke a mixture of Mandarin and their native dialects. Chen (2007) shows that in spite of the high ethno-linguistic vitality of Southern Min native people, they tend to speak Mandarin on formal occasions, such as at schools, banks, and for political affairs, while Southern Min is more frequently used in the private domain. Huang (1993:246) reported that in Taipei City the situation of dialect loss of Hakka and Southern Min was particularly noticeable among younger generations. But interestingly, Southern Min-accented Mandarin pronunciation is often regarded as an ethno-linguistic marker of language group identity for the Southern Min ethnic group and sometimes also for Taiwan as a country. It is also called Taiwanese accented Mandarin. In this article, to comply with linguistic terms, we use ‘Southern Min-accented pronunciation’ and ‘Taiwan Mandarin’ to refer to the phenomenon and the variety of Mandarin Chinese used in Taiwan, respectively.

1.3 Southern Min-accented pronunciation

While the Southern Min feel strong attachment to their native tongue (Hsu 1987; Young 1989), the general attitude towards Southern Min-accented Mandarin is rather negative according to Feifel’s (1994) study. However, with economic and political development, a change in this general attitude has gradually taken place with the indigenization of Taiwanese identity (Tse 2000). Ironically, an increased Taiwanese identity is accompanied by progressive dialect loss to the dominance of Taiwan Mandarin. But what is also happening at the same time is that the standard pronunciation of Taiwan Mandarin, that is the prestige norm, is also changing accordingly, as nowadays Southern Min-accented Mandarin is more often heard in the public domain than ever before. It seems that the negative association with a Southern Min accent is gradually disappearing, on its way to becoming a new variety of Mandarin. As proposed by Tsao (1987), Taiwan Mandarin needs to be re-evaluated to provide an updated norm of the official language that is close to people’s actual performance.

1.3.1 Comparison of vowel systems

As we are concerned with phonetic variation in Taiwan Mandarin with a focus on influence from Southern Min, we first point out differences in their vowel systems. Southern Min represents a group of dialectal varieties spoken in different regions in China and Taiwan (Ho 1996). Likewise, the sound system of Taiwan Mandarin as a whole can be different due to theoretical considerations of phonemes (Duanmu 2000; Ho 1996). For example, /w/ in the word *guoyu* /kwo y/ (the national language) can be considered as (1) a segmental feature, (2) a glide, or (3) part of the diphthong /uo/. In this article, /w/ is regarded as a glide, to allow for a clear distinction with the onset consonant and the following plain vowel. Figure 1 illustrates the vowel systems of Taiwan Mandarin and Southern Min (Ho 1996; Tse 1998). It should be noted that the same IPA symbol used for Southern Min and Mandarin do not represent exactly the same speech sound and quality.

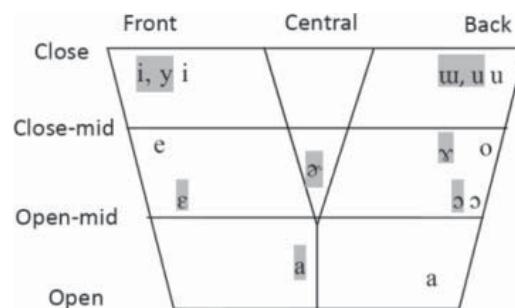


Figure 1: Plain vowels in Taiwan Mandarin adopted from Tse (1998:73), Southern Min adopted from Ho (1996:228). Mandarin vowels are shaded.

1.3.2 /w_o/ merger and /y/-delabialization

Unlike Southern Min, Taiwan Mandarin has a rounded front vowel /y/ in all its dialect varieties. Southern Min has two mid-back vowels /o, ɔ/. (It should be noted that in some Southern Min varieties, /o/ and /ɔ/ are merged into one phoneme.) Taiwan Mandarin has only one rounded mid-back vowel /o/ that shares similar vocalic qualities with /o, ɔ/ in Southern Min. In this article, we use /o/ to represent the rounded mid-back vowel in Taiwan Mandarin (noted as /ɔ/ in Tse 1998). Moreover, the glide /w/ cannot take the prenuclear position before /o/ in Southern Min, but it can in Taiwan Mandarin. Thus, phonological variants resulting from these differences, that is /w_o/ merger and /y/-delabialization, are regarded as typical Mandarin pronunciations influenced by Southern Min (Hsu 1987; Kubler 1985; Li 1985). For instance, /ko tɕja/ is used instead of /kwo tɕja/ and /i/ instead of /y/.

1.4 Research issue

This article attempts to explore to what extent dialect contact and mixing takes place in Taiwan by analyzing phonological variants and the phonetic representation of spoken Taiwan Mandarin from

a sociolinguistic perspective. Face-to-face interviews were conducted to collect social data together with speech recording. Phonological variants of /kwo y/ as well as acoustic properties of /o, y/ are examined in parallel to explore whether a kind of mixture of Taiwan Mandarin and Southern Min is in progress.

2. Data and method

Motivated by anthropological considerations, the correlation between phonological differences (language variation) and social groupings (social and cultural distance) has been intensively studied (Gumperz 1958). Also concerning himself with speaker groups, but focusing on social strata, Labov (1966) reached the following conclusion: If any two subgroups of New York City speakers are ranked based on a scale of social stratification, it is likely that they will be ranked in the same order by their differential use of (r). Since then, large-scale studies adopting quantified measures have emerged as a powerful method to enhance empirical, scientific research work on how people in a society use language. That is, sociolinguistic research has started to ‘officially’ adopt recently developing methodologies in corpus linguistics and language archives, for example the Sociolinguistic Archive and Analysis Project, which has accumulated 2,600 interviews in different dialects spoken in North Carolina in 2012 (Kendall 2007). Similarly, the methodology of sociophonetics, which integrates acoustic analysis into sociolinguistics, has also attracted great attention (Deshaies-Lafontaine 1974; Foulkes et al. 2010; Hay & Drager 2007; Labov 1966, 2006). In this line of research, phonological contrasts and acoustic features are used as indicators to account for categorical distributions and gradient properties of speech.

Phonetic forms vary according to speaking styles and communicative functions. Thus, we collected face-to-face interview data instead of lab speech or artificially elicited speech to resemble real-life communication as much as possible. Original acoustic data are normalized for statistical analyses to reduce individual and collective differences (Fant 1966; Lobanov 1971).

2.1 Data preparation

Data collection was organised through the National Digital Archives Project (2007–2012), which aims to document and archive the contemporary use of spoken Taiwan Mandarin in different geographic locations (Tseng 2008). In principle, at least 100 interviewees were collected for each region, covering places in the north, middle, and south of Taiwan. In the north are Yilan, Taoyuan, and Hsinchu counties. Those in the middle are Taichung City, Nantou County, Yunlin County, Chiayi City, and Changhua County. Tainan City, Kaohsiung City, and Kaohsiung County are in the south of Taiwan. We did not include Taipei City in the current study, as previous works have already been specifically devoted to Taipei City, and we would like to focus initially on other places in Taiwan (Hsu 1987; Hsu & Tse 2009; Huang 1993). Finally, to study /w_o/ merger and /y/-delabialization, we deliberately embedded the target word *guoyu* /kwo y/ (the national language) many times in the questions directed to the interviewees in the interview. This was so that, on the one hand, we could collect more /kwo y/ tokens; but, on the other hand, so that the interviewees would pay more attention to the answers than to their pronunciation of /kwo y/. In addition, efforts were made to

help the interviewees feel as relaxed and informal as possible, because we hoped to collect natural, communicative speech data. Despite our best efforts, as our interviewers were strangers to the interviewees, some interference (such as hypercorrection) resulted.

2.2 Face-to-face interviews

In total, 1,192 interviews in 11 regions were recorded and processed. Table 1 summarizes information about the place and time of recording and the number of interviewees.

Table 1: Data overview

Place of recording	Year of recording	Male interviewees	Female interviewees
Taichung City	2007	37	36
Changhua County	2007	52	80
Yunlin County	2007	46	71
Chiayi City	2008	44	74
Tainan City	2008	55	61
Nantou County	2008	54	59
Kaohsiung City	2008	42	65
Kaohsiung County	2009	53	50
Hsinchu County	2009	41	62
Taoyuan County	2009	51	58
Yilan County	2009	48	53

We went to public places such as parks, post offices, and banks, where we could most readily find suitable local people. We randomly selected people who were likely to have been between 20 and 40 years of age. As a result, the majority of our interviewees are aged between 20 and 40, but we also have interviewees aged below 20 and above 40. The interviews were recorded using the Sony Hi-MD MZ-RH1 digital recorder and the Sony ECM MS907 microphone. Orthographic transcription and speech signal alignment were conducted using PRAAT (Boersma & Weenink 2013). The labeled data were cross-checked to ensure annotation quality. Acoustic features are automatically extracted from the labeled boundary information by PRAAT scripts.

In each of the interviews, information was requested from the following three categories: (1) language use, (2) socio-economic background, and (3) internet use. The interviewees were asked to provide information about which languages they speak and use for daily communication, at work, and especially which languages they normally use within their family (parents and siblings). They were also asked where they were born and educated, their age, educational level, profession, and salary level. In addition, a series of questions were designed to acquire data about how often the interviewees used the internet. In total, there were 25 questions. The length of individual interviews ranged from three to eight minutes, depending on how willing the interviewees were to respond to the questions. All interviews were conducted in Taiwan Mandarin. The interviewers were instructed in the training phase to speak naturally as regards pronunciation and speaking tempo. Our overall impression is that the interviewees spoke in a quite casual and natural way.

2.3 Social factors

Answers to the 25 questions were converted into pre-defined social factors, coded in quantitative measures in Table 2, including the degree of Southern Min exposure, the degree of Hakka exposure, the number of languages interviewees normally use for communication, the interviewees' age, gender, educational level, salary, where they lived during their childhood before high school, and their internet use. It should be noted that we only analyzed cases where the sample size was greater than 20 for factors of language ability and childhood residence. The definition of language exposure and childhood residence is further elaborated below.

Table 2: Social factors with coding inventory

Factors	Inventory (Coding)
Degree of Southern Min exposure	0, 0.5, 1, 1.5, 2
Degree of Hakka exposure	0, 0.5, 1, 1.5, 2
Language ability	2, 3, 4 (Taiwan Mandarin, Southern Min, and Hakka are counted as distinct languages)
Age group	Under 19 (_19), between 20 and 30 (20_30), between 31 and 40 (31_40), above 41 (_41) (coded as 1, 2, 3, 4)
Gender	Female, male (coded as 0, 1)
Educational level	Junior high school, senior high school, university, graduate school (coded as 1, 2, 3, 4)
Area of residence as a child	32 combinations of administrative counties of Taiwan and unknown (coded by alphabetic order of the city name)
Salary level	Under 30K NT per month (_3), between 30K and 50K (3_5), between 50K and 80K (5_8), above 80K (_8) (coded as 1, 2, 3, 4)
Internet use	None, seldom, ordinary, often (coded as 1, 2, 3, 4)

2.3.1 Language exposure

About 70% of Taiwanese learn Southern Min as their first language and 12% of the population the Hakka dialect (Huang 1993). Sandel et al. (2006) discuss the phenomenon of language shift from Southern Min to Mandarin Chinese by describing the use of dialect within the family. Accordingly, we define the degree of language contact based on how much the interviewees are exposed to Southern Min or Hakka within the family. To take Southern Min as an example, if Southern Min is the only language used for communicating with parents, it is given 1 point. If Southern Min and Taiwan Mandarin are both used, it is 0.5 points. If no Southern Min is used, it is 0. In the case of siblings, the scoring principle is the same. For interviewees without siblings, it is scored 0. According to the answers the interviewees provided, we calculated the sum of the scores given for the cases of parents and siblings. An interviewee who speaks only Southern Min to his/her parents and siblings is scored highest, that is 2, for Southern Min exposure. An interviewee who speaks only Taiwan Mandarin to his/her parents and siblings receives the lowest score of 0. The same calculation procedure also applies to the degree of Hakka exposure.

2.3.2 Area of residence as a child

Taiwan is an island with the world's second highest population density. Immigration to big cities for family or work reasons is very common. Although we collected interviews from 11 geographically balanced counties, the interviewees might not all originate from the place where we recorded the interview. As the pronunciation of Taiwan Mandarin may be affected by the environment during the period of first language acquisition, the place where the interviewees received their education before high school is used to designate the 'area of residence as a child'. If two places from the same area of Taiwan were involved, the two places were converted into a single value. If more than two places were involved or the places scattered in distant areas in Taiwan, no value was assigned. If the information the interviewee provided was not enough to determine the place of childhood residence, the data was discarded.

2.4 /kwo y/ variants

Variants of 7,431 /kwo y/ tokens were manually labeled. To code the variants, if all segments in /kwo y/ are correctly pronounced, it is coded as an instance of *standard form* (7,309 tokens). If the glide /w/ and the nucleus /o/ are merged into one segment, it is coded as an instance of */w_o/ merger* (122 tokens). Finally, if /y/ is pronounced as /i/, it is coded as an instance of */y/-delabialization* (86 tokens). Occurrences with otherwise mispronounced segments such as aspirated /k/ instead of /k/ are excluded from our analysis. Mispronunciation includes 95 aspirated /k/ for /k/, 22 /ə/ for /o/, and 230 other variants for /y/. Figure 2 shows the three variants of /kwo y/. For the later vocalic-acoustic analysis, only the correctly produced /o/ and /y/ have been studied.

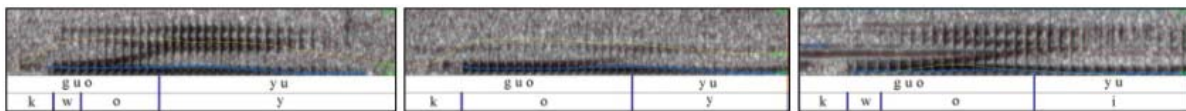


Figure 2: /kwo y/ standard form, /w_o/ merger, and /y/-delabialization

3. Phonological variants and social factors

Out of the 1,192 recorded interviews, we eventually used data from 1,159 interviewees for the present study, after excluding interviews with incomplete socio-linguistic information. Among the valid interviews, 509 interviewees are male and 650 are female. The final dataset contains 7,431 /kwo y/ tokens, equivalent to 6.4 instances per interviewee on average.

3.1 The interviewees

Most of the social factors correlate with each other. Two-tailed Pearson correlation tests report a significant correlation between educational level and salary level ($r(739) = .265, p < 0.05$), educational level and internet use ($r(1093) = .251, p < 0.05$), educational level and gender ($r(1113) = .190, p < 0.05$), salary level and internet use ($r(737) = .095, p < 0.05$), salary level and gender

($r(748) = .286, p < 0.05$), internet use and gender ($r(1107) = .120, p < 0.05$), age and salary level ($r(746) = .356, p < 0.05$), as well as age and internet use ($r(1105) = -.214, p < 0.05$). Furthermore, male interviewees have a higher educational level ($\chi^2(3) = 8.61, p = 0.035$) and a higher salary level, too ($\chi^2(3) = 58.83, p < 0.05$). The older the interviewee, the higher the salary level ($\chi^2(9) = 113.13, p < 0.05$). The higher the educational level, the higher the salary level ($\chi^2(9) = 69.16, p < 0.05$). Moreover, younger interviewees use the internet more often ($\chi^2(9) = 64.35, p < 0.05$), as do male interviewees ($\chi^2(3) = 18.34, p < 0.05$). Interviewees who are better educated also use the internet more often than their counterparts ($\chi^2(9) = 102.17, p < 0.05$). As a whole, the social patterns we found in the interviewees are those expected for a modern society.

3.2 The use of language

Southern Min exposure is significantly correlated with Hakka exposure ($r(1129) = -.215, p < 0.05$), educational level ($r(1113) = -.077, p < 0.05$), internet use ($r(1107) = -.151, p < 0.05$), gender ($r(1129) = .081, p < 0.05$), age ($r(1127) = .204, p < 0.05$), and language ability ($r(1129) = -.163, p < 0.05$). Table 3 summarizes the mean scores for interviewees' language ability by degree of exposure to Southern Min and Hakka. In parentheses are the numbers of interviewees. Degree of exposure to Southern Min and Hakka show opposite tendencies in terms of their relation with language ability. The higher the exposure to Hakka, the more languages the interviewees speak ($\chi^2(28) = 116.23, p < 0.05$), while the higher the exposure to Southern Min, the fewer languages they speak ($\chi^2(28) = 99.29, p < 0.05$). This result reflects the dominant role the Southern Min people play in Taiwanese society. According to Table 3, 95% of the interviewees have no Hakka exposure at all; 74% of the interviewees are exposed to Southern Min to different degrees within their family. In Taiwan, Hakka-speaking people use Southern Min for daily communication and also for commercial reasons. As regards the relationship between social factors and language ability, the more educated interviewees speak more languages ($\chi^2(21) = 102.13, p < 0.05$), and so do the interviewees who use the internet more often ($\chi^2(21) = 41.71, p < 0.05$). Also, the higher the salary level, the greater the number of languages that are spoken ($\chi^2(21) = 63.26, p < 0.05$).

Table 3: Language ability (means) of Southern Min and Hakka exposure groupings

Hakka exposure \ Southern Min exposure	0	0.5	1	1.5	2	Total
0	2.71(256)	3.39(18)	3.6(15)	4(3)	3.29(7)	2.83(299)
0.5	2.71(182)	3(3)	3(1)			2.72(186)
1	2.73(269)	2(1)	3(2)			2.73(272)
1.5	2.54(206)					2.54(206)
2	2.49(196)					2.49(196)
Total	2.65(1109)	3.27(22)	3.5(18)	4(3)	3.29(7)	2.68(1159)

Southern Min, despite its dominant role in Taiwan, is gradually disappearing in the younger generation (Chan 1994; Sandel et al. 2006; Young 1989). The boxplots presented in Figure 3 show age group, gender, educational level, and internet use on the x-axis and the distribution of the degree of Southern Min exposure on the y-axis. The results show that the younger the speakers are, the

less they are exposed to Southern Min. In the sociolinguistic study conducted in 1987 by Huang (1993), 16.8% of the 327 interviewees spoke only Taiwan Mandarin to their siblings, 27% only Southern Min, and 2.1% only Hakka. In the present study, it is 45%, 20%, and 0.6% for Taiwan Mandarin, Southern Min, and Hakka, respectively. The consequence of the policy of promoting Mandarin is apparent: Taiwan Mandarin has become the most commonly used language within the family among the generations recruited for our study.

As regards gender, male speakers are more exposed to Southern Min than female speakers ($\chi^2(4) = 21.91, p < 0.05$). Our data support the notion that males are more bound to the local, family-related community than females. Another tendency observed is that the more educated the speakers are, the less Southern Min exposure they have, with the exception of the interviewees with a postgraduate degree ($\chi^2(12) = 33.24, p < 0.05$). Also interesting is the use of the internet. The more often speakers use the internet, the less is their Southern Min exposure ($\chi^2(12) = 38.04, p < 0.05$). This may have to do with village–metropolis differences and/or the age effect (Sandel et al. 2006). Area of childhood residence has an effect on Southern Min exposure ($\chi^2(120) = 348.58, p < 0.05$), showing a regional difference of language use. But salary level shows no effect on Southern Min exposure. Regarding Hakka interviewees, as there were only 50 speakers we did not conduct any further analysis.

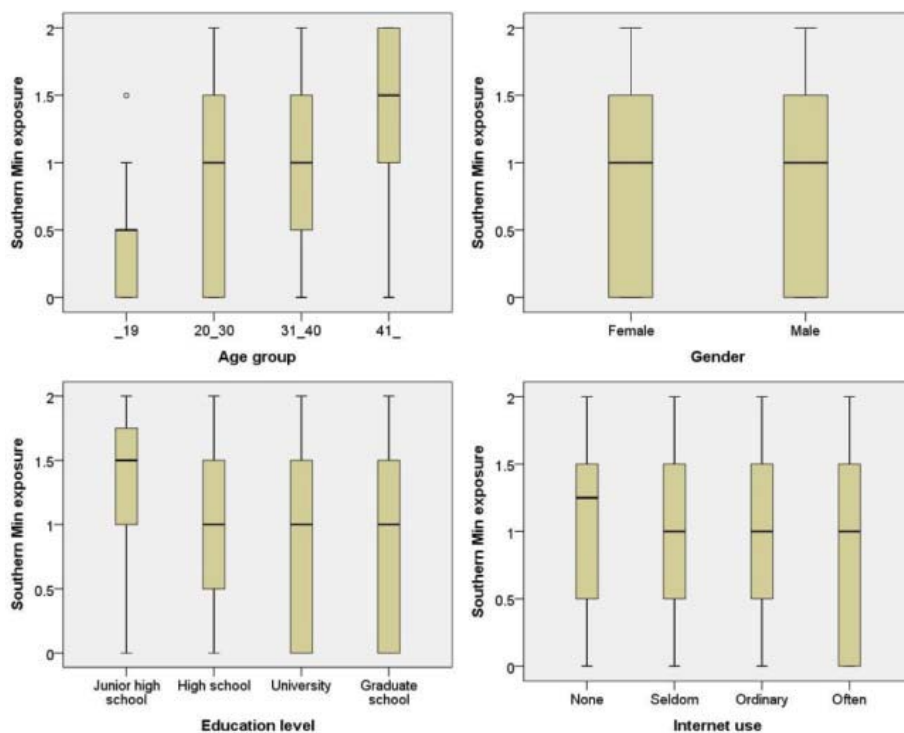


Figure 3: Southern Min exposure by age, gender, educational level, and internet use

3.3 The use of /kwo y/ variants

The use of the standard form varies from 0% to 100% (mean = 93.3%, standard deviation (SD) = 13.45%). /w_o/ merger ranges also from 0% to 100% (mean = 1.9%, SD = 8%). Similarly,

/y/-delabialization ranges between 0% and 100% (mean = 1.33%, SD = 7.73%). The use of the standard form, /w_o/ merger, and /y/-delabialization correlates with each other. Among the 1,159 speakers, negative correlations are revealed between the use of the standard form and the two typical Southern Min-accented variants ($r(1159) = -.570, p < 0.05$) and ($r(1159) = -.586, p < 0.05$), respectively. But /w_o/ merger and /y/-delabialization are positively correlated ($r(1159) = .206, p < 0.05$), showing that these two variants reflect similar linguistic outcomes of Southern Min-accented Mandarin.

3.4 Analysis of /kwo y/ variants by social factors

Generalized linear models were conducted to statistically verify the effects of the social factors on the three variants. Predictors are Southern Min exposure, Hakka exposure, educational level, gender, age group, as well as the interactional effects of age group with gender and educational level. The remaining pairs of interactional effects are not considered because they are strongly correlated with each other. Dependent variables are production rates of standard form, /w_o/ merger, and /y/-delabialization, with interviewee as the intercept model.

Table 4: Effects of social factors on /kwo y/ variants

Dependent variables	Standard form			/w_o/ merger			/y/-delabialization		
	Wald χ^2	df	p	Wald χ^2	df	p	Wald χ^2	df	p
(Intercept)	2012.46	1	<.01	26.286	1	<.01	28.370	1	<.01
Southern Min exposure	6.427	4	0.17	7.983	4	.092	17.455	4	<.01
Hakka exposure	15.005	4	<.01	20.486	4	<.01	4.752	4	.314
Educational level	38.043	3	<.01	113.865	3	<.01	12.828	3	<.01
Gender	11.277	1	<.01	17.777	1	<.01	10.491	1	<.01
Age group	18.233	3	<.01	136.858	3	<.01	31.325	3	<.01
Gender * age group	4.101	3	.25	17.083	3	<.01	18.814	3	<.01
Educational level * age group	118.093	7	<.01	1641.132	7	<.01	70.161	7	<.01

The use of the three /kwo y/ variants is significantly different between male and female interviewees (Table 4). The results are shown in Figure 4, with the use (%) of variants on the y-axis and gender on the x-axis. Female interviewees use the standard form more often than males; male interviewees produce /w_o/ merger and /y/-delabialization more often than females.

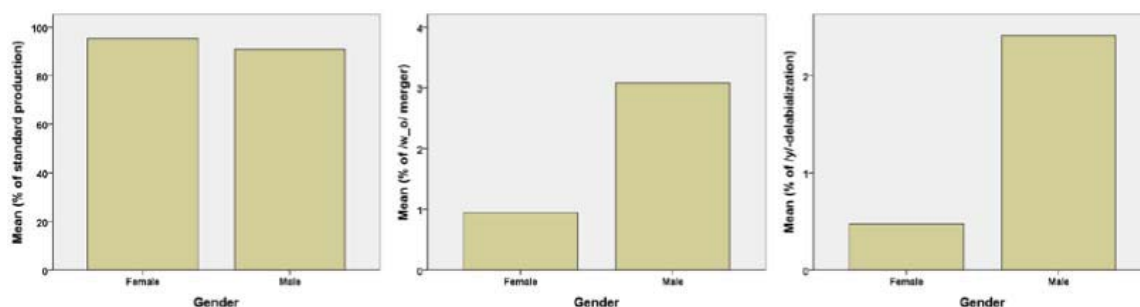


Figure 4: Use of /kwo y/ variants observed by gender

Statistically, only the subject group with Southern Min exposure degree of 0.5 produces the standard form significantly more often than that with degree 2. Nevertheless, a tendency is observed in Figure 5 (showing the mean production rates of the three variants by Southern Min exposure degree). The less the exposure to Southern Min is, the more likely the speakers are to pronounce the standard form. Similar tendencies are also observed for the other two variants. The group with the highest Southern Min exposure tends to produce /w_o/ merger and /y/-delabialization more often than the other groups.

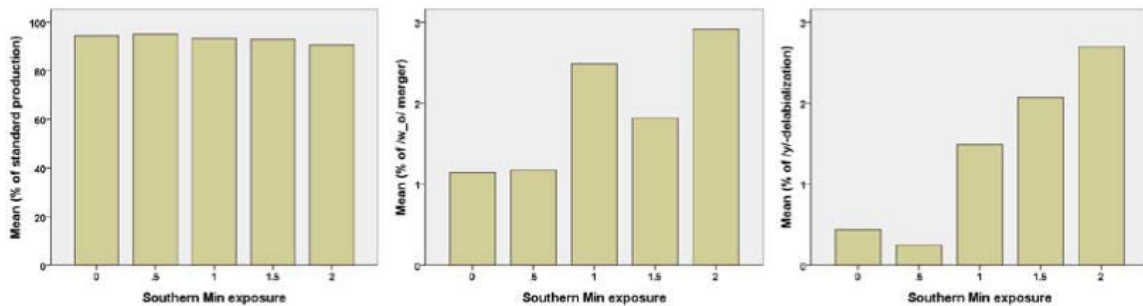


Figure 5: Use of /kwo y/ variants observed by Southern Min exposure

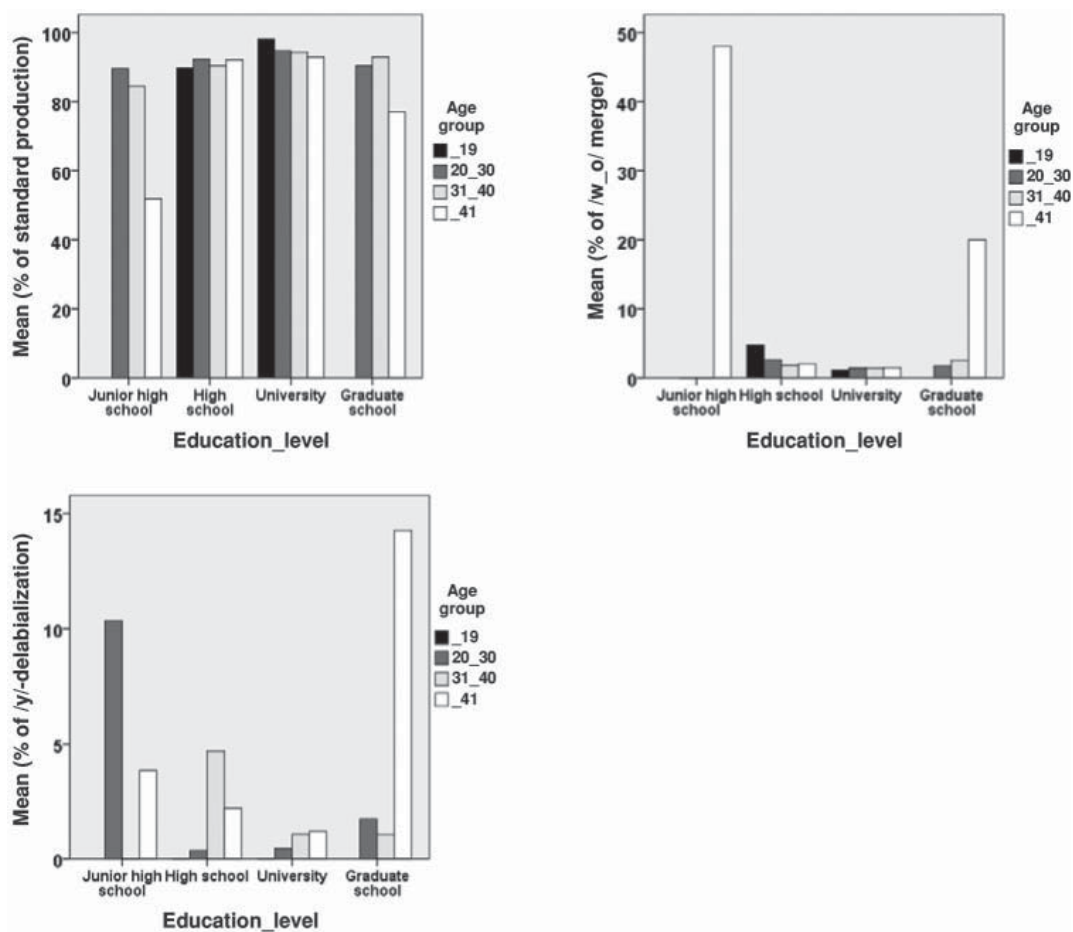


Figure 6: Use of /kwo y/ variants observed by educational level and age group

Educational level also plays a significant role in the use of the standard form. It is significantly higher in the group with the highest educational level than in the group with the lowest educational level. The use of /w_o/ merger and /y/-delabialization in the group with the highest educational level is significantly less frequent than in the other groups. Regarding age group, the older the interviewees, the more often they produce these two variants. The use of /w_o/ merger and /y/-delabialization is significantly different among age groups. Figure 6 shows the interactional effects of educational level and age group on the use of the variants. The oldest age group with the lowest educational level produces the standard form the least often and the /w_o/ merger variant the most often. As a whole, it can be seen that the relationship between speech variability and social factors such as age group and educational level is rather complex due to individual differences between the interviewees. The older generation should preserve more Southern Min-accented pronunciation, according to our previous results. But on the other hand, better educated people tend to use the standard form. As a result, the oldest group with the highest educational level produces /y/-delabialization most often in our data. To explain this result, analyses of childhood residence and individual background are necessary.

4. Vowel quality and social factors

4.1 Formants

Southern Min has two mid-back vowels /o, ɔ/ and Taiwan Mandarin has only /o/. Southern Min does not have the rounded /y/, but Taiwan Mandarin does. Given these differences, if the influence of Southern Min is salient and stable, the phonological contrasts of /o, y/ in our data should accordingly reflect the Southern Min-accented pronunciation. Vowels are described by three phonological contrasts: [±high], [±back], and [±rounded]. Three acoustic features that are indicative of phonological contrast of vowels proposed by Kent & Read (2002:134) are adopted in our study to quantify vowel quality. The difference between F1 and F0, the difference between F3 and F2, and the sum of F1, F2, and F3 designate the contrasts [±high], [±back], and [±rounded], respectively. As physiological differences (e.g. the length of vocal tract) associated with gender and age directly affect acoustic properties, confounding effects should at least to some degree be resolved (Labov 2006). This is one of the reasons why the measures with differences in formant values are chosen for [±high] and [±back]. Moreover, normalization methods, for example the logmean and 6-parameter regression methods, and the speaker normalization proposed by Fant (1966), are proposed. The new version of Fant's method was later suggested by Lobanov (1971), which normalizes original acoustic measurements produced by different speakers by taking the z -scores, $z = (x - \mu) / \sigma$, where x is the original value, μ the mean, and σ the standard deviation. We use z -scores in this article. As our focus is not the perception-related characteristics, we did not consider Mel or Bark scales. It should also be noted that, because the data were recorded in public places with different kinds of noise, not all acoustic features can be successfully extracted by PRAAT. Table 5 summarizes the definition of our acoustic measures and the interpretation of the respective phonological contrast. The fundamental frequency (F0) and the formants (F1, F2, F3) of the vowels are extracted at the time point where maximal intensity is measured.

Table 5: Acoustic features and phonological contrast (adopted by Kent & Read 2002:134)

Z-scores of acoustic features	Phonological contrast
ZF1 – F0: Difference of the first formant and fundamental frequency measured at max. intensity	Low vowel > high vowel
ZF3 – F2: Difference of the second and third formants measured at max. intensity	Back vowel > front vowel
ZF1 + F2 + F3: Sum of the first, second, and third formants measured at max. intensity	Rounded vowel < unrounded vowel

4.2 Analysis of vowel quality by social factors

We examine the acoustic features extracted from 7,287 /o/ and 7,115 /y/ tokens together with factors of Southern Min exposure, Hakka exposure, gender, age group, educational level, as well as the interactional effects of age group with gender and educational level. Table 6 summarizes the results of linear mixed models.

The acoustic properties of /o/ and /y/ vary. The [\pm high] contrast in /o/ is significantly different in terms of Southern Min exposure, educational level, gender, and age group. In the case of /y/, [\pm high] is significant only in educational level and gender. The [\pm back] contrast in /o/ is related only to gender; that in /y/ is related to all factors except for age group. The [\pm rounded] contrast in /o/ is related to Southern Min exposure, educational level, and gender, while that in /y/ is related to Southern Min exposure, gender, and age group. As a whole, the results of /o/ and /y/ are not symmetric.

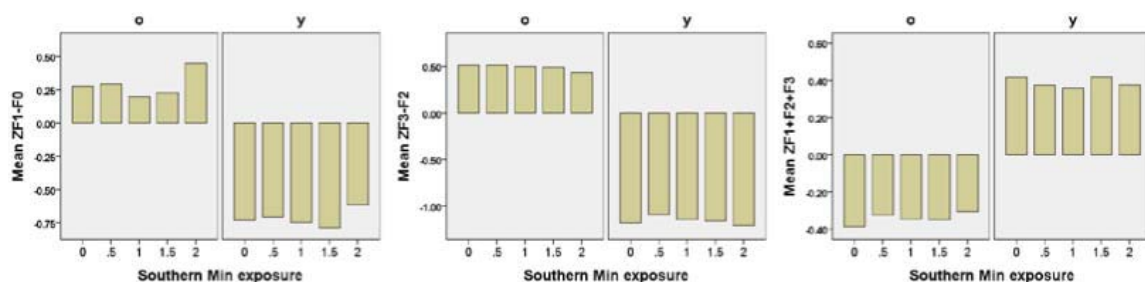
4.2.1 Southern Min exposure

The statistical results in Table 6 show that the degree of Southern Min exposure affects the vowel quality of /o/ and /y/ in most cases, except for the [\pm back] indicator for /o/. Statistically, the [\pm high] contrast in /o/ is significant between the extreme group assigned by a score of 2 and the other groups. But no significant difference is observed for the [\pm back] contrast for /o/. For the roundedness contrast in /o/, significant difference is only found between the extreme groups assigned by a score of 0 and 2. For the [\pm high] contrast in /y/, only differences between the group assigned by a score of 2 and the groups assigned by a score of 0.5 and 1 are significant. The [\pm back] contrast is significantly different between the extreme group assigned by a score of 2 and all other groups. For the roundedness indicator, the differences between the group assigned by a score of 1 and the groups assigned by a score of 0.5 and 1.5 are significant. Figure 7 summarizes the means of the three acoustic values of /o, y/ by the degree of Southern Min exposure. The vowel production of the extreme group assigned by a score of 2 shows a consistent tendency relative to the other groups. /o/ and /y/ in /kwo y/ production is lower, and more front in the group with the highest exposure to Southern Min. /o/ tends to be unrounded in the group assigned by a score of 2, but not as obviously as in /y/. The unrounded variants of /i/ and /y/ are the most typical pronunciation of

Table 6: Effects of social factors on /o/ and /y/ qualities

Dependent variable: ZF1–F0 [±high]	o			y		
	F	df	p	F	df	p
(Intercept)	71.522	1	<.01	150.241	1	<.01
Southern Min exposure	6.45	4	<.01	3.184	4	0.013
Hakka exposure	1.302	4	0.267	2.658	4	0.031
Educational level	7.672	4	<.01	4.941	4	<.01
Gender	1027.849	1	<.01	869.015	1	<.01
Age group	7.185	3	<.01	1.88	3	0.131
Educational level * age group	6.59	10	<.01	2.32	10	<.01
Gender * age group	0.308	3	.820	3.893	3	<.01
Dependent variable: ZF3–F2 [±back]	o			y		
	F	df	p	F	df	p
(Intercept)	62.304	1	<.01	717.332	1	<.01
Southern Min exposure	1.225	4	.298	4.786	4	<.01
Hakka exposure	2.594	4	.035	4.954	4	<.01
Educational level	2.629	4	.033	6.135	4	<.01
Gender	123.677	1	<.01	13.622	1	<.01
Age group	0.068	3	.977	1.874	3	.132
Educational level * age group	1.876	10	.044	1.265	10	.244
Gender * age group	1.540	3	.202	4.855	3	<.01
Dependent variable: ZF1+F2+F3 [±rounded]	o			y		
	F	df	p	F	df	p
(Intercept)	16.245	1	<.01	71.676	1	<.01
Southern Min exposure	4.348	4	<.01	3.808	4	<.01
Hakka exposure	3.28	4	.011	1.29	4	.271
Educational level	3.503	4	<.01	0.628	4	.643
Gender	112.548	1	<.01	796.007	1	<.01
Age group	1.122	3	.339	10.011	3	<.01
Educational level * age group	1.261	10	.247	2.407	10	<.01
Gender * age group	0.522	3	.667	1.802	3	.144

Southern Min-accented Mandarin. However, the specified vowel quality is not yet a general pattern across all Southern Min exposure degree groups, suggesting that the contact between Taiwan Mandarin and Southern Min has not yet led to a completed stage of vowel quality change.

**Figure 7:** /o/ and /y/ qualities observed by Southern Min exposure

4.2.2 Gender

Gender differences are statistically significant in all three acoustic indicators. Vowel quality in male interviewees is lower, more front and rounded than in female interviewees, as shown in Figure 8 summarizing the acoustic results of /o/ and /y/ by gender. Because of the longer vocal tract of male adults, fundamental frequency and formant values of male speakers may be generally lower than for female adults. However, as we used the *z*-scores of the F1–F0 and F3–F2 differences, this bias should be properly reduced. The lower and more front vowel properties of the males are the same as the group with the largest degree of Southern Min exposure. The [±rounded] feature shows different tendencies. Both /o/ and /y/ produced by the female speakers tend to be more unrounded than in the case of the males. As the sum of the first three formants may still be affected by the vocal tract length of the speakers, even after data normalization, the result relating to the [±rounded] feature requires further analyses to confirm.

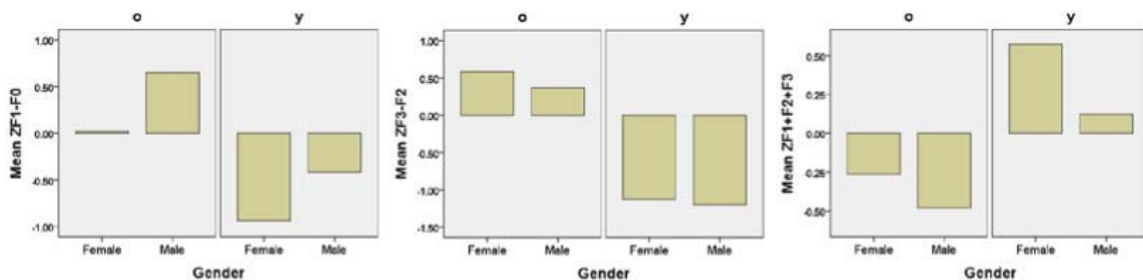


Figure 8: /o/ and /y/ qualities observed by gender

4.2.3 Age group and educational level

For /o/, the [±high] contrast is significantly different between the oldest group and the groups between 20–30 and 31–40. For /y/, the [±rounded] contrast is significant in all pairs, except for the groups under 19 and between 20 and 30. In general, the oldest group tends to produce lower, more front, and unrounded vowels than the other groups. This result is similar to the group with the highest degree of Southern Min exposure. But, as mentioned above, the roundedness is tested by the sum of the first three formants; unlike the formant difference for front–back and high–low contrasts, it should be regarded as a preliminary result only. Furthermore, educational level does not seem to be an important factor in vowel quality. However, the interactional effects of age group and educational level in Figure 9 suggest that the oldest age group with the lowest educational level tends to produce a lower, more back /o/, and a more unrounded /y/ than the other age groups. This particular subgroup of interviewees may represent the group of speakers who are the most locally bound. Their /o/ is low and back, and their /y/ is unrounded, compared with the other groups of speakers. This is a further piece of evidence that the Southern Min-accented pronunciation is present not only in the use of phonological variants, but also in vowel qualities.

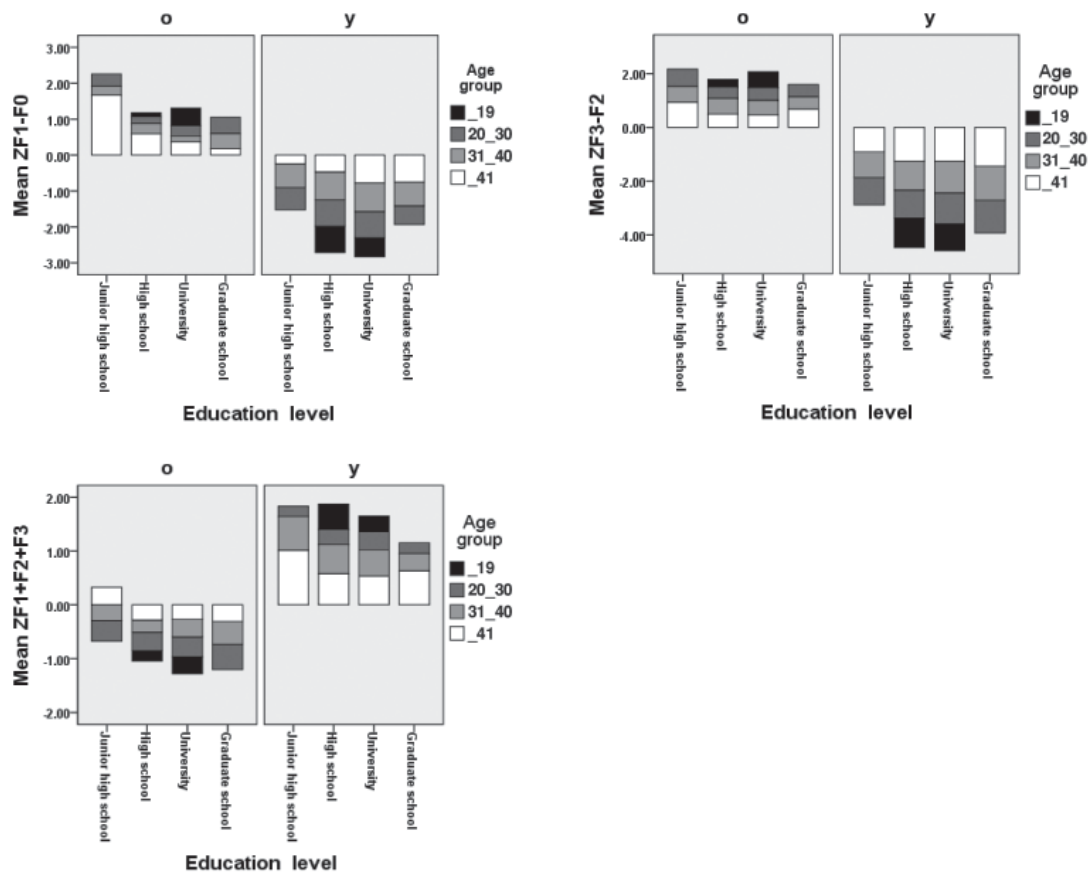


Figure 9: /o/ and /y/ qualities observed by educational level and age group

5. Discussion

5.1 Southern Min is disappearing

Language shift from dialects to Taiwan Mandarin has been noted in previous studies (Chan 1994; Sandel et al. 2006; Young 1989). This article has presented new empirical evidence supporting the same direction of language shift. Our survey consists of 1,159 geographically balanced interviewees. It is by far the most recent study confirming that Southern Min is disappearing not only in urban, but also in rural areas. Like many places around the globe, dialect loss is mostly caused by the promotion of the official language within a country on the one hand, and by globalization, for example international commercial activities and the internet, on the other hand. In the case of Taiwan, it has partly to do with the fact that the use of Southern Min and Hakka is restricted to being used in the spoken form only. The lack of a commonly used writing system leads to reduced recognition of prestige when using the dialects. Language shift is also related to social factors. For instance, educational level and internet use both represent social status and degree of modernization. Our results show that more educated people are in principle less exposed to Southern Min and people who use the internet more often are also less exposed.

Comparing our results with the study conducted in 1987 by Huang (1993), dialects are continuously disappearing in Taiwan. In Huang's survey, 27% of the interviewees spoke only Southern Min to their siblings, whereas it is down to 20% in this current study. Of the interviewees, 2.1% spoke only Hakka to their siblings, while it is now 0.6%. But clearly, more people speak only Taiwan Mandarin to their siblings today: 45% in the current study, compared with 16.8% in the 1987 study. Looking into family-internal use of languages from a different perspective, Southern Min-speaking interviewees tend not to use Southern Min for communicating with their siblings, spouse, and in particular children, although they do use it with their parents. Table 7 lists the number of interviewees who use Southern Min within their family, including those who also use other languages. This means less and less dialect exposure within the family for the younger generation. In response to the present situation of dialect loss, the Taiwan government has regulated the obligatory dialect promotion policy in elementary schools (Ministry of Education 2008). However, despite this effort, it seems unlikely that dialects can be actively revived with disappearing exposure in the private domain. If possible (though unlikely with government funding), we hope to extend the age pattern found in our apparent-time study to longitudinal studies, in which we can explicitly classify the stages of language change in a lifespan (Sankoff & Blondeau 2007).

Table 7: Use of Southern Min within family

	Valid #	# of Southern Min use	%
Parents	1,044	843	80.8
Siblings	1,126	607	53.9
Spouse	326	181	55.5
Children	326	107	32.8

5.2 Phonological variants are socially affected

As expected, we identified a positive correlation between the use of /w_o/ merger and /y/-delabialization and a negative correlation between them and the standard form. The results show that the correlation may also be sensitive to social variables. As regards different generations, older speakers produce more dialect-accented variants than younger speakers, and less often the standard form. As regards gender, male speakers produce /w_o/ merger and /y/-delabialization more often than female speakers. Nonstandard forms are preferred by men. Or to put it in other words, women favor the prestige form (Chambers 2013; Labov 2006). We did not consider social class as a factor in our study. But implicitly, while considering educational level, we found that educated people prefer the standard form. In addition to the phonological variants we investigated, a cluster of other variables, phonological or phonetic, may well be indicative of the process of 'Minification' of Taiwan Mandarin, too. The retroflex consonants may be neutralized, because Southern Min does not have retroflexes. Tones in Mandarin may not be pronounced in an appropriate way, because Southern Min has strict rules for tone unit groups that Mandarin does not have. Further studies of this nature will be carried out using our data.

The geographically defined factor, area of childhood residence, is sensitive to the use of the standard form. In addition to the size of ethnic groups in the particular location, other types of social factors may account for the results. For instance, Yunlin County, which is a county where

most citizens work for agriculture-related business, has the majority of the population speaking Southern Min. The use of the standard form is the least frequent in Yunlin County, followed by Tainan City and Kaohsiung County, which are both located in the South of Taiwan. On the contrary, interviewees with Kaohsiung City as the childhood residence use the standard form the most frequently. Kaohsiung City is also located in southern Taiwan, a neighboring region to Kaohsiung County. But unlike Kaohsiung County, Kaohsiung City is a metropolis with mixed ethnic groups of citizens. That is, we may need to account for types of places, for example city size and degree of industrialization, as differences between rural and urban regions are salient in terms of the degrees of global commercial diversity, social interactions, and modernization. And these factors are related to the use of the official language. To take Hsinchu County and Hsinchu City as examples, interviewees originating from these two highly industrialized places have the two highest rates of the standard form next to Kaohsiung City. Interestingly, they are also the groups with the highest Hakka exposure. Sociologically speaking, the pressure on the Hakka-speaking people to accommodate to the majority may be higher and industrialization may well accelerate this process too (Labov 2001). We need further investigation into the reason why the standard form is preferred in these two cities. A complex, comparative study of the vowel systems in Taiwan Mandarin, Southern Min, and Hakka and the degree of industrialization may be necessary.

5.3 Dialect mixing is progressing in Taiwan, but not yet stabilized

Dialect mixing is progressing according to our results. Surprisingly, very few interviewees with a high degree of Hakka exposure also produce /w_o/ merger and /y/-delabialization, probably because the norm is gradually changing due to influences from Southern Min. As shown in Table 3, Hakka-speaking people use Southern Min too. Nowadays in Taiwan, the stereotypical ‘standard’ pronunciation is less frequently heard in everyday communication compared with the period of Mandarin Language Policy. The prestige associated with the standard pronunciation of Taiwan Mandarin, as formerly very strongly promoted under the Mandarin Language Policy, is decreasing. Furthermore, affective similarities and social approval result in a kind of group convergence for Southern Min speakers as the majority ethnic group in Taiwan (Giles & Smith 1979). Previous studies have proposed that Taiwan Mandarin is the end result of a koinéization process, which mainly underwent the process of dialect leveling, particularly Southern Min (Hsu & Tse 2009; Kuo 2005). However, our data show that Taiwan Mandarin is not, as yet, a koiné or a new dialect (Kerswill 2002; Siegel 1985), since it has not yet led to the end result of dialect leveling, but is more like a variation form affected by the pronunciation of Southern Min. According to our results, variants indicating influences from Southern Min are still much less often used than the standard form, and apparent differences in vocalic quality are only observed in the oldest speakers with the highest Southern Min exposure, apparently not yet a generalized pattern across all speaker groups.

5.4 Conclusion and future work

As the first step in our long-term research plan to study speech production from a social perspective, we have confirmed some previous findings on Taiwan Mandarin. A number of studies are currently in progress. Regarding gender, although we found solid evidence for women preferring

the standard form, gender may also interact with other categories, such as class (salary level, type of profession, educational level), when speakers decide which forms to use (Eckert 1988). Further within-education analysis may provide interesting insights into the impact of education on all strata, for example rural versus urban and across different age groups. In particular, we shall look into the reason why Hakka people produce Southern Min-accented variants—whether this is a general phenomenon or only exceptional—by closely examining the social background data of our interviewees. Finally, we shall examine more Min-like variants to study the associated extent of ‘Minification’ and its social meaning.

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中文口語之社會語音研究： 以台灣所使用的「國語」為例

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本文以 1,159 個訪談資料探討社會變因與「國語」一詞的語音變體與元音聲學特徵之間的關連。社會語言的量化數據支持由閩南語與客語轉向國語的語言轉移，已經造成一定程度的方言流失。性別、年齡層、教育程度、網路使用以及成長地點等社會因素與「國語」的三種語音變體使用相關－標準形式、/w_o/ 合併與 /y/ 去雙唇化。後二者為典型的帶閩南語口音之語音形式。儘管如此，/o/ 與 /y/ 的聲學分析結果顯示，閩南語對於國語元音的影響僅止於閩南語使用最頻繁的族群。也就是說，在台灣使用的中文口語，即便經過與閩南語密切的語言接觸，造成語言的混合，也還未深化為一個穩定的語言變體型態。

關鍵詞：社會語言學，訪談語音資料庫，語音變體，元音聲學特徵