Performing 'husband and wife' relationships among Chinese gay couples: variations in pitch properties and sibilants in Mandarin

Xinyu Liao[*]

1 Introduction

Research in sexuality and sociophonetic variation has extensively paid attention to characterizing gay men's speaking styles by their distinct segmental and suprasegmental features across various languages. At the segmental level, consistent results have been found on English-speaking gay men's fronted sibilant /s/, also termed as 'gay lisping' in the literature (Linville 1998, Munson et al. 2006, Zimman 2013). Longer duration of /s/ among gay men has also been reported in English (e.g., Linville 1998, Smyth, Jacobs, and Rogers 2003) and Mandarin Chinese (Geng and Gu 2022). Regarding vowel production, gay men have been found to speak with larger vowel space (Pierrehumbert et al. 2004) and higher F1 (first formant frequency) in /æ/ and /ɛ/ (Munson et al. 2006). In contrast to the relatively consistent results above, findings on some suprasegmental variables, especially the f0 (fundamental frequency) or the acoustic correlate of pitch, remained controversial across different studies. Most of the previous studies did not find any significant differences in terms of the average f0 between gay and straight men (Gaudio 1994, Linville 1998, Smyth, Jacobs, and Rogers 2003, Munson et al. 2006). Against the stereotype of gay men's higher pitch for indexing femininity, some studies even reported significantly lower average f0 among American English-speaking (Zimman 2013) and, more recently, among Mandarin-speaking gay males (Geng and Gu 2022) in contrast to their heterosexual counterparts. Zimman (2013) also found a larger proportion of creaky voice in gay men's read speech. Inquiries about gay men's speech production and perceptions of the gay-sounding voices have also been extended to many other languages, such as Spanish (Davenport 2018), Italian (Russell 2015), German (Kachel et al. 2018), and more recently Mandarin Chinese (Geng and Gu 2022). Despite the fruitful results gained from the previous experimental investigations of gay men's continuous read speech or pronunciations of isolated words, many of these studies were also on the edge of recreating stereotypes and essentializing certain acoustic correlates as gay men's uniform speech features. Few studies (e.g., Podesva 2007, 2011) investigated the multiplicity of gay speaking styles and the performance of gay identity in situated discursive contexts.

   Different from many of the previous experimental inquiries on a uniform concept of gay men's speech, this article follows the third wave of variationist sociolinguistics (Eckert 2012) to investigate the potential multiplicity of gay speaking styles in Mandarin Chinese. Influenced by post-structuralism theories (Butler 1993), the third wave variation studies attached emphasis on individuals' agentive practice and how speakers construct or perform (as in Butler's theories of performativity) identities by drawing on the social meanings derived from certain linguistic variants or other semiotic resources. In this view, linguistic variables in all aspects of language (e.g., phonology, morpho-syntax, and lexical semantics) do not form one-to-one mapping with certain identities. Instead, one linguistic variable can index multiple social meanings that can then cluster and form an indexical field (Eckert 2008). Speakers can then draw upon one (or even more) social meaning(s) from one variable's indexical field containing multiple meaning potentials. Furthermore, linguistic forms and identities (especially gender identities) are mediated by the stances in specific conversational contexts (Ochs 1992). For instance, the gay man Health in Podesva's study (2007) used the falsetto voice quality (with extremely high f0 and rapid stretching of vocal folds) more frequently when talking with his close friends in a barbecue than with his patients in working situations. This falsetto voice quality can index the stance of expressiveness in the intimate talk and constitute the diva persona. As the stance of expressiveness is deviated from mainstream heterosexual masculinity, this stance might further contribute to the performance of Health's gay identity. Thus, the interpretation of indexicality and social meanings of linguistic forms should also consider the socio-cultural norms within the given community (Bucholtz and Hall 2005).

To explore the diverse gay speaking styles in Mandarin Chinese, this study created a spoken corpus of 20 vlogs on the Chinese video-sharing website Bilibili where 20 pairs of gay couples were performing 'husband and wife' relationships in their vlogs themed around their romantic relationship and daily life. Following the third wave of variationist studies, this article thus aims to explore how gay men with divergent self-positionings (i.e., gay husbands vs gay wives) perform and index their identities with distinct speech styles. The sociophonetic variables examined in the current study are mean f0, f0 range (maximum f0 minus the minimum f0), and two sibilant fricatives /s/ and /ɕ/ (these variables will also be further introduced in the following session). Specifically, this study aims to answer the following research questions:

a. Do gay husbands and gay wives differ in their variable usage of the sociophonetic variables?
b. What are the socio-indexical meanings created by the use of these variables?
c. How do these socio-indexical meanings relate to the performance of different gay personae?

2 The Sociophonetic Variables

2.1 Pitch Properties

The first sociophonetic variable investigated in the current study is the pitch, a suprasegmental property in speech production that is often related to the construction of personae and gender identity (Podesva 2007, Starr 2015, Starr, Wang, and Go 2020). The acoustic correlate of vocal pitch is the fundamental frequency that manifests the vocal fold's vibration speed. Sex-based differentiation in pitch typically occurs during puberty time because of testosterone and laryngeal growth among males (Zimman 2012). Generally, males' larger vocal folds usually result in slower vibration and lower f0.

Apart from the biological underpinnings of the pitch variations, previous studies have also shown the socio-cultural aspect of the pitch properties with evidence from cross-cultural differences in the average pitch among males and females. For instance, compared to those same-sex American English speakers, Japanese-speaking females used significantly higher average f0, while Japanese-speaking males spoke with lower average pitch levels (Yuasa 2008). In Mandarin Chinese, Keating and Kuo (2012) found that the average f0 in reading aloud was around 213 Hz for females and 128 Hz for males. 150 Hz was also set as the threshold for distinguishing between Mandarin-speaking men's and women's average pitch (Chan 1998) from the testing results of a speech analysis program. Other than the cross-cultural differences, pitch variations can also be attributed to speakers' awareness of gender ideologies (Zimman 2012). Ferrand and Bloom (1996) have found that pre-adolescent children in their study produced different patterns of pitch ranges based on their assigned sex, even though boys' and girls' development of vocal folds did not fully diverge. Although the previous experimental inquires discussed above in gay men's speech did not find consistent results on their pitch properties, this study still examined both average pitch and pitch range since gay wives might differ in their pitch properties from their husband counterparts when performing 'husband and wife relationships' in their vlogs.

2.2 Sibilant Fricatives - /s/ and /ɕ/ in Mandarin Chinese

In Mandarin Chinese, there is a three-way categorical system of three voiceless sibilant fricatives, including /s/, /ɕ/ and /ʂ/. Among these three sounds, /s/ is a dental fricative produced in the most anterior position with the tongue tip, while /ʂ/ is a retroflex sound articulated at a more posterior position (Chao 1968). Between /s/ and /ʂ/, /ɕ/ is an alveolo-palatal sound articulated towards the hard palate with the tongue body. This study will particularly focus on /s/ and /ɕ/, two voiceless sibilant fricatives that have been shown to relate to gender identity in Mandarin Chinese (Li 2017).

In the literature of Chinese sociolinguistics, the fronted articulation of /ɕ/ is usually linked with feminine identity. In many observational studies in the 1980s (Cao 1986, 1987), females (of different occupational groups and geographical locations) in Beijing produced more fronted /ɕ/ than males, and female adolescents even articulated it as the dental /s/. This articulatory style (together with the fronted production of /tɕ/ and /tɕʰ/) was also termed 'feminine accent' (nüguoyin) in the literature. Apart from the gender-based variation, the feminine accent is also an age-grading style linked to the

youth culture. In the cited studies above, girls in their adolescence most frequently adopted the feminine accent. Their usage of it gradually decreased after these women's marriage and finally disappeared after the age of 60 (Cao 1987). As a salient gender marker in speech (Li 2017), the fronting levels of /ɕ/ will thus be acoustically analyzed in the article to provide new evidence on the variable usage of /ɕ/ among gay men.

Regarding the social meanings of /s/, previous studies have found a wide range of socio-indexical meanings related to the variable usage of /s/ in Mandarin Chinese. Zhang (2005) has found that, in contrast to the yuppies working in international corporates, staff members working in the state-owned enterprises in Beijing more frequently utilized the interdental variant [θ] of /s/ to index the local 'alley saunterer' (hutong chuanzi) persona. Moreover, the articulation of /s/ has also been shown to relate to gender-based variation in southern contact mandarin varieties. With the promotion and wide spread of the standard Mandarin or Putonghua ('common speech') that is based on the phonology of Beijing Mandarin, there are many local contact Mandarin varieties (the contact between Putonghua and local dialects) in different areas of China. Zhao (2019) showed that male speakers of Ningbo Putonghua (a contact variety between Ningbo wu dialect and Putonghua) merged their articulation of the dental /s/ and the retroflex /ʂ/ more frequently than their female counterparts. Li's experiment (2017) on children's and adults' production of the three voiceless sibilant fricatives (/s/, /ɕ/, /ʂ/) also provided interesting evidence for the potential gendered meaning of /s/. In her acoustic analysis (based on spectral mean and standard deviation) of the sibilant fricatives, girls (aged between 2 and 5) produced more anterior /s/ and /ɕ/ than the same-age boys, while adult females only fronted their articulation of /ɕ/ as compared to other males. Li (2017) explained this age-differentiation by arguing that young girls' /s/-fronting is due to the chain shifts driven by their /ɕ/-fronting. In this sense, girls' fronted articulation of /s/ can help them maximally maintain the phonemic distinction between /s/ and /ɕ/. Although the gendered meaning of /s/ in Madnarin Chinese is still worth further explorations in production and perception experiments, this article selected this variable to compare the results in this study with the 'gay-lisping' that occurred across various languages (Boyd, Fruehwald, and Hall-Lew 2021).

3 Methodology

3.1 Data Collection

As briefly mentioned before, this study randomly selected 25 vlogs titled gay couples' daily life (*fufu de richang shenghuo*) from a video-sharing platform named Bilibili in China. After examining the overall theme and content of these vlogs, this study finally chose 20 of them where there is a distinction of self-positionings (gay husbands vs gay wives) in their intimate relationships. Among these gay couples, one self-referenced as the husband (*laogong*), while another self-positioned as the wife (*laopo*). This distinction of role types in the homosexual romantic relationships is interesting for further exploring how they draw upon certain linguistic variables for performing their divergent gender identities in situated conversational contexts (i.e., vlogs where they share their daily life and dating experience in the current study). It is in these conversational contexts that these gay couples' performance of distinct identity types is most salient in their vlogs.

3.2 Acoustic and Statistical Analysis

The four sociophonetic variables examined in this study include average pitch, pitch range, /s/ and /ɕ/. The variables selected for acoustic analysis of the four variables are presented below in Table 1. Pitch analysis was firstly conducted in Praat. The average f0 and the f0 range were extracted and calculated in each intonational phrase. The criteria for dividing intonational phrases include resetting the pitch levels, pauses, and lengthening of the final syllables (Cruttenden 1986). Since Mandarin Chinese is a tonal language where the changes in pitch levels might mark the transition of lexical tones between two words (Chao 1968), the latter two criteria will be mostly referred to when marking the boundary of intonational phrases.

The acoustic analysis of /s/ and /ɕ/ will mainly employ center of gravity (CoG) and spectral skewness. These two acoustic parameters have been shown to be mostly correlated with the place

of articulation in Mandarin voiceless fricatives (Lee, Yu, and Li 2014). Research in previous studies on gay men's speech production has usually found that the CoG of /s/ produced by gay men is significantly higher than heterosexual males (e.g., Zimman 2013), indicating a higher mean of the focused spectral energy and more fronted articulation of /s/. Moreover, lower or more negative skewness can also relate to more anterior production since lower skewness can suggest that more acoustic energy in the frequencies is higher than the mean (Munson et al. 2006). This correlation between CoG, skewness and /s/ also applies to the articulatory manners of the /ɕ/ sound in Mandarin.

sociophonetic variables	acoustic measurements
pitch	mean f0 in each intonational phrase
pitch range	maximum f0 – minimum f0 in in each intonational phrase
/s/	center of gravity and spectral skewness
/ɕ/	center of gravity and spectral skewness

Table 1: Acoustic measurements of the four sociophonetic variables

After the acoustic analysis, linear mixed-effects regression models in R (Bates et al. 2015) will be performed to investigate the fixed effects of role type (gay husband vs gay wife) and random effects of the individual speaker on the mean f0 and f0 range. For the sibilant variations, the features of the following segments might constrain the fronting of the two sibilant initials (i.e., /s/ and /ɕ/). The roundness of the following vowels will be particularly considered in this study. Lip spreading could intensify the acoustic energy of sibilant productions (Eckert 2019). Moreover, the lip rounding gesture of the following vowel might lead to a backer retroflex /ʂ/ production (Starr 2016). Table 2 and 3 below present the categorization of rounded and unrounded segments following the two sibilant initials (/s/ and /ɕ/ are at the initial positions in Mandarin syllables). The roundness of the following vowels will also be included in the fixed effects of the mixed-effects models to explore both the influence of role type and following vowels on variations of CoG and skewness for /s/ and /ɕ/.

roundness	following segments
round	/u/, /oʊ/
unround	/ɹ/, /ɤ/, /a/, /an/

Table 2: categorization of the following segments for /s/ in the corpus

roundness	following segments
round	/y/, /yɛ/
unround	/i/, /ia/, /in/, /ian/

Table 3: categorization of the following segments for /ɕ/ in the corpus

4 Results

4.1 Variations in Mean Pitch and Pitch Range

Figure 1 and Table 4 below firstly present the observed mean f0 for gay couples with two role types (gay wives and gay husbands) and the results of the linear mixed-effects regression model with role type as the fixed effects and speaker as the random effects. The results, as presented in Figure 1 and Table 4, revealed that the distinct self-positionings do have effects on the use of average pitch by gay couples. Gay husbands' mean f0 was significantly lower than that of gay wives ($t = -2.23$, $p = .032$). Moreover, the average value of gay husbands' mean f0 (125.47 Hz) is quite consistent with

the previous finding by Keating and Kuo (2012) on Mandarin-speaking males' average f0 (128 Hz) in reading aloud. In contrast, the mean of gay wives' averaged f0 was approximately 138.84 Hz, nearly reaching the boundary of 150 Hz for distinguishing Mandarin-speaking males' and females' voices (Chan 1998). As a salient gender marker in the speech, gay wives' adoption of significantly higher pitch suggests their marked choice for performing their feminine wife persona in gay intimate relationships. Moreover, the same setting in R was set for pitch range in the linear mixed effects models (role as fixed effects and speaker as random effects). As seen from Figure 2 and Table 5, gay husbands' f0 range was significantly narrower than that of their wife counterparts (t = -4.29, p <.001). Gay wives' wider pitch range linked to the more dynamic pitch patterning and contributed to more emotional and expressive stances in their conversational contexts. These stances all ideologically link with the stereotypical femininity in the Chinese culture and then legitimate and recontextualize (Bauman and Briggs 1990) the performance of a 'wife' persona in a male body.
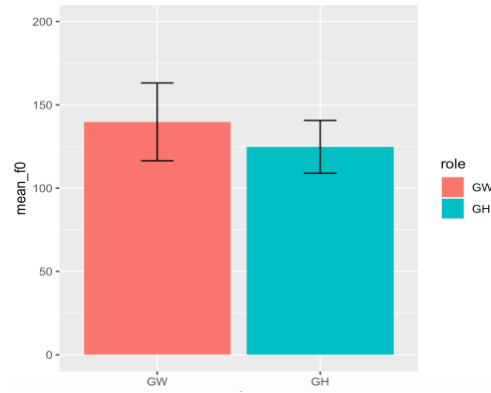

Figure 1: mean f0 (Hz) of gay wives (GW) and gay husbands (GH)

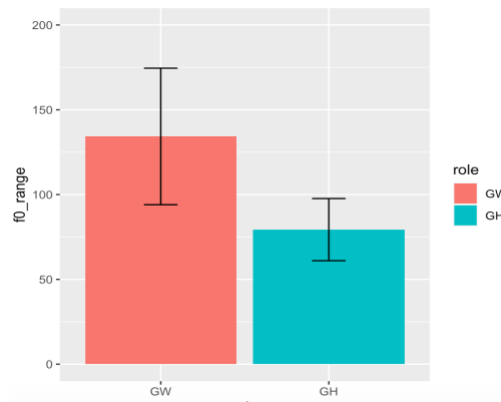|	Estimate	Std. Error	t value	p value
(intercept)	139.13	4.46	31.17	< .001 ***
GH	-14.24	6.39	-2.23	.032 *

Table 4: linear mixed effects regression model results for mean f0

Figure 2: f0 range (Hz) of gay wives (GW) and gay husbands (GH)

	Estimate	Std. Error	t value	p value
(intercept)	128.94	8.07	15.98	< .001 ***
GH	-49.76	11.61	-4.29	< .001 ***

Table 5: linear mixed effects regression model results for f0 range

4.2 Variations in Sibilant Fricatives

Figure 3 and Figure 4 below visualize the observed CoG values and spectral skewness of /s/ between gay wives (GW) and gay husbands (GH) as conditioned by the roundness of the following vowel. Table 6 and 7 also present the results of the linear mixed-effects models with the role type and roundness of the following vowels as fixed effects, and the individual speaker as random effects. It seems clear that, as compared with their wife partners, gay husbands produced /s/ with significantly lower CoG values (t = -3.46, p = .003) and higher skewness (t = 2.27, p = .04). These results all suggest that gay wives' /s/ production was more anterior and less constrained by the roundness of the following vowels. The /s/-fronting found among gay wives in this study provides new evidence on the /s/-fronting and construction of gay identity that has been discovered in gay men's production and perception of gay-sounding voices among speakers of many western languages (Boyd, Fruehwald, and Hall-Lew 2021). This finding on /s/-fronting and performance of delicate and cute 'wife' persona among gay men also relates to Calder's discussion (2019) on the drag queens' fronted /s/ for performing 'sissy' persona and deviant masculinity.

Similar to the findings on the gay wives' fronted articulation of /s/, this study also found that gay wives also produced more fronted /ɕ/ as compared to their husband counterparts. As seen from Figures 5 and 6 and Tables 8 and 9 below, gay husbands' /ɕ/ was also articulated with lower CoG values (t = -2.21, p = .03). Although the effects of role on the skewness of /ɕ/ was not significant, the roundness of the following vowel constrained the variations of /ɕ/. When being followed by unround vowels (e.g., /i/), /ɕ/ was articulated in a more anterior position as the skewness was significantly more negative. Fronted /ɕ/ production, as a well-noted linguistic marker ideologically linked with girls' gender performance in Mandarin (e.g., Cao 1986), also semiotically builds up the more feminine 'wife' persona among gay wives.
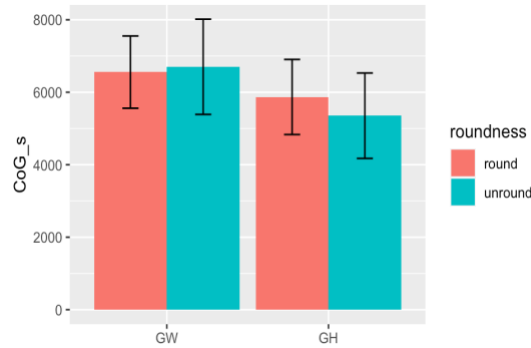

Figure 3: CoG (Hz) of /s/ between gay wives (GW) and gay husbands (GH)

	Estimate	Std. Error	t value	p value
(intercept)	6729.89	275.79	24.4	< .001 ***
GH	-1100.34	318.5	-3.46	.003 **
unround vowel	-129.92	313.64	-0.41	.68

Table 6: linear mixed effects regression model results for CoG of /s/

	Estimate	Std. Error	t value	p value
(intercept)	-0.5	0.14	-3.68	.001 ***
GH	0.35	0.16	2.27	.04 *
unround vowel	-0.19	0.15	-1.2	.23

Table 7: linear mixed effects regression model results for spectral skewness of /s/
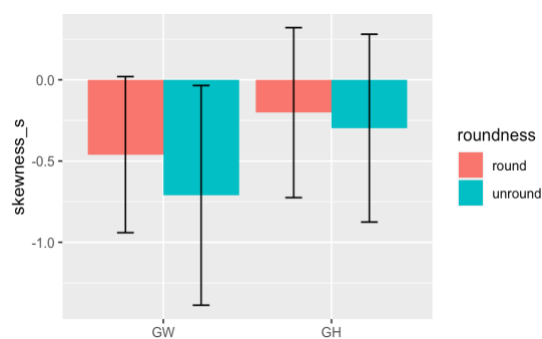

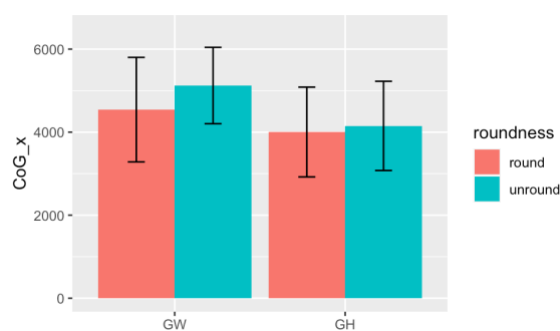Figure 4: skewness of /s/ between gay wives (GW) and gay husbands (GH)

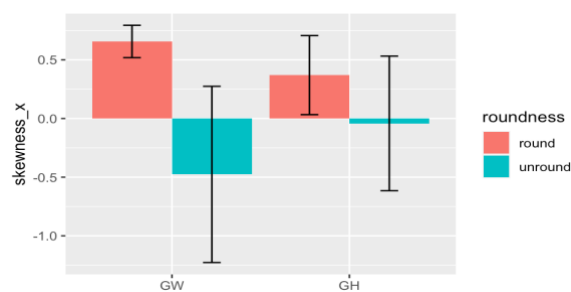Figure 5: CoG of /ɕ/ between gay wives (GW) and gay husbands (GH)

Figure 6: skewness of /ɕ/ between gay wives (GW) and gay husbands (GH)

	Estimate	Std. Error	t value	p value
(intercept)	4788.38	0.14	14.25	<.001 ***
GH	-604.35	0.16	-2.21	.03 *
unround vowel	183.21	0.15	0.64	.52

Table 8: linear mixed effects regression model results for CoG of /ɕ/

	Estimate	Std. Error	t value	p value
(intercept)	0.22	0.21	1.05	.29
GH	0.26	0.18	1.5	.14
unround vowel	-0.54	0.17	-3.14	.002 **

Table 9: linear mixed effects regression model results for spectral skewness of /ɕ/

5 Discussion

As outlined in Butler's theory of gender and performativity (1990), gender is not a biological state, but rather, it is constituted by a series of performative acts that build up on repetitively re-occurring signs associated with the social structure and values in a given community. The sociophonetic variables investigated in this study, as linguistic signs, also acquire their social meanings (especially the gendered meanings) through multiple orders of indexicality (Silverstein 2003) that mediate the macro-social categories (e.g., sex, social class, and ethnicity) and micro-social identity types emergent in the conversational dynamics. In Silverstein's model (2003), linguistic signs derive their social meanings firstly through the n-th indexical order, where particular linguistic variants are associated with certain large-scale demographic groups. At the n-th indexical order, three sociophonetic variables, including average pitch, pitch range, and /ɕ/, have been observed, in general trends, to be associated with a binary opposition between Mandarin-speaking males and females. Males tend to produce lower average pitch, narrower pitch range, and backer /ɕ/. In contrast, females generally produce a higher average pitch, broader pitch range, and fronter /ɕ/ (Chan 1998, Li 2017). Although the biologically governed body differences (especially the height) might constrain the differentiation of average pitch, variations in pitch range and /ɕ/ in Mandarin Chinese are more influenced by gender ideologies of different speech styles. Therefore, this contrast between the three phonetic variables is then semiotically and discursively associated with the hegemonic or stereotypical masculinity and femininity in social recognition.

Beyond the n-th indexical order, Silverstein argues that new socio-indexical meanings can be constructed in moment-to-moment conversations. For instance, Zhang (2005) found that Chinese yuppies working in international business fully realized the neutral tones in the unstressed syllables in Mandarin, which is originated from overseas Mandarin varieties (e.g., Taiwan Mandarin), to perform cosmopolitan and transnational 'yuppie' identity. The ideological link between full tonal realization and the transnational identity (n+1st indexical order) is built upon full tones' connection with the non-Mainland geographic regions (n-th indexical order). In this study, Chinese gay couples also reappropriated the sex-based speech differences in average pitch, pitch range and /ɕ/ articulation (n-th indexical order) to create a new binary ideological contrast – the husband role type and wife role type in gay romantic relationships (n+1st indexical order). Moreover, another social meaning indexed by the variations of pitch properties also relates to the expressive affect and the stance of childish petulance as gay wives' higher pitch and more dynamic pitch patterns in conversations also served pragmatic functions of performing emotive speech acts (e.g., complaining and paying compliments) and doing 'sajiao' (whiny) style (Liao 2022). This process of identity performance between gay husbands and gay wives is also built upon the 'distinctiveness' (Bucholtz and Hall, 2005), where the similarities between them (i.e., they are all gay men) are ideologically erased, but the distinction between the role types (gay husbands vs gay wives) is highlighted.

The somehow innovative /s/-fronting found among gay wives in this study might relate to gendered performance of the feminine wife persona via phonetic iconicity or sound symbolism (Eckert, 2019). Since the gender-based variation on /s/ articulation in Mandarin was only found among young girls but not adult females by Li (2017), and the influence of sexual orientation on /s/ production in Mandarin was also not found by Geng and Gu (2022), it remains uncertain here whether gay wives front their /s/ production in order to reappropriate the stereotypical femininity derived from females' speech features (as in the case of the other three sociophonetic variables in this study). Moreover, Silverstein's orders of indexicality (2003) might not be able to explain the socio-indexical meanings here, as no solid large-scale trends have been identified between /s/-fronting and the macro-social demographic groups in China. As Eckert has summarized (2019), there is an iconic sound-size relationship between acoustic frequency and body size. Originated from the frequency code by Ohala (1994), high acoustic frequency (such as higher pitch) usually correlates with smaller body size. Thus, the fronter /s/ production among gay wives with significantly higher CoG (i.e., the mean area of the focused acoustic energy is placed at higher levels) can also have an iconic association with the percepts of the fierceness and smaller body size. These iconic percepts can then relate to the elegance and delicacy as valued in traditional femininity of Chinese culture (Yang 2011). Thus, gay wives' fronted /s/ might index the delicate aspects of their wife persona through the stances of

refinedness derived from the iconic relationship between /s/-fronting and the percept of fierceness and smallness.

In sum, this study sets out to explore how Chinese gay couples highlighted their distinction of gendered performance via variations in four sociophonetic variables that have been shown to link with gender and sexuality across Mandarin and other languages. Mean pitch, pitch range, and /ɕ/-realization, as variables that have been observed to link with gender variations in Mandarin, provide semiotic resources for gay couples to create new social meanings on role type distinction between 'husband' and 'wife' in their homosexual intimate relationship. Furthermore, the somehow new /s/-fronting in Mandarin Chinese by gay wives adds new evidence on the semiotic potentials in the indexical field of /s/-fronting and performance of male sexuality found among many previous studies across different languages (e.g., Podesva and Janneke 2016, Calder 2019, Boyd, Fruehwald, and Hall-Lew 2021). This study attempts to explain gay wives' /s/-fronting by its potential phonetic iconicity of refinedness that can construct the delicate aspects of the gay wife persona. However, since /s/-fronting was only found by Li (2017) among Mandarin-speaking girls and was, as she explained, mainly due to the motivation of maintaining phonemic contrast with fronted /ɕ/, more studies on the perception of /s/-fronting and gendered meanings in Mandarin Chinese could be conducted in the future to better understand the results in this study. Furthermore, more studies on other under-studied languages or varieties could also explore how variations in /s/ production can serve as the semiotic resource for gender performance.

References

Bauman, Richard and Charles Briggs L. 1990. Poetics and Performance as Critical Perspectives on Language and Social Life. *Annual Review of Anthropology* 19: 59–88.

Bates, Douglas, Martin Mächler, Ben Bolker, and Steve Walker. 2015. Fitting linear mixed-effects models using lme4. *Journal of Statistical Software* 67:1–48.

Boyd, Zac, Fruehwald Josef, and Hall-Lew Laurence. 2021. Crosslinguistic perceptions of /s/ among English, French, and German listeners. *Language Variation and Change* 33:165–191.

Butcholtz, Mary, and Hall Kira. 2004. Theorizing identity in language and sexuality research. *Language in Society* 33: 469-515.

Butler, Judith. 1990. *Gender Trouble.* New York: Routledge.

Butler, Judith. 1993. *Bodies That Matter: On the Discursive Limits of Sex*. New York: Routledge.

Calder, Jeremy. 2019. From Sissy to Sickening: The Indexical Landscape of /s/ in SoMa, San Francisco. *Journal of Linguistic Anthropology* 29(3): 332 – 358.

Cao, Yun. 1986. 北京话语音里的性别差异 [Gender difference in the phonetics of Beijing Mandarin]. *汉语学习 [Chinese Studies]* 6: 31–31.

Cao, Yun. 1987. 北京话 tɕ 组声母的前化现象 [The fronting phenomenon of the /tɕ/ class sounds in Beijing Mandarin]. *语言教学与研究 [Language teaching and research]* 3: 84–91.

Chan, Marjorie K. M. 1998. Gender differences in the Chinese language: A preliminary report. In *Proceedings of the 9th North American Conference on Chinese Linguistics (NACCL)*, ed. H. Lin, 35-52.

Chao, Yuen Ren. 1965. *A Grammar of Spoken Chinese.* Berkeley, CA: Univ of California Press.

Cruttenden, Alan. 1986. *Intonation.* Cambridge: Cambridge University Press.

Davenport, Ellis. 2018. A sociophonetic analysis of gay male speech stereotypes in Buenos Aires, Argentina. *The Journal of Acoustical Society of America* 143(3): 1970.

Eckert, Penelope. 2008. Variation and the indexical field. *Journal of Sociolinguistics* 12(4): 453-476.

Eckert, Penelope. 2012. Three waves of variation study: The emergence of meaning in the study of sociolinguistic variation. *Annual review of Anthropology* 41: 87-100.

Eckert, Penelope. 2019. The limits of meaning: social indexicality, variation, and cline of interiority. *Language* 95(4): 751–776.

Ferrand, Carole T., and Bloom Ronald L. 1996. Gender differences in children's intonational patterns. *Journal of Voice* 10: 284-291.

Gaudio, Rudolf P. 1994. Sounding gay: Pitch properties in the speech of gay and straight men. *American Speech* 69(1): 30–57.

Geng, Puyang, and Gu Wentao. 2022. Acoustic and Perceptual Characteristics of Mandarin Speech in Gay and Heterosexual Males. *Language and Speech* 00:1-14.

Kachel, Sven, Simpson Adrian P., and Steffens Melanie C. 2018. "Do I Sound Straight?" Acoustic correlates of actual and perceived sexual orientation and masculinity/femininity in men's speech. *Journal of Speech, Language, and Hearing Research* 61: 1560–1578.

Keating, Patricia, and Kuo Grace. 2012. Comparison of speaking fundamental frequency in English and Mandarin. *The Journal of Acoustical Society of America* 132: 1050-1060.

Lee, Yang-Lee, Yu Zhang, and Li Ximing. 2014. Acoustic Characteristics of Voiceless Fricatives in Mandarin Chinese. *Journal of Chinese Linguistics* 42(1): 150-171.

Li, Fangfang. 2017. The development of gender-specific patterns in the production of voiceless sibilant fricatives in Mandarin Chinese. *Linguistics* 55(5): 1021-1044.

Liao, Xinyu. 2022. A sociophonetic investigation of Chinese gay couples' variability of pitch properties in vlogs. *International Journal of Languages, Literature and Linguistics* 8: 79-83.

Linville, Sue Ellen. 1998. Acoustic Correlates of Perceived versus Actual Sexual Orientation in Men's Speech. *Folia Phoniatrica et Logopaedica* 50:35–48.

Munson, Benjamin, McDonald Elizabeth C., DeBoe Nancy L., and White Aubrey R. 2006. The acoustic and perceptual bases of judgments of women and men's sexual orientation from read speech. *Journal of Phonetics* 34:202-240.

Munson, Benjamin. 2007.The acoustic correlates of perceived masculinity, perceived femininity, and perceived sexual orientation. *Language and Speech* 50(1):125-142.

Ochs, Elinor. 1992. Indexing Gender. In *Rethinking context: Language as an Interactive Phenomenon*, ed. A. Duranti and C. Goodwin, 335–358. Cambridge, UK: Cambridge University Press.

Ohala, John J. 1994. The frequency code underlies the sound-symbolic use of voice pitch. In *Sound Symbolism*, ed. L. Hinton, J. Nichols, and J. J. Ohala, 325-347. Cambridge, UK: Cambridge University Press.

Pierrehumbert, Janet B., Bent Tessa, Munson Benjamin, Bradlow Ann R., and Bailey Michael J. 2004. The influence of sexual orientation on vowel production. *The Journal of Acoustical Society of America* 116(4): 1905 – 1908.

Podesva, Robert J. 2007. Phonation type as a stylistic variable: The use of falsetto in constructing a persona. *Journal of Sociolinguistics* 11(4): 478-504.

Podesva, Robert J. 2011. The California vowel shift and gay identity. *American Speech 86*(1): 32 – 51.

Podesva, Robert J., and Janneke Van Hofwegen. 2016. /s/exuality in Smalltown California: Gender Normativity and the Acoustic Realization of /s/. In *Language, Sexuality, and Power*, ed. E. Levon and R. B. Mendes, 168–188. Oxford: Oxford University Press.

Russell, Eric Louis. 2015. Sounding gay and sounding straight: The performance of male sexual identity in Italian. *Journal of Language and Sexuality 4*(1): 30–76.

Silverstein, Michael. 2003. Indexical Order and the Dialectics of Sociolinguistic Life. *Language & Communication* 23: 193–229.

Smyth, Ron, Jacobs Greg, and Rogers Henry. 2003. Male voices and perceived sexual orientation: An experimental and theoretical approach. *Language in Society* 32:329-350.

Starr, Rebecca Lurie. 2015. Sweet voice: The role of voice quality in a Japanese feminine style. *Language in Society* 44:1-34.

Starr, Rebecca Lurie. 2016. *Sociolinguistic Variation and Acquisition in Two-Way Language Immersion: Negotiating the Standard.* Bristol, Blue Ridge Summit*:* Multilingual Matters.

Starr, Rebecca Lurie, Wang Tianxiao, and Go Christian. 2020. Sexuality vs. sensuality: The multimodal construction of affective stance in Chinese ASMR performances. *Journal of Sociolinguistics* 24: 492-513.

Yang, Jie. 2011. Nennu and Shunu: Gender, Body Politics, and the Beauty Economy in China. *Signs* 36(2):333-357.

Yuasa, Ikuko Patricia. 2008. *Culture and gender of voice pitch: A sociophonetic comparison of the Japanese and Americans.* London: Equinox.

Zhang, Qing. 2005. A Chinese yuppie in Beijing: Phonological variation and the construction of a new professional identity. *Language in Society* 34: 431–466.

Zhao, Hui. 2019. Variation in the Production and Perception of Regional Putonghua in Ningbo, China. Poster presented at UKLVC 12, Queen Mary University of London.

Zimman, Lal. 2012. Voices in Transition: Testosterone, Transmasculinity, and the Gendered Voice among Female-to-Male Transgender People. Doctoral dissertation, University of Colorado, Boulder.

Zimman, Lal. 2013. Hegemonic masculinity and the variability of gay-sounding speech: The perceived sexuality of transgender men. *Journal of Language and Sexuality* 2(1):1-39.

Faculty of Linguistics, Philology and Phonetics
University of Oxford
Walton St, Oxford OX1 2HG
xinyu.liao@ling-phil.ox.ac.uk