

Hardening Phenomenon in the Xiāng Dialects

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Abstract

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The focus of this study is on the hardening phenomenon found in the Xiāng dialects of the Chinese language family. According to Coblin (2011: 47), hardening is the phenomenon referring here to a previous dental, retroflex, or palatal affricate becoming a dental or retroflex stop in the Xiāng dialects. Some Xiāng dialects also exhibit velarization, which is the change of a previous retroflex, or palatal affricate becoming velar stops. In the Xiāng dialects, these two changes involve the characters whose initials belong to the Middle Chinese 知 *zhī* division III and 章 *zhāng* initials.

In this work, I first go through a survey of the modern readings of the related Middle Chinese initial categories, i.e. the 知 *zhī*, 莊 *zhuāng*, and 章 *zhāng* initials, in the seven major dialect groups of Chinese. Next, a short review is done on similar changes in other language families. These similar changes are variously called strengthening, fortition, and the like. Bybee and Easterday's 2019 article also provides a survey on similar sound changes in a selected 80 languages around the world. Then I go through the characters collected from Coblin's 2011 work to further analyze the hardening and velarization phenomena in the Xiāng dialects.

Through my study, I basically confirm the same condition of a previous high front vowel as Coblin (2011), except before Middle Chinese 止攝 *zhǐ shè* rhymes. The only Central Xiāng dialect that does not align with this pattern is Huìtóng-a, which Coblin also discusses. Furthermore, I find that the condition for velarization in Liányuán all occur in 重紐 *chóngniǔ* rhymes, in addition to being in 合口 *hékǒu* rhymes as many scholars have pointed out. Also in Liányuán, there is a process of previous dental, retroflex, or palatal fricatives changing to velar fricatives. This velarization in the fricatives also has the same condition, making it a parallel to the velarization of affricates. Some of the other Central Xiāng dialects do not have velarization of stops but do have velarization of fricatives. In looking at velarization and the 船 *chuán*, 禪 *shàn*, and 書 *shū* initial characters, I found a split in the initials combined with CCX final *-i final to be conditioned by MC *rù* tone. In addition, there are five 船 *chuán* and 禪 *shàn* initial characters that are almost always read as stops in the Xiāng hardening dialects. Observations and comparisons are made on the five characters with readings of other 船 *chuán* and 禪 *shàn* initial characters. Lastly, I go through a case study on 慈利 Cíli, a dialect located in 湖南 Húnán Province but is not classified as a Xiāng dialect.

I confirm the two points mentioned by Coblin (2011) with my own arguments: (1) Type I and Type II hardening are both innovations, and (2) velarization in Liányuán is also an innovation. Furthermore, I propose the following findings: (1) Type I and Type II hardening may actually be two processes rather than one, (2) the condition for velarization in Liányuán is MC *chóngniǔ* rhymes, (3) for the 船 *chuán*, 禪 *shàn*, and 書 *shū* initial split when combined with CCX *-i final, the condition is MC *rù* tone. Many questions still remain and new questions may arise, but it is hoped that the analyses and findings of this study would help shed light on the hard problem of hardening.

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LIST OF ABBREVIATIONS

Abbreviations are used in this study for the convenience of discussion. The abbreviations used are listed below. For the abbreviations of the Xiāng dialect names, see Chapter 2.

CCX	Common Central Xiāng (reconstructed by Coblin (2011))
CNR	<i>Chóngniǔ</i> 重紐 rhyme
Div	Division 等 <i>děng</i>
Fri.	Fricative
MC	Middle Chinese
OC	Old Chinese
QYS	Qiēyùn 切韻 system
+Asp	Aspirated consonant
-Asp	Unaspirated consonant
+Voi	Voiced consonant
-Voi	Voiceless consonant

COLOR CODES FOR TABLES

Example	Color code	Representations	Related phenomena
t	Red and bolded	MC or previous affricate initials (including 知 <i>zhī</i> , 莊 <i>zhuāng</i> , 章 <i>zhāng</i> , and 精 <i>jīng</i> initial groups, and 見 <i>jiàn</i> initials that turn to affricates first) that are read as modern dental stops	Hardening, pull chain
h	Purple and bolded	MC dental stops (端 <i>duān</i> initials) that are read as modern glottal fricative	Hardening, pull chain
f	Green and bolded	MC or previous affricate or fricative initials (including 知 <i>zhī</i> , 莊 <i>zhuāng</i> , and 章 <i>zhāng</i> initial groups, and 見 <i>jiàn</i> initials that turn to affricates first) that are read as modern labiodental affricates or fricatives	Labiodentalization
k	Blue and bolded	MC coronal affricates or fricatives (including 知 <i>zhī</i> , 莊 <i>zhuāng</i> , 章 <i>zhāng</i> initial groups) that are read as modern velar stops or fricatives	Velarization
l	Orange and bolded	MC 船 <i>chuán</i> and 禪 <i>shàn</i> initial characters that are read as l- initials	

CHAPTER 1. INTRODUCTION

Coblin's 2011 work focuses on the central Xiāng dialects that he grouped together based on the shared innovation 陽入 *yáng rù* > 陰去 *yīn qù*. In going through the pronunciations in these dialects, one phenomenon jumps out instantly to anyone who speaks Mandarin: many of the characters that are read as retroflex affricates tʂ- and tʂ^h- in Standard Mandarin are commonly read as dental stops t- and t^h- in the central Xiāng dialects, or even retroflex stops ʈ- and ʈ^h- in some. For example, 中 *zhōng* is pronounced as [tʌŋ^{陰平}] in Xiāngxiāng, [tʌŋ^{陰平}] in Shuāngfēng, and [tʌŋ^{陰平}] in Liányuán; 車 *chē* is [t'o^{陰平}] in Shuāngfēng, [t'o^{陰平}] in Lóudǐ Jiāolóngcūn, [t'ə^{陰平文} ~ t'a^{陰平白}] in Ānhuà, and [t'e^{陰平文} ~ t'a^{陰平白}] in Huìtóng Línchéng.

A correspondence of Mandarin retroflex affricates tʂ- and tʂ^h- to dental stops t- and t^h- (and d- if the dialect has not gone through devoicing) is not unheard of for speakers of other Chinese dialects. The Mǐn dialect group, for one, is known for an abundance of these correspondences. For instance, 桌 *zhuō* is [tʂʅ] in Xiàmén and [tʂʅ] in Fúzhōu; 竹 *zhú* is [tik] in Xiàmén, [tøyʔ] in Fúzhōu, and [tœʔ] in Pútián (Chang & Wan 2002) (tones omitted in the original source). It has also been reported that characters read as dental affricates ts- and ts^h- in Mandarin could be read as dental stops t- and t^h- in many places. For example, 左 *zuǒ* is pronounced [tua⁵⁵] in Táishān, a Yuè dialect, and 猜 *cāi* is [t^hai^{陰平}] in Nánchéng, a Gàn dialect. The table below gives some examples of these characters in Mandarin, Mǐn, Yuè, Gàn, and Xiāng, and also Middle Chinese as a comparison.

Table 1. Pronunciation comparison of Mandarin retroflex affricate characters to other dialects. Běijīng data from Qian et al. (2010), Xiàmén data from Tan (1996), Sūzhōu data from Ye (1993), Cantonese (廣州 Guǎngzhōu) data from Bai (1998), Méixiàn data from Chang & Wan (2002), Línchuān data from Luo (1940), Xiāngxiāng data from Coblin (2011). Tone markings follow the original source. The initials that show *dú rú duān zǔ* phenomenon are marked red and bolded in the tables hereafter.

Dialect	Group	知 <i>zhī</i>	豬 <i>zhū</i>	茶 <i>chá</i>	床 <i>chuáng</i>	車 <i>chē</i>	竹 <i>zhú</i>
MC		止開三平支知	遇開三平魚知	假開二平麻澄	宕開三平陽崇	假開三平麻昌	通開三入屋知
QYS		tʃe ^平	tʃwo ^平	ɕa ^平	dʒʒaŋ ^平	tʃhja ^平	tʃuk ^入
Běijīng	Mandarin	tʃʅ ^{陰平}	tʃʅ ^{陰平}	tʃʰa ^{陽平}	tʃʰuaŋ ^{陽平}	tʃʰɿ ^{陰平}	tʃʅ ^{陽平}
Xiàmén	Mǐn	tʃa ^{陰平}	tʃ ^{陰平}	tʃ ^{陽平}	tsʰŋ ^{陽平}	tsʰia ^{陰平}	tʃ ^{陰入}
Sūzhōu	Wú	tsɿ ^{陰平}	tsɿ ^{陰平}	zo ^{陽平}	zã ^{陽平}	tsʰo ^{陰平}	tsoʔ ^{陰入}
Méixiàn	Hakka	tsɿ ¹ , tʃ ¹	tsu ¹	tsʰa ²	tsʰəŋ ¹	tsʰa ¹	tsuk ⁷
Cantonese	Yuè	tsi ⁵³	tsy ⁵³	tsʰa ²¹	tsʰəŋ ²¹	tsʰɛ ⁵⁵	tsok ⁵⁵
Línchuān	Gàn	tʃ ^{陰平}	tʃ ^{陰平}	tsʰa ^{陰平}	tsʰəŋ ^{陽平}	tʃ ^{陰平}	tu ^{陰入}
Xiāngxiāng	Xiāng	tʃʅ ^{陰平}	ty ^{陰平}	--	--	tʃʰ ^{陰平文} ~ tʃ ^{陰平白}	tʃei ^{次陽平}

The Mǐn phenomenon has been confirmed by most scholars to be a retention from Old Chinese (Ting 1982, Chang & Wan 2002, Simons 2015, Tsai 2020). As for the dental affricates ts- and ts^h- versus dental stops t- t^h- correspondence between Mandarin and some other dialects such as Táishān and Nánchéng, it has been shown to be part of a pull chain starting with dental stops changing to h- or zero initial. The one phenomenon that remains without a clear explanation is the retroflex affricates versus dental or retroflex stops correspondence between Mandarin and the Xiāng dialects. This phenomenon is sometimes called the 讀如端組 *dú rú duān zǔ* phenomenon in Chinese, and is also found in the Gàn dialect group. Scholars have debated over if this phenomenon is a retention or an innovation. Coblin considers it to be an innovation, and calls the phenomenon “hardening”.

Bybee and Easterday’s (2019) survey on strengthening and weakening changes in languages show that strengthening phenomena are found much fewer than weakening in the world’s languages. To be exact, of the 81 languages that Bybee and Easterday surveyed, not a single one show a change

such as that found in the Xiāng dialects, which is affricates changing to stops. This presents the Xiāng dialects at a very interesting status: if such change is so uncommon in the world's languages, why is it found over and over again in the Xiāng as well as Gàn dialects? In other words, since hardening is found to be so rare a phenomenon cross linguistically, it is very unlikely that it happened multiple times independently, but much more likely is the case that it is a shared innovation. If hardening were indeed a shared innovation, it could serve as a valuable diagnostic in dialect classification. Although dialect classification is not one of the main points in this study, it is also a very important reason why hardening needs to be studied more.

As we will see in section 1.2, the phenomena in the Gàn dialects are much more complicated than in Xiāng. I concentrate on Xiāng first in the hope that a better understanding on the phenomena in the Xiāng dialects will provide a more solid basis for analyzing the situation in Gàn. In this study I follow Coblin's definition of hardening: "the change of a coronal affricate to a stop", and in the context of the Xiāng dialects, "the term refers to the change of earlier 'shibilants', i.e. retroflex and secondary palatal affricates (from earlier velars), to stops" (2011: 47).

The primary focus of this study is to examine the hardening phenomenon found in the Xiāng dialects. I address the following issues in this study:

- (1) The patterns of hardening in the Central Xiāng dialects, dividing them into Type I and Type II hardening based on Coblin's (2011) discussion.
- (2) Patterns of velarization of stops and fricatives in Liányuán and velarization of fricatives in the other Central Xiāng dialects.
- (3) 船 *chuán* and 禪 *shàn* initial character readings, especially on the five characters that are regularly read as stops in almost all the Central Xiāng dialects that show hardening.

- (4) A comparison of the dialect Cílì, which is located in Húnán Province but not classified as a Xiāng dialect by later scholars.

This study is divided into four chapters. Chapter 1.1 introduces the Middle and Old Chinese reconstruction systems that I use in my study. Chapter 1.2 is a survey through the major dialect groups of Chinese, focusing on if the dialect group shows the hardening phenomenon or other similar sound changes, and if not, what are the modern turnouts. Chapter 1.3 goes through the hardening phenomenon in the Xiāng dialects, and the previous studies on it. Chapter 1.4 looks at similar strengthening phenomena in other language families, follows Bybee and Easterday's (2019) survey on analyzing different strengthening and weakening processes in 81 languages, and their proposal in explaining the cause of strengthening. In Chapter 2, a basic geographical and phonological overview is given on the seven Xiāng dialects that are studied here. Chapter 3 starts my own analysis of the phenomenon, which is further divided into five parts: 3.1 discusses the ones that I call Type I hardening, which are characters from Middle Chinese dental affricates, or the 知 *zhī* group division III and 章 *zhāng* group in traditional Chinese philology terms. 3.2 talks about Type II hardening, which are characters from earlier palatal affricates that can be essentially traced back to Middle Chinese velar stops. 3.3 considers another related phenomenon velarization, which is that the characters that show hardening in other Xiāng dialects are sometimes read with velars, mainly in Liányuán. 3.4 revisits five 船 *chuán* and 禪 *shàn* initial characters that are always read as dental or retroflex stops in all these hardening dialects, despite that the most common turnout for 船 *chuán* and 禪 *shàn* initial characters seem to be fricatives. 3.5 explores a dialect Cílì. This dialect is located in Húnán Province, where the Xiāng dialects mainly located, but is not included in Coblin's discussion on the Central Xiāng dialects due to its still in debate classification. This dialect shows hardening, and interestingly also has dentalabialization, i.e. readings of pf- or

pf^h- in the hardening characters. The only other place that show dentalabialization are some Mandarin dialects located in Gānsù Province. Chapter 4 gives a summary and discussion on the issues analyzed in Chapter 3 and my conclusion on this study.

1.1 MIDDLE CHINESE AND OLD CHINESE RECONSTRUCTIONS

1.1.1 Middle Chinese

The 切韻 *Qièyùn* system (QYS) initial categories with Middle Chinese values as reconstructed by Li, Fang-Kuei (1971) are given in Table 1. The terms 唇音 *chúnyīn* ‘lip sounds; labials’, 舌音 *shéyīn* ‘tongue sounds; dentals or alveolars’, 齒音 *chǐyīn* ‘front teeth sounds; alveolars and/or palatals’, 牙音 *yáyīn* ‘molar teeth sounds; velars’, and 喉音 *hóuyīn* ‘throat sounds; gutturals’ are traditional rhyme table terms for the place of articulation of the sounds.

照 *zhào* group is the rhyme table name for the five initials: 照 *zhào*, 穿 *chuān*, 床 *chuáng*, 審 *shěn*, and 禪 *shàn*. The 照 *zhào* group characters are put on the second and third rows of the rhyme tables, and are conveniently called 照 *zhào* group division II and 照 *zhào* group division III (see later section for 等 *děng* ‘division’). For the purpose of this thesis, however, I will not go into so much detail on the differences between 照 *zhào* group versus 莊 *zhuāng* group and 章 *zhāng* group, but will use 照 *zhào* group division II and 莊 *zhuāng* group or 照 *zhào* group division III and 章 *zhāng* group as interchangeable terms in the following discussions. In the 章 *zhāng* group, 船 *chuán* initial is reconstructed as an affricate [dʒ] and 禪 *shàn* a fricative [ʒ] in Karlgren’s and Li’s system, as can be seen from the chart above. They are, however, reconstructed as fricative and affricate respectively in Pulleyblank’s and Baxter’s systems (Baxter 2014: 15, Pulleyblank 1991).

For the Middle Chinese reconstruction, I use Li's system unless otherwise specified, as it is one of the most widely used reconstruction systems. The Middle Chinese initial categories involved in the hardening and other similar phenomena are mainly 知 *zhī* group (retroflex stops), 精 *jīng* group (dental affricates), and 照 *zhào* group (post-alveolar affricates). The Chinese term used for describing the related phenomena is “讀如端組 *dú rú duān zǔ*”, meaning that the modern reading of certain characters of Middle Chinese non-端 *duān* group initials in a dialect is the same as the modern reading of the Middle Chinese 端組 *duān* group initials, which are mostly dental stops. Note, however, that this is only a descriptive statement, and does not imply any direction or source of the situation. Also, this change sometimes involves results of the initial reading as velar stops in some dialects. The term “hardening” that I use, however, I follow Coblin's definition: “the change of a coronal affricate to a stop”, and in the case of the Xiāng dialects, “the term refers to the change of earlier ‘shibilants’, i.e. retroflex and secondary palatal affricates (from earlier velars), to stops” (2011:47).

In the cases of Middle Chinese, a series of hexagram is supplied for each character when necessary. The hexagrams are called 中古音地位 *zhōnggǔyīn dìwèi* ‘Middle Chinese status’ in Chinese, and are a series of six-character strings denoting the sound property of the character by its traditional rhyme book and rhyme table classifications. For example 展 *zhǎn* ‘to extend’ is 山開三上獮知, 山 *shān* stands for 山攝 *shān shè*, 開 *kāi* stands for 開口 *kāikǒu* ‘open mouthed’, 三 *sān* for *sān dǐng* division III, 上 for *shǎng* tone, 獮 *xiǎn* rhyme, and 知 *zhī* initial. The hexagrams are collected from 韻典網 *Yundiǎnwǎng* (<https://ytenx.org/>) and 古今字音對照手冊 *Gǔjīn zìyīn duìzhào shǒucè* (Ding & Li 1966). For convenience, Chinese Pīnyīn of hexagrams will not be provided in

the discussion and tables. Instead, a reconstruction according to Li's system as given below will be provided, labeled QYS. For example, 山開三上獮知 QYS tjän^上.

The reconstruction of Middle Chinese rhymes in Li's system are given below (Li 1971, modified from Handel 2019: 34-35). In each rhyme, the 平聲 *píngshēng* 'level tone' rhyme is listed, unless there is no level tone in that rhyme.

Table 3. 切韻 Qièyùn system initial categories. Middle Chinese values as reconstructed by Li, Fang-Kuei (1971), modified from Handel (2019: 34-35).

攝 <i>shè</i>	開合口 <i>kāihékǒu</i>	一等 D-I	二等 D-II	三等 D-III	四等 D-IV		
果 <i>Guǒ</i>	開 <i>kāi</i>	歌 <i>Gē</i>	â	--	歌 <i>Gē</i> jâ	--	
	合 <i>hé</i>	戈 <i>Gē</i>	uâ	--	戈 <i>Gē</i> juâ	--	
假 <i>Jiǎ</i>	開 <i>kāi</i>	--	麻 <i>Má</i>	a	麻 <i>Má</i> ja	--	
	合 <i>hé</i>	--	麻 <i>Má</i>	wa	--	--	
遇 <i>Yù</i>	--	模 <i>Mó</i>	uo	--	魚 <i>Yú</i> jwo	--	
	--	--	--	--	虞 <i>Yú</i> ju	--	
蟹 <i>Xiè</i>	開 <i>kāi</i>	哈 <i>Hāi</i>	âi	皆 <i>Jiē</i>	ǎi	祭 <i>Jì</i> j(i)âi	齊 <i>Qí</i> iei
	合 <i>hé</i>	灰 <i>Huī</i>	uâi	皆 <i>Jiē</i>	wâi	祭 <i>Jì</i> jw(i)âi	齊 <i>Qí</i> iwei
	開 <i>kāi</i>	泰 <i>Tài</i>	âi	夬 <i>Guài</i>	ai	廢 <i>Fèi</i> jêi	--
	合 <i>hé</i>	泰 <i>Tài</i>	wâi	夬 <i>Guài</i>	wai	廢 <i>Fèi</i> jwêi	--
	開 <i>kāi</i>	--	--	佳 <i>Jiā</i>	ai	--	--
止 <i>Zhǐ</i>	合 <i>hé</i>	--	--	佳 <i>Jiā</i>	wai	--	--
	開 <i>kāi</i>	--	--	--	支 <i>Zhī</i>	j(i)ě	--
	合 <i>hé</i>	--	--	--	支 <i>Zhī</i>	jw(i)ě	--
	開 <i>kāi</i>	--	--	--	脂 <i>Zhī</i>	(j)i	--
	合 <i>hé</i>	--	--	--	脂 <i>Zhī</i>	(j)wi	--
	開 <i>kāi</i>	--	--	--	之 <i>Zhī</i>	i	--
效 <i>Xiào</i>	開 <i>kāi</i>	--	--	--	微 <i>Wēi</i>	jěi	--
	合 <i>hé</i>	--	--	--	微 <i>Wēi</i>	jwěi	--
	效 <i>Xiào</i>	豪 <i>Háo</i>	âu	肴 <i>Yáo</i>	au	宵 <i>Xiāo</i> j(i)âu	蕭 <i>Xiāo</i> ieu
	流 <i>Liú</i>	侯 <i>Hóu</i>	ǎu	--	尤 <i>Yóu</i> jǎu	--	--
咸 <i>Xián</i>	--	--	--	--	幽 <i>Yōu</i> jiǎu	--	--
	--	談 <i>Tán</i>	âm	銜 <i>Xián</i>	am	鹽 <i>Yán</i> j(i)âm	添 <i>Tiān</i> iem
	--	覃 <i>Tán</i>	âm	咸 <i>Xián</i>	ãm	嚴 <i>Yán</i> jëm	--
深 <i>Shēn</i>	--	--	--	--	凡 <i>Fán</i> jwëm	--	--
	--	--	--	--	侵 <i>Qīn</i> j(i)ëm	--	--
	開 <i>kāi</i>	寒 <i>Hán</i>	ân	刪 <i>Shān</i>	an	仙 <i>Xiān</i> j(i)ân	先 <i>Xiān</i> ien
山 <i>Shān</i>	合 <i>kāi</i>	桓 <i>Huán</i>	uân	刪 <i>Shān</i>	wan	仙 <i>Xiān</i> jw(i)ân	先 <i>Xiān</i> iwen
	開 <i>kāi</i>	--	--	山 <i>Shān</i>	ăn	元 <i>Yuán</i> jən	--
	合 <i>hé</i>	--	--	山 <i>Shān</i>	wăn	元 <i>Yuán</i> jwen	--
臻 <i>Zhēn</i>	開 <i>kāi</i>	痕 <i>Hén</i>	ən	--	欣 <i>Xīn</i> jən	--	--
	合 <i>hé</i>	魂 <i>Hún</i>	uən	--	文 <i>Xīn</i> juən	--	--

	開 <i>kāi</i>	--	--	--		真 <i>Zhēn</i>	j(i)ě̃n	--	
	合 <i>hé</i>	--	--	--		諄 <i>Zhūn</i>	ju(i)ě̃n	--	
	開 <i>kāi</i>	--	--	--		臻 <i>Zhēn</i>	jẽn	--	
宕 <i>Dàng</i>	開 <i>kāi</i>	唐 <i>Táng</i>	ẫng	--		陽 <i>Yáng</i>	jang	--	
	合 <i>hé</i>	唐 <i>Táng</i>	wẫng	--		陽 <i>Yáng</i>	jwang	--	
梗 <i>Gěng</i>	開 <i>kāi</i>	--	--	庚 <i>Gēng</i>	eng	庚 <i>Gēng</i>	jẽng	青 <i>Qīng</i>	ieng
	合 <i>hé</i>	--	--	庚 <i>Gēng</i>	weng	庚 <i>Gēng</i>	jweng	青 <i>Qīng</i>	iweng
	開 <i>kāi</i>	--	--	耕 <i>Gēng</i>	eng	清 <i>Qīng</i>	jā̃ng	--	
	合 <i>hé</i>	--	--	耕 <i>Gēng</i>	weng	清 <i>Qīng</i>	jwā̃ng	--	
曾 <i>Zēng</i>	開 <i>kāi</i>	登 <i>Dēng</i>	ə̃ng	--		蒸 <i>Zhēng</i>	jə̃ng	--	
	合 <i>hé</i>	登 <i>Dēng</i>	wə̃ng	--		--	--	--	
通 <i>Tōng</i>		東 <i>Dōng</i>	ung	--		東 <i>Dōng</i>	jung	--	
		冬 <i>Dōng</i>	uong	--		鍾 <i>Dōng</i>	jwong	--	
江 <i>Jiāng</i>		--	--	江 <i>Jiāng</i>	ã̃ng	--	--	--	
咸 <i>Xián</i>		盍 <i>Hé</i>	ẫp	狎 <i>Xiá</i>	ap	葉 <i>Yè</i>	j(i)ẫp	帖 <i>Tiě</i>	iep
		合 <i>Hé</i>	ẫp	洽 <i>Qià</i>	ẫp	業 <i>Yè</i>	jẽp	--	
		--	--	--	--	乏 <i>Fá</i>	jwep	--	
深 <i>Shēn</i>		--	--	--	--	緝 <i>Qì</i>	j(i)ẫp	--	
山 <i>Shān</i>	開 <i>kāi</i>	曷 <i>Hé</i>	ẫt	鎋 <i>Xiá</i>	at	薛 <i>Xuē</i>	jẽt	--	
	合 <i>hé</i>	末 <i>Mò</i>	uẫt	鎋 <i>Xiá</i>	wat	薛 <i>Xuē</i>	jwet	--	
	開 <i>kāi</i>	--	--	黠 <i>Xiá</i>	ât	月 <i>Yuè</i>	--	--	
	合 <i>hé</i>	--	--	黠 <i>Xiá</i>	wât	月 <i>Yuè</i>	--	--	
臻 <i>Zhēn</i>	開 <i>kāi</i>	沒 <i>Mò</i>	(ə̃t)	--	--	迄 <i>Qì</i>	jə̃t	--	
	合 <i>hé</i>	沒 <i>Mò</i>	uə̃t	--	--	物 <i>Wù</i>	juə̃t	--	
	開 <i>kāi</i>	--	--	--	--	質 <i>Zhí</i>	j(i)ě̃t	--	
	合 <i>hé</i>	--	--	--	--	術 <i>Shù</i>	ju(i)ě̃t	--	
	開 <i>kāi</i>	--	--	--	--	櫛 <i>Zhì</i>	jẽt	--	
宕 <i>Dàng</i>	開 <i>kāi</i>	鐸 <i>Duó</i>	ẫk	--	--	藥 <i>Yào</i>	jak	--	
	合 <i>hé</i>	鐸 <i>Duó</i>	wẫk	--	--	藥 <i>Yào</i>	jwak	--	
梗 <i>Gěng</i>	開 <i>kāi</i>	--	--	陌 <i>Mò</i>	ek	陌 <i>Mò</i>	jẽk	--	
	合 <i>hé</i>	--	--	陌 <i>Mò</i>	wek	陌 <i>Mò</i>	jwek	--	
	開 <i>kāi</i>	--	--	麥 <i>Mài</i>	ek	昔 <i>Xí</i>	jäk	--	
	合 <i>hé</i>	--	--	麥 <i>Mài</i>	wek	昔 <i>Xí</i>	jwäk	--	
曾 <i>Zēng</i>	開 <i>kāi</i>	德 <i>Dé</i>	ək	--	--	職 <i>Zhí</i>	jək	--	
	合 <i>hé</i>	德 <i>Dé</i>	wək	--	--	職 <i>Zhí</i>	jwək	--	
通 <i>Tōng</i>		屋 <i>Wū</i>	uk	--	--	屋 <i>Wū</i>	juk	--	
		沃 <i>Wò</i>	uok	--	--	燭 <i>Zhú</i>	jwok	--	
江 <i>Jiāng</i>		--	--	覺 <i>Jué</i>	ã̃	--	--	--	

Another commonly used term in the study of Middle Chinese is 等 *děng* ‘division’. In general, it refers to the row that a character is placed on the rhyme tables. I will refer to the four *děng* as divisions I, II, III, and IV.

One other term found in the field of Middle Chinese is 重紐 *chóngniǔ* ‘repeated button’. *Chóngniǔ* refers to the phenomenon that in certain QYS rhymes, in the 唇 *chún*, 牙 *yá*, and 喉 *hóu* initial series, there are pairs of characters that are in different homophone groups in the QYS rhyme books, and one set of character placed on the third row of the rhyme tables while the other one on the fourth row. These pairs are called *chóngniǔ* doublets. For the *chóngniǔ* characters, I will refer to them as III-3 for the characters that are put on the third row in the rhyme tables, and IV-4 for the ones on the fourth row.

1.1.2 Old Chinese

The work of Old Chinese reconstruction is a lot more complicated than Middle Chinese, and still holds many discrepancies between different systems reconstructed by different scholars. I follow the system of Baxter and Sagart (2014), last revised in 2015, unless otherwise specified. In order to account for 諧聲 *xiéshēng* series, i.e. characters that have the same phonetic element, modern dialects, early loan words into different languages, as well as Middle Chinese, Baxter and Sagart have reconstructed a system with extensive use of complicated syllable onsets with pre-initials (2014: 42-193). The table below gives the basic initial system as reconstructed by Baxter and Sagart, excluding the pre-initials. Each of the consonant can either be plain in a Type B syllable, as shown in the table, or pharyngealized with superscript ^ʕ in a Type A syllable. For Type A syllables, there is an additional *ʔ^{wʕ} initial, but its occurrence is rare.

Table 4. Old Chinese main syllable initial consonants. The glottal $\text{ʔ}^w\text{ʃ}$ only occurs in Type A syllables, and is very rare. Table modified from Baxter & Sagart 2014: 69, Table 4.1).

Bilabial	p	p ^h	b	ɱ	m
Alveolar	t	t ^h	d	ɲ	n
	ts	ts ^h	dz		
		s			
				ʎ	l
				ʎ̥	r
Velar	k	k ^h	g	ŋ	ŋ
Labio-velar	k ^w	k ^{wh}	g ^w	ŋ ^w	ŋ ^w
Uvular	q	q ^h	ɢ		
Labio-uvular	q ^w	q ^{wh}	ɢ ^w		
Glottal	ʔ	ʔ ^{w\text{ʃ}}}			

Baxter and Sagart reconstruct a Type A versus Type B distinction for the system. Old Chinese Type A syllables are those that become Middle Chinese divisions I, II, and IV, while Type B are those that become division III characters¹. In their system, they follow Norman’s 1994 reconstruction that Type A syllables have pharyngealized initials, while Type B are unpharyngealized. For example (both Old Chinese and Middle Chinese in Baxter and Sagart’s system):

更 *k^ʃraŋ > *kaeng* > gēng ‘change (v.)’ (division II, Type A)

京 *[k]raŋ > *kjaeng* > jīng ‘hill; capital city’ (division III, Type B)

According to their reconstructed system, the Middle Chinese retroflexes and palatal affricates, in other words, the 知 *zhī* group and 照 *zhào* group initials, can have several different sources in Old Chinese. In Baxter and Sagart’s system, there are no retroflexes in Old Chinese. There are five main Old Chinese sources for the Middle Chinese 知 *zhī* group and 莊 *zhuāng* group, which are

¹ Since Chinese writing is a syllabic system, i.e. each character represents one syllable of the spoken language, I use the terms “character” and “syllable” interchangeably.

retroflexes in Middle Chinese: (1) dental stops, affricates, and fricatives, and laterals, plus an *-r-medial, for example:

鎮 *t<r>i[n]-s > *trinH* > zhèn ‘press down’

鬯 *t^hraŋ-s > *trhjangH* > chàng ‘aromatic spirits’

住 *dro(?)>-s > *drjuH* > zhù ‘stop (v.)’

沙 *s^ʰraj > *srae* > shā ‘sand’

除 *l<r>a > *drjo* > chú ‘remove’

(2) Preinitial *s- followed by initial *r- becomes MC *sr-*. This one only applies to Middle Chinese retroflex fricatives. An example is:

數 *s-roʔ > *srjuX* > shǔ ‘count (v.)’; also *s-roʔ-s > *srjuH* > shù ‘number (n.)’

(3) Pre-initial *t- before the main velar initial plus an *-r- medial. This is the Type II palatalization proposed by Schuessler in 1996, and can also be a source for 章 *zhāng* group initials, as will be discussed below. Some examples are:

經(梗開三平清徹) *t-k^hreŋ > *t^hreŋ > *trhjeng* > chēng ‘red’

(cf. 輕 *t[k^h]eŋ > *krjieng* > qīng ‘light (≠ heavy)’)

肘 *t-[k]<r>uʔ > *truʔ > *trjuwX* > zhǒu ‘elbow’

(the element 寸 cùn on the right was originally

九 *t[k]uʔ > *kjuwX* > jiǔ ‘nine’)

(4) Old Chinese clusters with an *s- preinitial and a medial *-r-, for instance:

責 *s-tʰrek > *tsʰrek > *tsreak* > zé ‘demand payment; require’

債、責 *s-tʰrek-s > *tsʰrek-s > *tsreaH* > zhài ‘debt’

(cf. 謫 *m-tʰrek > *m-dʰrek > *dʰrek > *dreak* > zhé ‘blame, punish’)

And (5) Old Chinese *ɾ- (nonpharyngealized, Type B) becoming Middle Chinese *trh-*, for example:

攄 *ɾa > *trhjo* > shū ‘extend’

离 *ɾaj > *trhje* > chī ‘mountain demon’

The four conditions above can all apply to both Type A and Type B syllables (Baxter & Sagart 2014: 79-81, 109, 112).

For the 章組 *zhāng* group initials, which are palatals in Li’s Middle Chinese reconstruction, there are also four main possible sources: (1) Old Chinese nonpharyngealized (Type B) alveolar initials *t-, *tʰ-, *d-, and *n-. For example:

隻 *tek > *tsyek* > zhī ‘single’

(2) Palatalization of non-pharyngealized (Type B) velar initials *k- and *g- before the front vowels *i and *e, but not *kʰ- nor those with velar codas. This is the Type I palatalization discussed in Schuessler (1996). Some examples are:

支 or 枝 *ke > *tsye* > zhī ‘branch (of tree), limb’

腎 *Cə.[g]i[n]? > *dzyinX* > shèn ‘kidney’

(3) Pre-initial *t- before the main velar initial, as mentioned above in (3) of the sources for 知 *zhī* group and 照 *zhào* group initials. The proposed scenario is that the initial cluster of a pre-initial *t- plus a velar initial is first simplified to an alveolar stop, then palatalized like the Old Chinese alveolars. As mentioned before, this is the Type II palatalization idea in Schuessler's discussion, though previous scholars are unable to give satisfactory explanations for palatalizations in environments including non-high vowels of this type. Baxter and Sagart propose a pre-initial *t- preceding a velar initial as the explanation. In fact, they expand the development to not just velar initials, but also uvulars and possibly labials. Below are some examples of this type:

齒 *t-[k^h] ə(ŋ)ʔ or *t-ŋəʔ > *t^həʔ > *tsyhiX* > *chǐ* 'front teeth'

出 *t-k^hut > *t^hut > *tsyhwit* > *chū* 'go or come out'

杵 *t.q^haʔ > *t^ha > *tsyhoX* > *chǔ* 'pestle'

箒, 帚 *t.q[ə]ʔ > *tuʔ > *tsyuwX* > *zhǒu* 'broom'

And finally (4) non-pharyngealized (Type B) laterals changing to a palatal fricative in Middle Chinese, for instance:

首 *l₁uʔ > *syuwX* > *shǒu* 'head'

世 *l₁ap-s > *l₁at-s > *syejH* > *shì* 'generation'

(Baxter & Sagart 2014: 48, 77-79, 99, 109, 112).

The 精 *jīng* group initials in Middle Chinese are basically from the same alveolar affricate series, of the pharyngealized (Type A) group.

Baxter and Sagart reconstruct the Old Chinese rhymes (or finals) with a system of six main vowels (*i, *ə, *u, *e, *a, *o) combining with one of the codas (*zero, *-k, *-ŋ, *-j, *-t, *-n, *-r, *-w, *-wk, *-m, and *-p). Not all of the combinations are possible in Old Chinese. The chart below shows the ones that are possible (Baxter & Sagart 2014: 49-50, 194-315).

Table 5. Possible combinations for the final syllables of Old Chinese in Baxter and Sagart’s system. Modified from Baxter & Sagart (2014: 49).

	*i	*u	*ə	*e	*o	*a
*-∅	--	-u	-ə	-e	-o	-a
*-j	-ij	-uj	-əj	-ej	-oj	-aj
*-w	-iw	--	--	-ew	--	-aw
*-n	-in	-un	-ən	-en	-on	-an
*-m	-im	-um	-əm	-em	-om	-am
*-ŋ	-iŋ	-uŋ	-əŋ	-eŋ	-oŋ	-aŋ
*-r	-ir	-ur	-ər	-er	-or	-ar
*-t	-it	-ut	-ət	-et	-ot	-at
*-p	-ip	-up	-əp	-ep	-op	-ap
*-k	-ik	-uk	-ək	-ek	-ok	-ak
*-wk	-iwk	--	--	-ewk	--	-awk

In Baxter and Sagart’s system, Old Chinese words are formed with a root plus possible affixes. The word root can be either monosyllabic consisting of a full syllable (Σ), or disyllabic consisting of a full syllable with a minor syllable (σ) in front: $\sigma\Sigma$. A full main syllable Σ can be divided into five positions: Ci (initial), Cm (medial, *r), V (vowel nucleus, the six vowels *i, *ə, *u, *e, *a, *o), Cc (coda, *zero, *-k, *-ŋ, *-j, *-t, *-n, *-r, *-w, *-wk, *-m, and *-p), and Cpc (postcoda, a glottal stop *ʔ that is only possible after a sonorant, either one of the six vowels or a sonorant coda) (Baxter & Sagart 2014: 50-51). The structure of a full syllable is given in Figure 1.

Old Chinese main syllables can be preceded by preinitials. In Baxter and Sagart’s convention, when the preinitial is a prefix that has clear morphological function, it is separated from the word root by a hyphen. When the preinitial is an element that for the time being does not have a clear identity or function, it is separated from the word root by a period. Also, it is possible in some

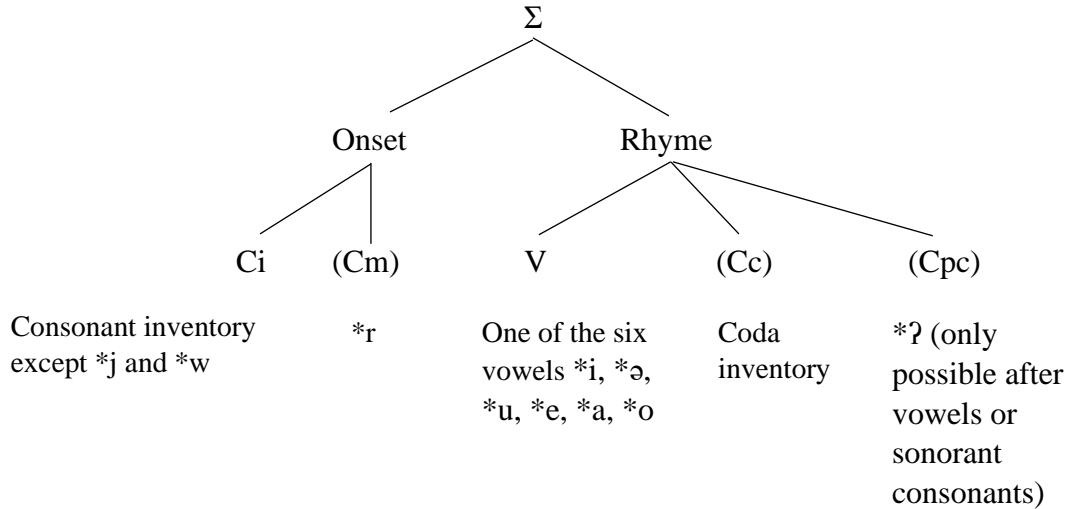


Figure 1. The structure of an Old Chinese full syllable. The possible inventory of phonemes that can be filled in each position are included. From Baxter & Sagart (2014: 50).

cases to have two prefixes stacking before the word root. The examples below show the use of such convention (Baxter & Sagart 2014: 51-52, 54, 4.6).

賜 *s-lek-s > *sjeH* > cì ‘give’ (*s- added to the root 易 *lek > *yek* > yì ‘change, exchange’)

千 *s.ŋ⁶i[ŋ] > *tshen* > qiān ‘thousand’

A minor syllable consists of two positions: Cpi (preinitial consonant) and Vpi (preinitial vowel). The possible inventory of Cpi includes the consonants *p, *t, *k, *r, *s, *m, and *N, where *N is a positional allophone of either *n or *ŋ. On the other hand, the position Vpi can be either filled by *ə or left empty. The following figure shows the structure of a minor syllable with a possible inventory for each position.

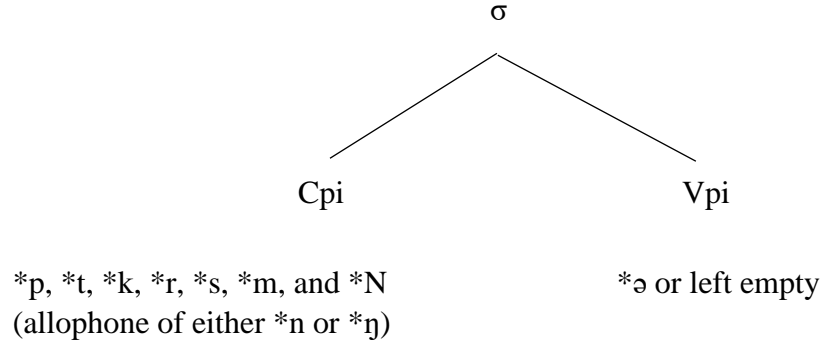


Figure 2. The structure of an Old Chinese minor syllable. The possible inventory of phonemes that can be filled in each position are included. From Baxter & Sagart (2014: 52).

For more discussions on Middle Chinese and Old Chinese reconstructions and the materials and methods, see Li (1971), Baxter (1992: 27-85), Baxter and Sagart (2014), and others.

1.2 SURVEY OF HARDENING IN THE CHINESE DIALECTS

Hardening is a phenomenon recognized by many Chinese scholars. Among the major dialect groups of Chinese, many dialects have stop reflexes corresponding to Middle Chinese retroflex and secondary affricates. As mentioned before, the Chinese term used for describing the related phenomena is “讀如端組” *dú rú duān zǔ*, meaning that the modern reading of certain characters of Middle Chinese non-端 *duān* group initials in a dialect is the same as the modern reading of the Middle Chinese 端 *duān* group initials, which are mostly dental stops. Note that this is only a descriptive statement, and does not imply any direction or source of the situation.

In order to have a more in depth understanding on the distribution of hardening phenomenon in the different dialect groups, in this section I discuss the sound values and mergers of the three

Middle Chinese initial groups 知 *zhī* group (retroflex stops), 精 *jīng* group (dental affricates), and 照 *zhào* group (post-alveolar affricates) in the seven major dialect groups. Since hardening in the Xiāng dialects primarily occurs in 知 *zhī* and 照 *zhào* initial groups, the focus is mainly on the two group, and only discuss 精 *jīng* group if the given dialect group has similar sound changes for 精 *jīng* initial characters. The distribution sometimes reveals regular patterns of hardening throughout the whole group, sometimes only in sporadic characters, sometimes only hardening in a few dialects, and in many cases no hardening at all, although the many different patterns of merger result in different numbers of fricative series.

This survey also serves the function for clarifying the actual identity of similar phenomena among the dialects, including the presumed starting point of the sound change, i.e. the Middle Chinese initials involved, the proposed routes and conditions, and the modern reflexes, in order to eliminate the unrelated phenomena that are called *dú rú duān zǔ* or various other names and to center my study on the true hardening phenomenon as defined earlier. As we will see, hardening phenomena are found most widespread and regularly in the Xiāng and Gàn dialects. For this reason, the survey of these dialect groups will be followed by a more detailed investigation of the historical origins of the phenomena.

1.2.1 The Mǐn dialect group^{2,3}

The Mǐn dialect group is probably one of the best-known dialect group that has the *dúrú duān zǔ* feature. There is still some debate on the inner sub-grouping of the Mǐn dialect group, but most scholars agree to at least five: 閩南 Mǐnnán ‘Southern Mǐn’, 閩東 Mǐndōng ‘Eastern Mǐn’, 閩北 Mǐnběi ‘Northern Mǐn’, 閩中 Mǐnzhōng ‘Central Mǐn’, and 莆仙 Púxiān. Sometimes 雷州 Léizhōu and 瓊文 Qióngwén, traditionally classified under Southern Mǐn, are raised as another one of the major branch. 邵寧 Shàoníng dialect, a dialect located at the border of the Mǐn, Hakka, and Gàn-speaking regions, is also sometimes classified as a subgroup under Mǐn (Zhang 1985, Lin 2002).

According to Chang & Wan (2002), in the 白讀 *báidú* ‘vernacular reading’⁴, the 知 *zhī* group division II and III characters are read as dental stops in all the varieties of Mǐn dialects. For example, in 廈門 Xiàmén, a Southern Mǐn dialect, the reading for 桌(知二) *zhuō* (*zhī*-initial division II) ‘table’ is [toʔ] (tone excluded), and 竹(知三) *zhú* (*zhī*-initial division III) ‘bamboo’ [tik] (tone excluded). For the 莊 *zhuāng* group and 章 *zhāng* group characters, they have merged with the 精 *jīng* group characters and are all read as dental affricates in most varieties of Mǐn except in Central Mǐn. For instance, in Xiàmén 蔗(章) *zhè* (*zhāng*-initial) ‘sugar cane’ is [tsia] (tone excluded), and 莊(莊) *zhuāng* (*zhuāng*-initial) [tsŋ] (tone excluded). Table 1 shows some character readings of 知

² Dialect groups and dialects: Here I use the terms ‘dialect group’ to refer to the major dialect groups, and ‘dialect’ to refer to the different varieties under a given dialect group, unless otherwise specified.

³ I follow the classification in *Encyclopedia of Chinese Language and Linguistics* (Norman 2015) that classifies the Chinese language family into 7 major dialect groups: Mandarin, 吳 Wú, 贛 Gàn, 湘 Xiāng, 客家 Kèjiā ‘Hakka’, 粵 Yuè, and 閩 Mǐn.

⁴ According to Yang 2015, the terms 文讀 *wéndú* ‘literary reading’ and 白讀 *báidú* ‘vernacular reading’ refer to different readings of the same character depending on whether the pronunciation represents a morpheme in the literary or colloquial lexical layer. For more discussion, see Yang 2015.

zhī group division II and III, 莊 *zhuāng* group, and 章 *zhāng* group in various Mǐn dialects. Examples of Central Mǐn are given in Table 2. In Central Mǐn, as mentioned previously, the 知 *zhī* group division II and III characters are read as dental stops, but 莊 *zhuāng* group have merged with 精 *jīng* group and are all read as dental affricates, while 章 *zhāng* group characters are read as palato-alveolar affricates. For example, in 永安 Yǒng’ān, one of the representative places of Central Mǐn dialects, 拆(徹二) *chāi* (*chè*-initial division II) ‘to dismantle’ is read as [t’io], 竹(知三) *zhú* (*zhī*-initial division III) ‘bamboo’ [ty], while 遮(章) *zhē* (*zhāng*-initial) ‘to cover’ is [tʃio], and 莊(莊) *zhuāng* (*zhuāng*-initial) [tsam] (tones excluded in all cases). Table 2 shows some character readings of 知 *zhī* group division II and III, 莊 *zhuāng* group, and 章 *zhāng* group initials in various Central Mǐn dialects.

Table 6. Vernacular readings of 知 *zhī* group division II and III, 莊 *zhuāng* group, and 章 *zhāng* group initial characters in various Mǐn dialects. 福州 Fúzhōu, 莆田 Pútían, 廈門 Xiàmén, 建甌 Jiàn’ōu, and 潮州 Cháozhōu in 福建 Fújiàn Province, 靈溪 Língxī in 浙江 Zhèjiāng Province, and 遂溪 Suìxī and 文昌 Wénchāng in 廣東 Guǎngdōng Province. Table modified from Chang & Wan (2002). Tones omitted in the original table. Dialect classification added: E – Eastern Mǐn, S – Southern Mǐn, N – Northern Mǐn, P – Púxiān dialect, L – Léizhōu dialect, H – Hǎinán dialect.

		Division II				Division III		
		-Voi, -Asp	-Voi, +Asp	+Voi	Fri.	-Voi, -Asp	-Voi, +Asp	+Voi
知 <i>zhī</i> group		桌 <i>zhuō</i>	拆 <i>chāi</i>			竹 <i>zhú</i>		櫛 <i>chú</i>
MC initial		知 <i>zhī</i>	徹 <i>chè</i>			知 <i>zhī</i>		澄 <i>chéng</i>
QYS		ták ^入	tʰek ^入			tjuk ^入		dju ^平
Fúzhōu	E	tɔʔ	tʰieʔ			tɔyʔ		tiu
Pútían	P	--	tʰiaʔ			tɔeʔ		tiu
Xiàmén	S	tɔʔ	tʰiaʔ			tik		tu
Jiàn’ōu	N	tɔ	tʰia			ty		ty
Cháozhōu	S	tɔʔ	tʰiaʔ			tu		tu
Língxī	S	tɔ	tʰia			tu		tu
Suìxī	L	--	tʰia			tu		tu
Wénchāng	H	ɗuak	hia			ɗiok		ɗu
照 <i>zhào</i> group		莊 <i>zhuāng</i> ‘sur name’	炒 <i>chǎo</i>	床 <i>chuáng</i>	梳 <i>shū</i>	蔗 <i>zhè</i>	車 <i>chē</i>	時 <i>shí</i>
MC initial		莊 <i>zhuāng</i>	初 <i>chū</i>	崇 <i>chóng</i>	生 <i>shēng</i>	章 <i>zhāng</i>	昌 <i>chāng</i>	禪 <i>shàn</i>

QYS		tsjang ^平	tʂhau ^上	dzjang ^平	sjwo ^平	tʂja ^去	tʂhja ^平	ʒi ^平
Fúzhōu	E	tsouŋ	ts'a	ts'ouŋ	sœ	tsia	ts'ia	si
Pútíán	P	tsuŋ	ts'ɔ	ts'uŋ	lø	tsia	ts'ia	fi
Xiàmén	S	tsŋ	ts'a	ts'ŋ	sue	tsia	ts'ia	si
Jiàn'ōu	N	tsɔŋ	ts'au	ts'ɔŋ	su	tsia	ts'ia	si
Cháozhōu	S	tsuŋ	ts'a	ts'uŋ	siu	tsia	ts'ia	si
Líng xī	S	tsŋ	ts'a	ts'ŋ	sɔ	tsia	ts'ia	si
Suixī	L	--	ts'a	ts'ɔ	sɔ	tsia	ts'ia	si
Wénchāng	H	tuanŋ	sa	so	tiu	tsia	sia	ti

Table 7. Vernacular readings of 知 *zhī* group division II and III, 莊 *zhuāng* group, and 章 *zhāng* group initial characters in (a) several Central Mǐn dialects, 永安 Yǒng'ān, 三元 Sānyuán, and 沙縣 Shāxiàn in Fújiàn Province, and (b) the same three Central Mǐn dialects and some non-Central Mǐn dialects in Fújiàn Province, Xiàmén, Cháozhō, Fúzhōu, and Jiàn'ōu, for comparison. Table from Chang & Wan (2002). Tones omitted in the original table. E – Eastern Mǐn, C – Central Mǐn, S – Southern Mǐn, N – Northern Mǐn.

(a)

	Division II				Division III			
	-Voi, -Asp	-Voi, +Asp	+Voi	Fri.	-Voi, -Asp	-Voi, +Asp	+Voi	Fri.
知 <i>zhī</i> group		拆 <i>chāi</i>			竹 <i>zhú</i>		櫛 <i>chú</i>	
MC initial		徹 <i>chè</i>			知 <i>zhī</i>		澄 <i>chéng</i>	
QYS		tʂek ^入			tʂuk ^入		dʒu ^平	
Yǒng'ān		tʰio			ty		ty	
Sānyuán		tʰio			ty		ty	
Shāxiàn		tʰia			tø		ty	
	莊 _(姓氏) <i>zhuāng</i> 'sur name'	差 <i>chā</i>	床 <i>chuáng</i>	梳 <i>shū</i>	遮 <i>zhē</i>	炊 <i>chuī</i>		匙 <i>chí</i>
Initial	莊 <i>zhuāng</i>	初 <i>chū</i>	崇 <i>chóng</i>	生 <i>shēng</i>	章 <i>zhāng</i>	昌 <i>chāng</i>		禪 <i>shàn</i>
QYS	tsjang ^平	tʂha ^平	dzjang ^平	sjwo ^平	tʂja ^平	tʂhjwě ^平		ʒjě ^平
Yǒng'ān	tsam	ts ^h ɔ	ts ^h am	sou	tʃiɔ	tʃ ^h ye		ʃie
Sānyuán	tsam	ts ^h ɔ	ts ^h am	sou	tʃiɔ	tʃ ^h ye		ʃie
Shāxiàn	tsaŋ	ts ^h a	ts ^h aŋ	su	tʃia	tʃ ^h ye		ʃie

(b)

	Division II				Division III				
	-Voi, -Asp	-Voi, +Asp	+Voi	Fri.	-Voi, -Asp	-Voi, +Asp	+Voi	-Voi Fri.	+Voi Fri.
	爪 <i>zhuǎ</i>	插 <i>chā</i>	巢 <i>cháo</i>	山 <i>shān</i>	正 <i>zhèng</i>	廠 <i>chǎng</i>	船 <i>chuán</i>	聲 <i>shēng</i>	成 <i>chéng</i>
MC Initial	莊 <i>zhuāng</i>	初 <i>chū</i>	崇 <i>chóng</i>	生 <i>shēng</i>	章 <i>zhāng</i>	昌 <i>chāng</i>	船 <i>chuán</i>	書 <i>shū</i>	禪 <i>shàn</i>
QYS	tʂau ^上	tʂhǎp ^入	dzau ^平	ʂǎn ^平	tʂjǎŋ ^去	tʂjang ^上	dʒjwǎn ^平	ʂjǎŋ ^平	ʒjǎŋ ^平
Yǒng'ān	C	tso	ts ^h ɔ	ts ^h ø	sum	tʃiɔ	tʃ ^h iam	ʃyeiŋ	ʃiǎ
Sānyuán	C	tsio	ts ^h ɔ	ts ^h ø	syẽ	tʃiɔ	tʃ ^h iam	ʃyain	ʃiɔ

Shāxiàn	C	tsia	ts ^h a	ts ^h au	suĩ	tʃiõ	tʃ ^h iŋ	ʃyĩ	ʃiõ	ʃiõ
Xiàmén	S	nĩãũ	ts ^h aʔ	tsau	sũã	tsĩã	ts ^h ĩũ	tsun	sĩã	ts'ĩã
Cháozhō	S	ziəu	ts ^h aʔ	ts ^h au	sũã	tsĩã	ts ^h iaŋ	tsuŋ	sĩã	ts'ĩã
Fúzhōu	E	tsau	ts ^h aʔ	tsau	saŋ	tsiaŋ	ts ^h uəŋ	suŋ	siaŋ	siaŋ
Jiàn'ōu	N	tsau	ts ^h a	ts ^h e	suŋ	tsiaŋ	ts ^h əŋ	yŋ	siaŋ	siaŋ

In the 文讀 *wéndú* ‘literary readings’, in general the 知 *zhī* group division II and III characters are not read as stops, but merged with 莊 *zhuāng* group, 章 *zhāng* group, and 精 *jīng* group and are all read as dental affricates.

Table 8. Literary readings of 知 *zhī* and 章 *zhāng* group characters in the Mǐn dialects. (a) 知 *zhī* group division II and III characters in dialects other than Central Mǐn, including Xiàmén, Fúzhōu, Cháozhō, and Jiàn'ōu in Fújiàn Province, Língxī in Zhèjiāng Province, and Suìxī in Guǎngdōng Province; (b) 章 *zhāng* character initials in the three Central Mǐn dialects, Yǒng'ān, Sānyuán, and Shāxiàn in Fújiàn Province. Table from Chang & Wan (2002). Tones omitted in the original table. Subscripts mark the Middle Chinese initial category. E – Eastern Mǐn, C – Central Mǐn, S – Southern Mǐn, N – Northern Mǐn, L – Léizhōu dialect.

(a)

	Division II					Division III						
	-Voi, -Asp		-Voi, +Asp	+Voi		-Voi, -Asp			-Voi, +Asp	+Voi		
	站 <i>zhàn</i>	椿 <i>zhuāng</i>	戳 <i>chuō</i>	濁 <i>zhuó</i>	賺 <i>zhuàn</i>	駐 <i>zhù</i>	注 <i>zhù</i>	轉 <i>zhuǎn</i>	痴 <i>chī</i>	柱 <i>zhù</i>	住 <i>zhù</i>	
MC Initial	知 <i>zhī</i>		徹 <i>chè</i>	澄 <i>chéng</i>		知 <i>zhī</i>			徹 <i>chè</i>	澄 <i>chéng</i>		
QYS	təm ^去	təŋ ^平	tʰək ^入	dək ^入	dəm ^去	tju ^去	tju ^去	tjwän ^上	tʰi ^平	dju ^上	dju ^去	
Xiàmén	S	tsan	tsəŋ	ts'ak	tsək	tsuan	tsu	tsu	tsuan	ts'i	tsu	tsi
Fúzhōu	E	tsam	tsuəŋ	ts'oʔ	tsuak	tsuaŋ	tsu	tsu	tsueŋ	ts'i	tsu	tsu
Cháozhōu	S	tsaŋ	tsouŋ	ts'ouʔ	tsouʔ	tsaŋ	tsøy	tsøy	tuəŋ	ts'i	tsøy	tsøy
Jiàn'ōu	N	tsaŋ	tsəŋ	ts'io	tsə	t'ein	tsy	tsy	tsyŋ	ts'i	tsy	tsy
Língxī	S	tsan	--	--	tsio	t'an	tsu	tsu	tsuan	--	tsu	tsu
Suixī	L	tsam	tsuaŋ	--	tsuak	tsuaŋ	--	--	tʃuaŋ	--	tsu	tsu

(b)

	-Voi, -Asp					-Voi, +Asp		-Voi, Fri.		+Voi Fri.	
		章 <i>zhāng</i>	脂 <i>zhī</i>	志 <i>zhì</i>	折 <i>zhé</i>	織 <i>zhī</i>	齒 <i>chǐ</i>	春 <i>chūn</i>	詩 <i>shī</i>	世 <i>shì</i>	市 <i>shì</i>
MC initials	章 <i>zhāng</i>					昌 <i>chāng</i>		書 <i>shū</i>		禪 <i>shàn</i>	
QYS	tʃaŋ ^平	tʃi ^平	tʃi ^去	tʃjət ^入	tʃjək ^入	tʃhī ^上	tʃhjuən ^平	ʃi ^平	ʃjai ^去	ʃi ^上	ʃjɛ ^去
Yǒng'ān	C	ts	ts	ts	ts	ts ^h	ts ^h	s	s	s	s
Sānyuán	C	ts	ts	ts	ts	ts ^h	ts ^h	s	s	s	s
Shāxiàn	C	ts	ts	ts	ts	ts ^h	ts ^h	s	s	s	s

Aside from 知 *zhī* group division II and III characters, there appears to be some 照 *zhào* group (莊 *zhuāng* and 章 *zhāng* groups) characters that are read as dental stops in the Mǐn dialects as well, although the most common reading for the 照 *zhào* group characters is dental and/or palato-alveolar affricates and fricatives. For example, in Xiàmén (Amoy), 榨 *zhà* ‘to squeeze, extract’ is read as [ta], 事 *shì* ‘thing (matter, event)’ [tai], and 篩 *shāi* ‘filter’ [t^hai] (tones excluded) (Tsai 2020: 37-38). This phenomenon has been noticed by many scholars, but there is still no consensus on the cause and source of the sound change. Sagart and Baxter (2012) propose an Old Chinese *s- prefix, although this prefix mainly affects changes into Middle Chinese 生 *shēng* initial characters, which does not explain the cause of hardening in other 照 *zhào* group characters.

In sum, the *dú rú duān zǔ* phenomenon can be found in the vernacular pronunciations of 知 *zhī* group division II and III characters in all the Mǐn dialects, and some 照 *zhào* group characters in some of the Mǐn dialects, although the most common reading for the 照 *zhào* group characters is dental and/or palato-alveolar affricates and fricatives. Most scholars agree that the *dú rú duān zǔ* phenomenon of the 知 *zhī* group division II and III characters in the Mǐn dialect group is a retention from Old Chinese. Recall, for example, the previously given Old Chinese reconstruction: 住 *dro(?)>s > *drjuH* > *zhù* ‘stop (v.)’. The basic argument is that in the development of Mǐn, the Old Chinese initial cluster *dr- simplified to *d-, instead of becoming a retroflex stop that led to retroflex affricates in Middle Chinese and the modern northern dialects. In fact, it is one of the features that many traditional Chinese scholars use for classifying the Mǐn dialect group (Chang & Wan 2002). As for the *dú rú duān zǔ* phenomenon in the 照 *zhào* group characters, the distribution is not as wide as in the 知 *zhī* group characters; only some Mǐn dialects

show this phenomenon, and only some characters are read as dental stops in these dialects. Many scholars have noticed this phenomenon, but the source and cause of it is still unclear.

1.2.2 The Wú dialect group

The Wú dialect group can be further subgrouped into six sub-dialects: 太湖 Tàihú, 台州 Táizhōu, 甌江 Ōujiāng, 婺州 Wùzhōu, 處衢 Chùqú, and 宣州 Xuānzhōu. In general, the Wú dialects do not have the feature of *dú rú duān zǔ* (Fu et al. 1986, You 2015). Concerning the Middle Chinese 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters, there can be three different types in the Wú dialects. The first type is 知 *zhī* group division II characters merging with 莊 *zhuāng* group and are read as dental affricates such as ts-, while 知 *zhī* group division III merges with 章 *zhāng* group and could have the readings of palato-alveolar, alveolo-palatal, and/or retroflex affricates, such as tʃ-, te-, and tʂ-. This type includes most of the southern Wú dialects, i.e. Táizhōu, Ōujiāng, Chùqú, and Wùzhōu, and also includes many of the Tàihú dialect, a northern Wú dialect (Chang & Wan 2002). The table below shows examples of readings of some characters in these dialects.

Table 9. Readings of some 知 *zhī* group division II and III, 莊 *zhuāng* group, and 章 *zhāng* group characters in Wú dialects. (a) Some 知 *zhī* group division II and 莊 *zhuāng* group characters, and (b) some 知 *zhī* group division III and 章 *zhāng* group characters. Table modified from Chang & Wan 2002. Tones omitted in the original table. Tz – Táizhōu dialect, O – Ōujiāng dialect, C – Chùqú dialect, W – Wùzhōu dialect, Th – Tàihú dialect.

(a)

		知 <i>zhī</i> group				莊 group					
		-Voi, -Asp		-Voi, +Asp	+Voi	-Voi, -Asp		-Voi, +Asp	+Voi	-Voi, Fric.	
		知 <i>zhī</i>	摘 <i>zhāi</i>	拆 <i>chāi</i>	茶 <i>chá</i>	賺 <i>zhuàn</i>	債 <i>zhài</i>	爭 <i>zhēng</i>	初 <i>chū</i>	柴 <i>chái</i>	沙 <i>shā</i>

MC initial		知 <i>zhī</i>	徹 <i>chè</i>	澄 <i>chéng</i>	莊 <i>zhuāng</i>	初 <i>chū</i>	崇 <i>chóng</i>	生 <i>shēng</i>			
QYS		tje ^平	ʈek ^入	ʈʰek ^入	ɖa ^平	ɖam ^去	tʂai ^去	tʂɛŋ ^平	tʂhwo ^平	dʒai ^平	ʂa ^平
Jingjiāng	Th	tsǎ̃	tsǎʔ	tsʰaʔ	dzo	dzǎ̃	tsæ	tsəŋ	tsəu	szæ	so
Chángshóu	Th	dzE ⁵	tsAʔ	tsAʔ	dzu	dzE	tʂa	tʂǎ̃	tsu	za	su
Huángyán	Tz	dze	tʂeʔ	tsʰeʔ	dzo	dze	tʂA	tʂǎ̃	tsəu	zA	so
Wēnzhōu	O	dza	tʂa	tsʰa	dzo	dza	tʂa	tsɛ	tsəu	szɑ	so
Qúzhōu	C	dzǎ̃	tsǎʔ	tsǎʔ	dza	dzǎ̃	tʂe	tʂən	tsən	szɛ	sa
Jīnhuá	W	tʂa	tsǎʔ	tsʰǎʔ	ts'ua	tʂa	tʂa	tʂAŋ	tsun	sa	sua

(b)

		知 <i>zhī</i> group					章 <i>zhāng</i> group				
		-Voi, -Asp		-Voi, +Asp	+Voi		-Voi, -Asp	-Voi, +Asp	+Voi	-Voi, Fri.	
		肘 <i>zhǒu</i>	張 <i>zhāng</i>	醜 <i>chǒu</i>	綢 <i>chóu</i>	丈 <i>zhàng</i>	帚 <i>zhǒu</i>	臭 <i>chòu</i>	繩 <i>shéng</i>	手 <i>shǒu</i>	書 <i>shū</i>
MC initial		知 <i>zhī</i>		徹 <i>chè</i>	澄 <i>chéng</i>		章 <i>zhāng</i>	昌 <i>chāng</i>	船 <i>chuán</i>	書 <i>shū</i>	
QYS		tʂǒu ^上	tʂaŋ ^平	ʈʂǒu ^上	ɖǒu ^平	ɖjaŋ ^去	tʂǒu ^上	tʂhǒu ^去	dʒjəŋ ^平	ʂǒu ^上	ʂwo ^平
Jingjiāng	Th	teøʏ	teiǎ̃	te'øʏ	dzøʏ	dziǎ̃	teøʏ	teøʏ	te ^h iəŋ	eøʏ	dzøʏ
Chángshóu	Th	tʂu	tʂǎ̃	tʂ'u	dzu	dzǎ̃	tʂu	tʂ ^h u	dzɛ̃ɲ	tʂu	dzu
Huángyán	Tz	teiu	teiǎ̃	teiu	dziu	dziǎ̃	teiu	te ^h iu	ziŋ	eiu	ziu
Wēnzhōu	O	teiu	tei	te'iu	dziu	dzi	teiu	te ^h iu	szɛŋ	eiu	dziu
Qúzhōu	C	tʂyɯ	tʂyǎ̃	tʂyɯ	dzyɯ	dzyǎ̃	tʂyɯ	tʂ ^h yɯ	zyən	ʂyɯ	dzyɯ
Jīnhuá	W	teiuu	teiAŋ	te ^h iuu	dziuu	dziAŋ	teiuu	te ^h iuu	eɪŋ	eiuu	dziuu

The second type is 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group initials all merging together and are all read as dental affricates ts-, ts^h-, or dz. This type is mostly seen in the northern Wú dialects (Chang & Wan 2002). The following table shows some character readings in the Tàihú dialect.

Table 10. Readings of some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group initial characters in various Tàihú dialects of the Wú dialect group. Table modified from Chang & Wan 2002. Tones omitted in the original table. CZ: Chángzhōu 常州, SH: Shànghǎi 上海, HZ: Hángzhōu 杭州, YY: Yúyáo 餘姚.

	知 group				照 group						
	-Voi, -Asp	-Voi, +Asp	+Voi		-Voi, -Asp	-Voi, +Asp	+Voi		-Voi, Fri.	+Voi, Fri.	
Div II	罩 <i>zhào</i>	撐 <i>chēng</i>	撞 <i>zhuàng</i>		爭 <i>zhēng</i>	詐 <i>zhà</i>	抄 <i>chāo</i>	巢 <i>cháo</i>	愁 <i>chóu</i>	搜 <i>sōu</i>	

⁵ For a reference to non-IPA symbols in transcriptions in the field of Chinese studies, see Handel (2015).

MC initial	知 <i>zhī</i>	徹 <i>chè</i>	澄 <i>chéng</i>		莊 <i>zhuāng</i>	初 <i>chū</i>	崇 <i>chóng</i>	生 <i>shēng</i>			
QYS	tau 去	theng 平	dang 去		tʂeng 平	tʂa 去	tʂhau 平	dʒau 平	dʒjəu 平	ʂjəu 平	
CZ	tsax	tsʰAɲ	dzAɲ		tsAɲ	tso	tsʰax	zax	dzei	sei	
SH	tsɔ	tsʰAɲ	zAɲ		tsAɲ	tso	tsʰɔ	zɔ	zɣu	sɣu	
HZ	tsɔ	tsʰAɲ	dzɥAɲ		tsɔn	tʂa	tsʰɔ	zɔ	dzei	sei	
YY	tsɔ	tsʰÃ	dzɔ̃		tsÃ	tso	tsʰɔ	zɔ	dʒɣ	sɣ	
Div III	張 <i>zhāng</i>	超 <i>chāo</i>	丈 <i>zhàng</i>	潮 <i>cháo</i>	照 <i>zhào</i>	蔗 <i>zhè</i>	昌 <i>chāng</i>	舌 <i>shé</i>		收 <i>shōu</i>	仇 <i>chóu</i>
MC initial	知 <i>zhī</i>	徹 <i>chè</i>	澄 <i>chéng</i>		章 <i>zhāng</i>		昌 <i>chāng</i>	船 <i>chuán</i>		書 <i>shū</i>	禪 <i>shàn</i>
QYS	tjang 平	thjäu 平	djang 去	djäu 平	tʂjäu 去	tʂja 去	tʂhja 平	dʒjät 入		ʂjəu 平	ʒjəu 平
CZ	tsAɲ	tsʰax	dzAɲ	zax	tsax	tso	tsʰAɲ	zəʔ		sei	dzei
SH	tsAɲ	tsʰɔ	zAɲ	zɔ	tsɔ	tso	tsʰAɲ	zəʔ		sɣu	zɣu
HZ	tsAɲ	tsʰɔ	dzAɲ	zɔ	tsɔ	tʂa	tsʰAɲ	szɛ		sei	dzei
YY	tsÃ	tsʰɔ	dzÃ	zɔ	tsɔ	tso	tsʰÃ	ziʔ		sɣ	dʒɣ

The only dialect that shows the *dú rú duān zǔ* phenomenon is Chùqú, a subgroup located peripherally in the south-western part of the Wú dialect region (You 2015). The Chùqú dialect includes 處州 Chùzhōu, or modern 麗水 Lìshuǐ, and 衢州 Qúzhōu. The Chùqú dialect actually has at least three different layers of reading for the 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters, including the two types mentioned above, and an additional vernacular layer, where 知 *zhī* group characters are read as dental stops, the same reading as 端 *duān* group in this dialect, 莊 *zhuāng* group as dental affricates, and 章 *zhāng* group as alveolo-palatal affricates (Chang & Wan 2002). For instance, Lìshuǐ vernacular layer 豬 *zhū* ‘pig’ [ti 陰平], 椿 *chūn* ‘Chinese toon’ [tɕjɔ̃ 陰平], 張 *zhāng* ‘to draw a bow; to stretch’ [tʂiã 陰平], 長 *cháng* ‘long’ [dɕɛ̃ 陽平], and 竹 *zhú* ‘bamboo’ [tʂiɔ̃ 陰入] (Fu et al. 1986). The following table shows some more 知 *zhī* group characters that are read as dental stops in various Chùqú dialects. In some other places, such as 武義 Wǔyì, there are no 知 *zhī* group characters read as dental stops, but instead the 知 *zhī* group characters are commonly read as a lateral approximant l-, which supposedly came from a previous ʔd-. For

example, in Wùyì 豬 *zhū* ‘pig’ is [li¹], 蜘蛛 *zhīzhū* ‘spider’ [li¹ lu¹], 摘 *zhāi* ‘to pluck’ [laʔ⁷], and 置 *zhì* ‘to put, to place; to set upright’ [li⁵] (Pan 1995).

Table 11. Vernacular readings of some 知 *zhī* group characters in various Chùqú dialects. Table modified from Pan (1995).

	Div II		Div III						
	-Voi, -Asp		-Voi, -Asp					+Voi	
	摘 <i>zhāi</i>	桌 <i>zhuō</i>	豬 <i>zhū</i>	中 <i>zhōng</i>	張 <i>zhāng</i>	蛛 <i>zhū</i>	砧 <i>zhēn</i>	長 <i>cháng</i>	腸 <i>cháng</i>
MC initial	知 <i>zhī</i>		知 <i>zhī</i>					澄 <i>chéng</i>	
QYS	tək ^入	tāk ^入	tjwo ^平	tjung ^平	tjang ^平	tju ^平	tjəm ^平	djang ^平	djang ^平
Lìshuǐ	təʔ ⁷	tioʔ ⁷	t ¹	ton ¹	tian ¹	ty ¹	ton ¹	dən ²	--
Qīngtián	teʔ ⁷	tioʔ ⁷	t ¹	ton ¹	te ¹	ty ¹	tian ¹	--	--
Lóngquán	t ⁷	tioʔ ⁷	t ¹	ton ¹	tian ¹	t ¹	--	de ²	de ²
Qīngyuán	t ⁷	tioʔ ⁷	t ¹	ton ¹	tian ¹	tye ¹	ton ¹	te ²	te ²
Sōngyáng	--	tioʔ ⁷	tua ¹	--	tian ¹	--	tin ¹	dæn ²	--
Suīchāng	t ⁷	tyoʔ ⁷	t ¹	tin ¹	tian ¹	--	--	dæn ²	dæn ²
Yúnhé	--	tyoʔ ⁷	t ¹	ton ¹	tian ¹	--	--	te ²	--
Tàishùn	--	tyoʔ ⁷	t ¹	tō	tian ¹	ty ¹	tan ¹	--	--

On the other hand, most of the 章 *zhāng* group characters in all varieties of Chùqú dialects have merged with the 精 *jīng* group ones and are all read as dental affricates. For example, it is reported that the characters 昌 *chāng* ‘prosperous’ (昌 *chāng* initial) and 槍 *qiāng* ‘spear, gun’ (清 *qīng* initial) are read the same in the Chùqú dialects, as are 船 *chuán* ‘boat, ship’ (船 *chuán* initial) and 旋 *xuán* ‘revolve, spin’ (邪 *xié* initial), and 唇 *chún* ‘lip’ and 巡 *xún* ‘patrol’ (Fu et al. 1986). There are a few characters, however, that are read as dental stops, as in the Min dialects. For example, the word for ‘elbow’ in the Wú dialects is 手肘頭 *shǒu zhōng tóu*, and is read as [ɕiəu³ tãŋ¹ dəu²] in Lìshuǐ, and [tɕhye³ ʔdɐ¹ tiu²] in 慶元 Qīngyuán, where the character 肘 *zhōu* is read with a dental stop initial in both places despite being a 照 *zhào* group initial character. The same character is also read with a dental stop initial in many of the Mǐn dialects (Pan 1995).

For the source of the 知 *zhī* group characters read as dental stops in Chùqú dialect, several different possibilities have been proposed by different scholars. Some think it is through contact influence through Mǐn, since Chùqú dialect is located beside the Mǐn dialect group (Fu et al. 1986). On the other hand, for the 照 *zhào* group characters, scholars such as Akitani (1999) consider this as evidence that show an early relationship between Wú and Mǐn. It has also been proposed by scholars such as Pan (1995) that Mǐn was brought to south from the north through a wave of immigrants in early times. This wave of immigrants first by the modern Wú region before continuing south to the modern Mǐn area, mixing with the local people and leaving traces of their language there. Thus the 照 *zhào* group characters that are read as dental stops, the same as in the Mǐn dialects, reflect one of the oldest layers in Wú that shows early contact with Mǐn (You 2015).

In sum, among the six subgroups of the Wú dialects, the *dú rú duān zǔ* phenomenon of 知 *zhī* group divisions II and III characters is only found in the vernacular layer readings of the Chùqú dialect. The other dialects have various readings of dental, palato-alveolar, alveolo-palatal, and/or retroflex affricates for 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters. The Chùqú dialect also has some characters of the 照 *zhào* group initial group that are read as dental stops, similar to the Mǐn dialects. Some scholars consider the *dú rú duān zǔ* phenomenon in Chùqú to be due to contact with Mǐn, since Chùqú is located next to the Mǐn dialect group. Other scholars consider it to be substratum evidence that show early Mǐn immigrants passing by modern Wú region before entering modern Mǐn area from the north.

1.2.3 The Hakka dialect group

Hakka, or 客家 Kèjiā in Mandarin, is also one of the major dialects groups. Although most scholars agree Hakka as one of the seven major Chinese dialect groups, there remains much in debate on which varieties can be classified as Hakka dialects, as well as the inner subgrouping of the dialect group. Different scholars give a range of four to eight major subgroups based on different criteria. Here I follow a stricter linguistic subgrouping of four dialects: 嘉應 Jiāyīng, the most representative of the Hakka dialect group and also the most widely distributed, 本地話 Běndihuà ‘local speech’ Běndì dialect, 江西 Jiāngxī, and 閩西 Mǐnxī, Western Mǐn or Western Fújiàn (Lau 2015).

In general, the Hakka dialects do not have the *dú rú duān zǔ* phenomenon. The majority of the 知 *zhī* group, 莊 *zhuāng* group, 章 *zhāng* group, and 精 *jīng* group characters are read as affricates in most Hakka dialects. The readings of 知 *zhī* group, 莊 *zhuāng* group, 章 *zhāng* group, and 精 *jīng* group characters in various Hakka dialects can be grouped into several different types. The first type is merging of all 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group initials into dental affricates. This is also the most common type found in the Hakka dialects (Liu 1999, Liu 2004, Chang & Wan 2002). The following table shows some example characters in these dialects.

Table 12. First type readings of 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters of some Hakka dialects. Table modified from Chang & Wan 2002. Tones omitted in the original table. MX: Méixiàn 梅縣, WY: Wēngyuán 翁源, NH: Níngguà 寧化, ND: Níngdū 寧都, LC: Lùchuān 陸川, XG: Xiānggǎng 香港. Jy – Jiāyīng, B – Běndì, Jx – Jiāngxī, WF – Western Fújiàn.

	知 <i>zhī</i> group					照 <i>zhào</i> group				
	-Voi, -Asp		-Voi, +Asp	+Voi		-Voi, -Asp	-Voi, +Asp	+Voi	-Voi, Fri.	+Voi, Fri.
Div II	罩 <i>zhào</i>	摘 <i>zhāi</i>	拆 <i>chāi</i>	茶 <i>chá</i>	賺 <i>zhuàn</i>	債 <i>zhài</i>	初 <i>chū</i>	查 <i>chá</i>	沙 <i>shā</i>	

MC initial	知 <i>zhī</i>		徹 <i>chè</i>	澄 <i>chéng</i>		莊 <i>zhuāng</i>	初 <i>chū</i>	崇 <i>chóng</i>	生 <i>shēng</i>		
QYS	tau ^去	tek ^入	tʰek ^入	ɬa ^平	ɬəm ^去	tʂai ^去	tʂhjwo ^平	dza ^平	ʂa ^平		
MX	Jy	tsau	tsak	tsʰak	tsʰa	tsʰən	tsai	tsʰɿ	tsʰa	ta	
WY	Jy	tsau	tsak	tsʰak	tsʰa	tsʰaŋ	tsai	tsʰy	tsʰa	sa	
NH	WF	tsau	tsa	tsʰa	tsʰa	tsʰuaŋ	tsa	tsʰu	tsʰa	sa	
ND	Jx	tsə	tsa	tsʰa	tsʰa	tsʰɔ̃	tsæ	tsʰu	tsʰa	sa	
LC	Jy	tsau	tsek	tsʰek	tsʰa	tsʰan	tsai	tsʰo	tsʰa	sa	
XG	Jy	tsau	tsak	tsʰak	tsʰa	tsʰan	tsai	tsʰɔ	tsʰa	sa	
Div III	豬 <i>zhū</i>	張 <i>zhāng</i>	抽 <i>chōu</i>	綢 <i>chóu</i>	丈 <i>zhàng</i>	帚 <i>zhǒu</i>	臭 <i>chòu</i>	舌 <i>shé</i>	手 <i>shǒu</i>	仇 <i>chóu</i>	
MC initial	知 <i>zhī</i>		徹 <i>chè</i>	澄 <i>chéng</i>		章 <i>zhāng</i>	昌 <i>chāng</i>	船 <i>chuán</i>	書 <i>shū</i>	禪 <i>shàn</i>	
QYS	tjwo ^平	tjang ^平	tʂjəu ^平	djəu ^平	djang ^去	tʂjəu ^上	tʂhjəu ^去	dʒjət ^入	ʂjəu ^上	ʒjəu ^平	
MX	Jy	tsu	tsəŋ	tsʰu	tsʰu	tsəŋ	tsu	tsʰu	sat	su	su
WY	Jy	tsy	tsəŋ	tsʰiu	tsʰiu	tsəŋ	tsiu	tsʰiu	sat	siu	siu
NH	WF	tsɿ	tsəŋ	tsʰəu	tsʰəu	tsʰəŋ	tsəu	tsʰəu	sɿ	səu	səu
ND	Jx	tsie	tsəŋ	tsʰəu	tsʰəu	tsʰəŋ	tsəu	tsʰəu	sat	səu	səu
LC	Jy	tsu	tsəŋ	tsʰau	tsʰau	tsʰəŋ	tsau	tsʰau	sat	sau	sau
XG	Jy	tsu	tsəŋ	tsʰiu	tsʰiu	tsʰəŋ	tsiu	tsʰiu	sat	siu	siu

The second type is 知 *zhī* group division II and 莊 *zhuāng* group merging into dental affricates, while 知 *zhī* group division III and 章 *zhāng* group merge together and can be variously read as palate-alveolar, retroflex, and/or alveolo-palatal affricates (Liu 1999, Liu 2004, Chang & Wan 2002). The table below shows some examples of this type of reading in some Hakka dialects.

Table 13. Second type readings of 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters of some Hakka dialects. Table modified from Chang & Wan 2002, Li & Chang 1992. Tones omitted in the original table. LN: Liánnán 連南, JX: Jiēxī 揭西, ZT: Zhǎngtīng 長汀, SD: Sāndū 三都, DY: Dàiyú 大余, XH: Xīhé 西河. Subgrouping: Jy – Jiāyīng, B – Běndì, Jx – Jiāngxī, WF – Western Fújiàn.

	知 <i>zhī</i> group					照 <i>zhào</i> group				
	-Voi, -Asp		-Voi, +Asp	+Voi		-Voi, -Asp	-Voi, +Asp	+Voi	-Voi, Fri.	+Voi, Fri.
Div II	罩 <i>zhào</i>	摘 <i>zhāi</i>	拆 <i>chāi</i>	茶 <i>chá</i>	賺 <i>zhuàn</i>	債 <i>zhài</i>	初 <i>chū</i>	查 <i>chá</i>	沙 <i>shā</i>	
MC initial	知 <i>zhī</i>	知 <i>zhī</i>	徹 <i>chè</i>	澄 <i>chéng</i>	澄 <i>chéng</i>	莊 <i>zhuāng</i>	初 <i>chū</i>	崇 <i>chóng</i>	生 <i>shēng</i>	
QYS	tau ^去	tek ^入	tʰek ^入	ɬa ^平	ɬəm ^去	tʂai ^去	tʂhjwo ^平	dza ^平	ʂa ^平	
LN	Jy	tsau	tsak	tsʰak	tsʰa	tsʰan	tsai	tsʰəu	tsʰa	sa

JX	Jy ⁶	tsau	tsak	ts ^h ak	ts ^h a	ts ^h ɔŋ	tsai	ts ^h ɿ	s ^h a	sa	
ZT	WF	tsɔ	tsa	ts ^h a	ts ^h a	ts ^h aŋ	tsai	ts ^h u	ts ^h a	sa	
SD	Jx	tsau	tsak	ts ^h ak	ts ^h a	ts ^h aŋ	tsai	ts ^h ɿ	ts ^h a	sa	
DY	Jy	tsɔ	tsa	ts ^h a	ts ^h a	tsɔŋ	tsæ	ts ^h u	ts ^h a	sa	
XH	Jy	θau	θak	t ^h ak	t ^h a	t ^h aŋ	θai	t ^h u	t ^h a	sa	
		豬 <i>zhū</i>	張 <i>zhāng</i>	抽 <i>chōu</i>	綢 <i>chóu</i>	丈 <i>zhàng</i>	帚 <i>zhǒu</i>	臭 <i>chòu</i>	舌 <i>shé</i>	手 <i>shǒu</i>	仇 <i>chóu</i>
MC initial		知 <i>zhī</i>	知 <i>zhī</i>	徹 <i>chè</i>	澄 <i>chéng</i>	澄 <i>chéng</i>	章 <i>zhāng</i>	昌 <i>chāng</i>	船 <i>chuán</i>	書 <i>shū</i>	禪 <i>shàn</i>
QYS		tjwo ^平	tjang ^平	tʰjəu ^平	djəu ^平	djang ^去	tʰjəu ^上	tʰhəu ^去	dʒjät ^入	ʃjəu ^上	ʒjəu ^平
LN	Jy	tʃy	tʃɔŋ	tʃ ^h iu	tʃ ^h iu	tʃ ^h ɔŋ	tʃiu	tʃ ^h iu	ʃet	ʃiu	tʃ ^h iu
JX	Jy	tʃu	tʃɔŋ	tʃ ^h iu	tʃ ^h iu	tʃ ^h ɔŋ	tʃiu	tʃ ^h iu	ʃat	ʃiu	tʃ ^h iu
ZT	WF	tʃu	tʃɔŋ	tʃ ^h əu	tʃ ^h əu	tʃ ^h ɔŋ	tʃəu	tʃ ^h əu	ʃe	ʃəu	tʃ ^h əu
SD	Jx	tʃu	tʃɔŋ	tʃ ^h u	tʃ ^h u	tʃ ^h ɔŋ	tʃu	tʃ ^h u	ʃet	ʃu	tʃ ^h u
DY	Jy	tɛy	tsɔ̃	tɛ ^h iu	tɛ ^h iu	ts ^h ɔ̃	teiu	tɛ ^h iu	sə	eiu	tɛ ^h iu
XH	Jy	tʃu	tʃɔŋ	tʃ ^h u	tʃ ^h u	tʃ ^h ɔŋ	tʃu	tʃ ^h u	ʃet	ʃu	tʃ ^h u

The more interesting type is the one represented by 西河 Xīhé in the above table. Located in 廣西 Guǎngxī, this dialect has the Middle Chinese 知 *zhī* group division II and 莊 *zhuāng* group unaspirated initials now read as a voiceless dental fricative θ-, while the aspirated initials as a voiceless dental stop t^h-. The 知 *zhī* group division III and 章 *zhāng* group characters in Xīhé are read as palato-alveolar affricates. This situation is similar to some Gàŋ dialects such as 南城 Nánchéng, 樂安 Lè’ān, and 宜黃 Yíhuáng. Wan considers this phenomenon in the Xīhé Hakka dialect and the Gàŋ dialects to be a feature influenced by the Tai-Kadai languages (Chang & Wan 2002).

Aside from Xīhé dialect, there are also some other Hakka dialects that have 知 *zhī* group characters read as stops. In several of the Hakka dialects located in western Fújiàn such as 連城 Liánchéng

⁶ There are different classifications of the Jiēxī Hakka dialect. Some classify it as Jiāyīng, others as 粵東 Yuèdōng ‘Eastern Yuè’, which according to You (2015) would be Běndì. 中國語言地圖集 Zhōngguó Yǔyán Dìtújí ‘Map Collection of Languages in China’ (2012) classifies it as 粵台片 Yuètái subdialect, which would be under You’s Jiāyīng dialect.

and 四堡 Sibǎo, some 知 *zhī* group division III and 章 *zhāng* group characters are read as velar stops (Chang & Wan 2002). The table below gives some examples of the character readings.

Table 14. Some character readings of 知 *zhī* group division III and 章 *zhāng* group in the two western-Fújiàn Hakka dialects Liánchéng (LC) and Sibǎo (SB). Data from Luo & Deng (1995: 46-47). The MC affricate initials that are read as velar stops are marked blue and bolded here after.

	-Voi, -Asp		-Voi, +Asp			+Voi		-Voi, Fri.		+Voi, Fri.
知 <i>zhī</i> group	轉 <i>zhuǎn</i>	豬 <i>zhū</i>				傳 <i>chuán</i>	錘 <i>chuí</i>			
MC	山合三上 獮知	遇開三 平魚知				山合三平 仙澄	止合三 平支澄			
QYS	tjwǎn ^上	tjwo ^平				djwǎn ^平	djwi ^平			
LC	kue ^上	tjye ^{陰平}				k^hue ^{陽平}	tj ^h ye ^{陽平}			
SB	kuæŋ ^上	ku ^{陰平}				k^huæŋ ^{陽平}	k^hu ^{陽平}			
章 <i>zhāng</i> group	專 <i>zhuān</i>	珠 <i>zhū</i>	喙 <i>huì</i>	穿 <i>chuān</i>	處 <i>chù</i>			鼠 <i>shǔ</i>	伸 <i>shēn</i>	殊 <i>shū</i>
MC	山合三平 仙章	遇合三 平虞章	止合三去 支昌	山合三平 仙昌	遇開三去 御昌			遇合三 上魚書	臻開三平 真書	遇合三 平虞禪
QYS	tśjwǎn ^平	tśju ^平	tśhjwě ^去	tśhjwǎn ^平	tśhjwo ^去			śjwo ^上	śjēn ^平	źju ^平
LC	kue ^{陰平}	tjye ^{陰平}	kvi ^{陰去}	k^hue ^{陽平}	tj ^h ye ^{陰去}			tj ^h ye ^{陰上}	k^heun ^{陰平}	jye ^{陰平}
SB	kuæŋ ^{陰平}	ku ^{陰平}	kue ^{陰去}	k^huæŋ ^{陽平}	k^hu ^{陰去}			k^hu ^{陰上}	k^huin ^{陰平}	k^hu ^{陰平}

Luo and Deng consider this change in the western Fújiàn Hakka dialects an innovation. First, although there may be some exceptions, there is a clear condition for the velar readings to occur before *hékǒu* characters, and affecting all across the 知 *zhī* group division III and 章 *zhāng* group characters. This is quite different to the situation in the Mǐn dialects, where the retention of velar readings from Old Chinese are preserved sporadically in only some of the 章 *zhāng* group characters, for instance 枝 *zhī* is [ki] in many of the Mǐn dialects. Secondly, scholars such as Li Fang-Kuei have shown that Middle Chinese dental or palatal affricates that can be traced back to

⁷ Given as Sibǎo [‘kuæŋ] and Liánchéng [‘k^hue] in Luo & Deng 1995: 46.

Old Chinese velars are found only among the Middle Chinese 章 *zhāng* group characters. In the western Fújiàn Hakka dialects, however, velar-initial readings are also found in the 知 *zhī* group characters. This implies that the 知 *zhī* group and 章 *zhāng* group characters changed into velars together. On the other hand, for the 知 *zhī* group division III and 章 *zhāng* group characters that are not read as velars, they are all read as palato-alveolars $tʃ^-$, $tʃ^h$ in Liánchéng and Sibǎo. It is not clear, however, whether these readings simply stay unaffected by the change into velars, or if they changed into velars at some point and then changed to palatals. It is also not clear why in some of the western Fújiàn Hakka dialects like Liánchéng, some of the 知 *zhī* group and 章 *zhāng* group characters are read as velars while some as palato-alveolars. The conclusion that Luo and Deng make is that this is a change interrupted in the middle of the sound change process due to forces such as the interference or competition of other sound changes (Luo & Deng 1995: 46-51).

Another dialect 武平 Wǔpíng has some 知 *zhī* group division III and 章 *zhāng* group characters read as dental stops. For example, 知 *zhī* ‘to know’ (止開三平支知, QYS tje^{陰平}) [ts_1^1] or [$t^h_1^1$]. On the other hand, the 知 *zhī* group division III and 章 *zhāng* group characters that are not read as dental stops are read as dental affricates in Wǔpíng, same as the 知 *zhī* group division II and 莊 *zhuāng* group character readings. For instance, 遮 *zhē* ‘to cover’ (假開三平麻章, QYS tʃja^平) [$tʃa^1$], and 朝 *zhāo* ‘morning’ (效開三平宵知, QYS tjäu^平) [$tsəu^1$] (Li & Chang 1992). The source of the readings of these characters are in more debate, since in Wǔpíng the *dú rú duān zǔ* phenomenon does not occur all across the 知 *zhī* group division III and 章 *zhāng* group characters. Some scholars think they are retentions from Old Chinese, while other scholars consider them to have clear conditions and are better treated as innovations (Chang & Wan 2002).

Another Hakka dialect, 奉新縣澡溪鄉 Fèngxīn County Zǎoxī Town, is a dialect that has the majority of 知 *zhī* group division III and 章 *zhāng* group characters read as dental stops. Zǎoxī is an interesting case since it is the only Hakka dialect that exhibits the *dú rú duān zǔ* phenomenon all across the 知 *zhī* group division III and 章 *zhāng* group characters. For example, 豬 *zhū* ‘pig’ [tu¹] (遇合三平魚知, QYS tjo^平), and 遮 *zhē* ‘to cover’ [ta⁴] (假開三平麻章, QYS tsja^平). The division II 知 *zhī* group and 莊 *zhuāng* group are mostly read as dental affricates. For instance, 罩 [tsau⁴] (效開二去效知, QYS tau^去), and 愁 [ts^heu²] (流開三平尤崇, QYS dzjəu^平) (Liu 1999). According to Liu (2004), the Middle Chinese 照 *zhào* group fricatives, i.e. the 船 *chuán*, 書 *shū*, and some of the 禪 *shàn* initials, are read as retroflex fricatives. Since Zǎoxī is a dialect surrounded by Gàn dialects that have the *dú rú duān zǔ* phenomenon, it is most likely that the *dú rú duān zǔ* phenomenon is influenced by surrounding dialects (Liu 2004). For the other Hakka dialects that do not show the *dú rú duān zǔ* phenomenon, a few 知 *zhī* group characters are commonly read as dental stop initials across many Hakka dialects, for example 知 *zhī* ‘to know’ is read as [ti^平] in 梅縣 Méixiàn, 翁源 Wēngyuán, and 長汀 Chángtīng. Two other characters mentioned that are like this are 啄 *zhuó* ‘peck’ (江開二入覺知, QYS tək^入) and 擇 *zé* ‘pick’ (梗開二入陌澄, QYS dek^入), although the specific readings in the individual dialects are not given. Since there are only a few cases that are read as dental stops, most scholars agree on treating them as retention from Old Chinese (Huang 1987).

In sum, the Hakka dialects in general do not show the *dú rú duān zǔ* phenomenon. The 知 *zhī* group and 照 *zhào* group characters are read as palato-alveolar, retroflex, and/or alveolo-palatal affricates, depending on the dialect and different phonetic environment. There are a few characters

that have dental stop readings across many of the Hakka dialects, such as 知 *zhī* ‘to know’, 啄 *zhuó* ‘peck’, and 擇 *zé* ‘pick’, but since these cases are few, they are probably best considered as readings retained from Old Chinese (Huang 1987). There are a few Hakka dialects, however, that have more than just a few cases of the *dú rú duān zǔ* phenomenon in the Middle Chinese 知 *zhī* group and 照 *zhào* group characters, though their sources vary. Xīhé has the Middle Chinese 知 *zhī* group division II and 莊 *zhuāng* group unaspirated initials now read as a voiceless dental fricative θ-, while the aspirated ones as a voiceless dental stop t^h-. The 知 *zhī* group division III and 章 *zhāng* group characters are read as palato-alveolar affricates. Wan (1998) considers this phenomenon in the Xīhé Hakka dialect and the Gàn dialects that have similar phenomena to be influenced by the Tai-Kadai languages. Liánchéng Sibǎo has some 知 *zhī* group division III and 章 *zhāng* group characters read as velar stops, and these readings are considered to be an innovation by most scholars. Wǔpíng has some 知 *zhī* group division III and 章 *zhāng* group characters read as dental stops. Some scholars think they are retentions from Old Chinese, while other scholars consider them to have clear conditions and are better treated as innovations. Zǎoxī is the only Hakka dialect that has the majority of 知 *zhī* group division III and 章 *zhāng* group characters read as dental stops. Since it is surrounded by Gàn dialects that have the *dú rú duān zǔ* phenomenon, it is most likely that this is due to influence by the surrounding Gàn dialects.

1.2.4 The Yuè dialect group

The Yuè dialect group is also a dialect group that has high inner complexity. There are still debates on the sub-grouping of the Yuè dialects, but according to Kwok et al. (2015) the Yuè dialect group

can be further divided into seven sub-groups: (1) 廣府 Guǎngfǔ, including those spoken in 廣州 Guǎngzhōu, 香港 Xiānggǎng Hong Kong, and 澳門 Àomén Macau. This dialect is also known as Cantonese, which is the most prestigious dialect of the Yuè dialect group. (2) 四邑 Sìyì, including 台山 Táishān, sometimes known as Toishanese or Taishanese overseas. (3) 高陽 Gāoyáng, spoken in regions of southwestern 廣東 Guǎngdōng. (4) 吳化 Wúhuà, located along the southwestern coast of Guǎngdōng, surrounded by the Gāoyáng dialect. (5) 勾漏 Gōulòu, spoken in northwestern Guǎngdōng and eastern 廣西 Guǎngxī. There is still no consensus on whether this dialect should be classified as a dialect of Yuè or 平話 Píng huà, another major Chinese dialect group still in debate. (6) 邕潯 Yōngxún, distributed over central and western Guǎngxī, characterized by having strong 壯 Zhuàng influence. (7) 欽廉 Qīnlián, spoken along the southern coast of Guǎngxī.

The Yuè dialect group is a dialect group that generally does not have the *dú rú duān zǔ* phenomenon in the 知 *zhī* group and 照 *zhào* group initials. In most of the Yuè dialects the 知 *zhī* group, 照 *zhào* group, and 精 *jīng* group characters have all merged into just one set of affricates, either dental or palato-alveolar (Sang 2008, Carlyle 2020: 112-116). A few common 知 *zhī* group and 照 *zhào* group characters may have dental stop readings in some dialects, but they appear to be sporadic (Zhan & Chen 1998). The table below shows some 知 *zhī* group and 照 *zhào* group character readings in various Yuè dialects.

Table 15. 知 *zhī* group and 照 *zhào* group initial characters in the Yuè dialect group. 廣州 Guǎngzhōu (GZ) data from Bai (1998), 東莞 Dōngguǎn (DG) from Zhan & Chen 1998, 懷集懷城 Huáijí Huáichéng (HH) from Yang (2012), 廉州 Liánzhōu (LZ) from Li (2010). Subgrouping: GF – Guǎngfǔ 廣府, GL – Gōulòu 勾漏, QL – Qīnlián 欽廉.

	知 <i>zhī</i> group	照 <i>zhào</i> group
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	-Voi, -Asp		-Voi, +Asp	+Voi	-Voi, - Asp	-Voi, +Asp	+Voi	-Voi, Fri.	+Voi, Fri.	
Div II	站 <i>zhàn</i>			茶 <i>chá</i>	莊 <i>zhuāng</i>	初 <i>chū</i>	床 <i>chuáng</i>	生 <i>shēng</i>		
MC	咸開二去 陷知			假開二 平麻澄	宕開三平 陽莊	遇開三平 魚初	宕開三平 陽崇	梗開二平 庚生		
QYS	t̚am ^去			da ^平	tsjang ^平	tshjwo ^平	dzjang ^平	ʂəŋ ^平		
GZ	GF	tsam ²²		ts ^h a ²¹	tsəŋ ⁵³	--	ts ^h əŋ ²¹	saŋ ³⁵		
DG	GF	--		ts ^h a ²¹	tsəŋ ²¹³	ts ^h ə ²¹³	--	səŋ ²¹³		
HH	GL	tsam ³²⁵		tsa ²³¹	tsəŋ ⁴²	ts ^h ə ⁴²	tsəŋ ²³¹	θəŋ ⁴²		
LZ	QL	t̚ ^h am ²¹		t̚ ^h a ³³	t̚ ^h əŋ ⁴⁵	t̚ ^h ə ⁴⁵	ʃəŋ ³³	ʃəŋ ⁴⁵		
Div III	知 <i>zhī</i>	豬 <i>zhū</i>	抽 <i>chōu</i>	柱 <i>zhù</i>	戰 <i>zhàn</i>	穿 <i>chuān</i>	船 <i>chuán</i>	手 <i>shǒu</i>	時 <i>shí</i>	
MC	止開三平 支知	遇開三 平魚知	流開三平 尤微	遇合三 上麌澄	山開三去 線章	山合三平 仙昌	山合三平 仙船	流開三上 有書	止開三平 之禪	
QYS	tje ^平	tjwo ^平	t̚jəu ^平	dju ^上	tsjän ^去	tshjwän ^平	dzjwän ^平	sjəu ^上	ʒi ^平	
GZ	GF	tsi ⁵³	tsy ⁵³	ts ^h eu ⁵³	ts ^h y ²³	tsin ³³	ts ^h yn ⁵³	syn ³⁵	səu ²³	si ²¹
DG	GF	t̚ei ²¹³	tsy ²¹³	ts ^h au ²¹³	ts ^h y ¹³	tsin ³²	ts ^h əŋ ²¹³	səŋ ²¹	sau ³⁵	si ²¹
HH	GL	tsi ⁴²	t̚y ⁴²	ts ^h au ⁴²	tsy ¹³	tsin ³³	ts ^h yn ⁴²	tsyn ²³¹	θau ⁵³	θi ²³¹
LZ	QL	t̚i ⁴⁵	t̚fu ⁴⁵	t̚ ^h eu ⁴⁵	t̚ ^h u ²¹	t̚in ³³	t̚ ^h un ⁴⁵	ʃun ³³	ʃeu ²⁴	ʃi ³³

Although the 知 *zhī* group and 照 *zhào* group initials do not show the *dú rú duān zǔ* phenomenon in most of the Yue dialects, some of the dialects do show a *dú rú duān zǔ* phenomenon in the 精 *jīng* group and even some of the 知 *zhī* group and 照 *zhào* group characters, particularly in the Sìyì sub-group (Sang 2008, Carlyle 2020: 112-116). The table below gives some examples of 精 *jīng* group, 知 *zhī* group, and 照 *zhào* characters read in various Yuè dialects.

Table 16. 精 *jīng* group initial characters in the Yuè dialect group. Table modified from Mai 1997. Tones omitted from the original source. GZ: Guǎngzhōu 廣州, NN: Nánning 南寧, QZ: Qīnzhōu 欽州, YL: Yùlín 鬱林, TS: Táishān 台山, HS: Hèshān 鶴山. Subgrouping: GF – Guǎngfǔ 廣府, YX – Yōngxún 邕潯, QL – Qīnlíán 欽廉, GL – Gōulòu 勾漏, SY – Sìyì 四邑.

	-Voi, -Asp		-Voi, +Asp	+Voi	+Voi, Fri.	-Voi, Fri.			
	資 <i>zī</i>		此 <i>cǐ</i>	瓷 <i>cí</i>	詞 <i>cí</i>	旋 <i>xuán</i>	私 <i>sī</i>	小 <i>xiǎo</i>	線 <i>xiàn</i>
MC	止開三平脂 精		止開三上紙 清	止開三 平脂從	止開三平 之邪	山合三平仙 邪	止開三平脂 心	效開三上小 心	山開三去線 心
QYS	tsi ^平		tshje ^上	dzi ^平	zi ^平	zjwän ^平	si ^平	sjäu ^上	sjwän ^去
GZ	GF	tsi	ts ^h i	ts ^h i	ts ^h i	syn	si	siu	sin
NN	YX	tsɿ	ts ^h ɿ	ts ^h ɿ	ts ^h ɿ	lyn	sɿ	liu	lin
QZ	QL	tsi	ts ^h i	ts ^h i	ts ^h i	lyn	li	liu	lin
YL	GL	t̚i	t̚ ^h i	t̚ ^h i	t̚ ^h i	lyn	li	liu	lin
TS	SY	tu	lu	lu	lu	lun	lu	liau	len
HS	SY	tsi	t̚ ^h y	ly	t̚ ^h y	lyn	ly	sie	lin

Many scholars have noticed the *dú rú duān zǔ* phenomenon of the 精 *jīng* group characters in these Yuè dialects. Another phenomenon associated with this is that many dialects of Sìyì also has the 端 *duān* group characters read as zero initial or a glottal fricative h- initial. This reasonably suggests a pull chain where the 端 *duān* group initials change to a zero initial or a glottal fricative initial first, then the 精 *jīng* group initials shift to the dental stop slot (Zeng 2013). The 端 *duān* group characters with initials read as glottal fricative h- are marked purple and bolded hereafter.

Table 17. (a) 端 *duān* group and (b) 精 *jīng* group, 知 *zhī* group, and 照 *zhào* group initial characters in some Sìyì subdialects of Yuè. Table modified from Zeng 2013. TS: Táishān 台山, HSs: Hèshān Shāpíng 鶴山沙坪, HSY: Hèshān Yáyáo 鶴山雅瑤, KP: Kāipíng 開平, EP: Ēnpíng 恩平.

(a)

	-Voi, -Asp				-Voi, +Asp			+Voi
	多 <i>duō</i>	短 <i>duǎn</i>	凍 <i>dòng</i>	德 <i>dé</i>	胎 <i>tāi</i>	桶 <i>tǒng</i>	脫 <i>tuō</i>	跳 <i>tiào</i>
MC	果開一平歌 端	山合一上緩 端	通開一去送 端	曾開一入德 端	蟹開一平哈 透	通開一上董 透	山合一入末 透	效開四平蕭 定
QYS	tá ^平	tuân ^上	tung ^去	tøk ^入	thâi ^平	thung ^上	thuât ^入	diêu ^平
TS	ua ³³	uon ⁵⁵	øn ³³	ak ⁵⁵	hoi ⁵⁵	hoŋ ⁵⁵	huot ³³	hiâu ³³
HSs	tou ³⁴	tøn ⁴⁵	tun ³⁴	tek ⁴⁵	thoi ³⁴	huŋ ⁴⁵	thyt ³⁴	thiu ³⁴
HSy	ou ³³	on ⁵⁵	on ³³	ak ⁵⁵	hye ³³	hoŋ ⁵⁵	huot ³³	hie ³³
KP	u ³³	on ⁵⁵	øn ³³	ak ⁵⁵	hoi ³³	hoŋ ⁵⁵	hot ³³	hiu ³³
EP	tua ³³	tuan ⁵⁵	ton ³³	tak ⁵⁵	huai ²²	hoŋ ⁵⁵	huat ³³	hiu ²²

(b)

	-Voi, -Asp	-Voi, +Asp	+Voi	+Voi, Fri.	-Voi, -Asp	-Voi, +Asp	+Voi
	精 <i>jīng</i> group				莊 <i>zhuāng</i> group		
	左 <i>zuǒ</i>	草 <i>cǎo</i>	坐 <i>zuò</i>	象 <i>xiàng</i>		初 <i>chū</i>	床 <i>chuáng</i>
MC	果開一上哥 精	效開一上皓 清	果合一上果 從	宕開三上養 邪		遇開三平魚 初	宕開三平陽 崇
QYS	tsâ ^上	tshâu ^上	dzua ^去	zjang ^上		tshjwo ^平	dzjang ^平
TS	tua ⁵⁵	thau ⁵⁵	tua ³¹	tian ³¹		ts ^h ua ³³	ts ^h oŋ ²²
HSs	tsou ⁴⁵	th ^h a ⁴⁵	th ^h ou ³⁴	tsoŋ ³¹		th ^h ou ³⁴	th ^h oŋ ²³
HSy	tou ⁵⁵	th ^h e ⁵⁵	tou ³² , th ^h ou ³³	tun ³²		ts ^h ou ³³	ts ^h œŋ ¹²
KP	tu ⁵⁵	th ^h o ⁵⁵	tu ²¹ , th ^h u ³³	tian ³⁵		ts ^h u ³³	ts ^h oŋ ²²
EP	tsua ⁵⁵	ts ^h ou ⁵⁵	ts ^h ua ³³	tsioŋ ²¹		ts ^h ua ³³	ts ^h oŋ ²²
	知 <i>zhī</i> group				章 <i>zhāng</i> group		

		抽 <i>chōu</i>	茶 <i>chá</i>	柱 <i>zhù</i>			穿 <i>chuān</i>	
MC		流開三平尤 微	假開二平麻 澄	遇合三上 麌澄			山合三平仙 昌	
QYS		tʰjəu ^平	ɕa ^平	ɕju ^上			tʰjwän ^平	
TS		ts ^h eu ³³	ts ^h a ²²	ts ^h ui ²¹			ts ^h un ³³	
HSs		t ^h eu ³⁴	t ^h p ²³	t ^h y ¹³			t ^h yn ³⁴	
HSy		ts ^h au ³³ , ts ^h əu ³⁴	ts ^h ia ¹²	tsy ³²			t ^h yn ³³	
KP		ts ^h au ³³	ts ^h a ²²	ts ^h ui ¹¹			ts ^h ən ³³	
EP		ts ^h ei ³³	ts ^h a ²²	ts ^h ui ²¹			ts ^h ien ³³	

In the Guǎngdōng and Guǎngxī Yuè speaking regions, there are many of the local Chinese dialects that are still in debate of their classification, due to the highly mixed linguistic situation including Chinese dialects like Yuè, Hakka, Xiāng, and Gàn, and some non-Chinese languages like Zhuang. Many of these local dialects, however, also show the feature of 精 *jīng* group characters read as dental stops. Unlike the Sìyì dialects where there is a pull chain of 端 *duān*- and 透 *tòu*-initial characters changing to zero initial and glottal fricative h- first, these local dialects mostly show a complete merger with the 端 *duān* group characters without the 端 *duān* group characters changing to something else first, as in 昭平 Zhāopíng, 鍾山 Zhōngshān, and 八都話 Bādūhuà (Mai 2008, Huang 2006, Deng 2000). There are also some local dialects that show the *dú rú duān zǔ* phenomenon in some of the commonly used 知 *zhī*, 照 *zhào*, and/or 精 *jīng* group characters, as in 沙坊話 Shāfānghuà (Zou 2016). The following table presents some example characters from these local dialects.

Table 18. (a) 端 *duān* group and (b) 精 *jīng*, 知 *zhī*, 莊 *zhuāng*, and 章 *zhāng* group initial characters in some of the non-classified local dialects in the Yuè-speaking region. 八都話 Bādūhuà (BD) data from Mai (2008), 昭平 Zhāopíng (ZP) from Huang (2006), 鍾山 Zhōngshān (ZS) from Deng (2000), 沙坊話 Shāfānghuà (SF) from Zou (2016).

(a)

	-Voi, -Asp				-Voi, +Asp				+Voi
	多 <i>duō</i>	短 <i>duǎn</i>	凍 <i>dòng</i>	德 <i>dé</i>	胎 <i>tāi</i>	桶 <i>tǒng</i>	跳 <i>tiào</i>	脫 <i>tuō</i>	糖 <i>táng</i>

MC	果開一平 歌端	山合一上 緩端	通開一去 送端	曾開一人 德端	蟹開一平 哈透	通開一上 董透	效開四平 蕭定	山合一入 末透	宕開一平 唐定
QYS	tâ ^平	tuân ^上	tung ^去	tək ^入	thai ^平	thung ^上	diou ^平	thuât ^入	dang ^平
Bādūhuà	lʊ:ə ⁵⁵	lən ³⁵	li:ən ⁵³	lə ³¹	tʰai ⁵⁵	tʰi:ən ³⁵	tʰi:ə ⁵³	tʰu:ə ²⁴	tən ³³
Zhāopíng	tə ⁵²	tun ⁵⁵	tun ⁴⁴	tək ⁵	tʰoi ⁵²	tʰun ⁵⁵	tʰiu ⁴⁴	tʰut ⁵	tuən ²⁴²
Zhōngshān	lɔ ³⁵	lũ ⁴²	lõ ⁵¹	lɔ ⁴⁴	tʰø ³⁵	tʰø ⁴²	tʰiu ⁵¹	tʰũ ⁵¹	tiã ²¹³
Shāfānghuà	tə ⁵³	tun ³⁵	ton ⁵⁵	tət ⁴	tʰei ⁵³	tʰon ³⁵	tiu ⁵⁵	tʰut ⁴	tən ³³

(b)

	-Voi, -Asp		-Voi, +Asp		+Voi			-Voi, Fri.	+Voi, Fri.
精 <i>jīng</i>	左 <i>zuǒ</i>	資 <i>zī</i>	草 <i>cǎo</i>	次 <i>cì</i>	坐 <i>zuò</i>	秦 <i>qín</i>	自 <i>zì</i>	酸 <i>suān</i>	象 <i>xiàng</i>
MC	果開一上 寄精	止開三平 脂精	效開一上 皓清	止開三去 至清	果合一上 果從	臻開三平 眞從	止開三去 至從	山合一平 桓心	宕開三上 養邪
QYS	tsâ ^上	tsi ^平	tshâ ^上	tshi ^去	dzuâ ^去	dzjĕn ^平	dzi ^去	suân ^平	zjang ^上
BD	tʊ:ə ³⁵	tsɿ ⁵⁵	tʰeu ³⁵	tsʰ ⁵³	sʊ:ə ¹³	tiŋ ³³	sɿ ³¹	səŋ ⁵⁵	si:əŋ ¹³
ZP	tə ⁵⁵	tʰi ⁵²	tʰeu ⁵⁵	tʰi ⁴⁴	fo ³⁵	fĕn ²⁴²	fʰi ²¹⁴	fun ⁵²	fien ³⁵
ZS	fø ⁵¹	tʰi ³⁵	tʰø ⁴²	tʰi ⁵¹	θø ³³	θuã ²¹³	θi ³¹	θũ ³⁵	θiã ³³
SF	tso ³⁵	tsɿ ⁵³	tsʰa ^{35 8}	tsʰ ⁵⁵	tsʰo ⁵³	tsʰĕn ³³	tsʰ ⁴²	syn ⁵³	tsʰien ^{42 9}
知 <i>zhī</i>	站 <i>zhàn</i>	知 <i>zhī</i>	抽 <i>chōu</i>	痴 <i>chī</i>	茶 <i>chá</i>	柱 <i>zhù</i>	遲 <i>chí</i>		
MC	咸開二去 陷知	止開三平 支知	流開三平 尤徹	止開三平 之徹	假開二平 麻澄	遇合三上 麌澄	止開三平 脂澄		
QYS	tʰəm ^去	tʰje ^平	tʰjəu ^平	tʰi ^平	ɕa ^平	ɕju ^上	ɕi ^平		
BD	tʰo ³¹	lɛi ⁵⁵	tʰʰau ⁵⁵	tʰi ⁵⁵	tʰa ³³	tʰjy ³¹	tɔi ³³		
ZP	tsam ²¹⁴	tsi ⁵²	tsʰeu ⁵²	tsʰi ⁵²	sa ²⁴²	sY ³⁵	si ²⁴²		
ZS	tʰǣ ⁵¹	tʰi ³⁵	tʰʰo ⁵¹	tʰi ³⁵	ʃa ²¹³	ʃy ³³	ʃi ²¹³		
SF	tsʰuan ⁴²	tʰi ^{53 (ㄷ)} , tsi ^{53 (ㄷ)}	tsʰeu ⁵³	--	tsʰo ³³	tsʰy ³⁵	tsʰi ³³		
莊 <i>zhuāng</i>	抓 <i>zhuā</i>		初 <i>chū</i>		查 <i>chá</i>	床 <i>chuáng</i>	士 <i>shì</i>		生 <i>shēng</i>
MC	效開二平 肴莊		遇開三平 魚初		蟹開二平 佳崇	宕開三平 陽崇	止開三上 止崇		梗開二平 庚生
QYS	tʰsau ^平		tʰhjwo ^平		dza ^平	dzjang ^平	dzi ^上		sĕng ^平
BD	--		tʰʰu:əi ⁵⁵		tʰa ³³	tʰəŋ ³³	sɿ ³¹		ʃo ⁵⁵
ZP	tsa ⁵²		tsʰo ⁵²		sa ²⁴²	suən ²⁴²	si ³⁵		sĕŋ ⁵²
ZS	tʰa ³⁵		tʰø ³⁵		ʃa ²¹³	ʃiã ²¹³	ʃi ³¹		ʃã ³⁵
SF	--		tsʰø ⁵³		tsʰo ³³	tsʰĕŋ ³³	si ⁴²		sĕŋ ⁵³
章 <i>zhāng</i>	戰 <i>zhàn</i>	支 <i>zhī</i>	穿 <i>chuān</i>	齒 <i>chǐ</i>	乘 <i>chéng</i>	神 <i>shén</i>	示 <i>shì</i>	翅 <i>chì</i>	時 <i>shí</i>
MC	山開三去 線章	止開三平 支章	山合三平 仙昌	止開三上 止昌	曾開三平 蒸船	臻開三平 眞船	止開三去 至船	止開三去 真書	止開三平 之禪
QYS	tʰjǎn ^去	tʰjĕ ^平	tʰhjwǎn ^平	tʰhi ^上	dʒjəŋ ^平	dʒjĕn ^平	dʒi ^去	ʃje ^去	ʒi ^平
BD	tʰi:ə ⁵³	tʰi ⁵⁵	tʰʰY:ə ⁵⁵	tʰhi ³⁵	ʃiŋ ³³	ʃiŋ ³³	ʃi ⁵³	tʰhi ⁵³	ʃi ³³
ZP	tsin ⁴⁴	tsi ⁵²	tsʰun ⁵²	tsʰi ⁵⁵	sĕŋ ²⁴²	sen ²⁴²	si ²¹⁴	tsʰi ⁴⁴	si ²⁴²
ZS	tʰi ⁵¹	tʰi ³⁵	tʰhi ³⁵	tʰhi ⁴²	ʃe ²¹³	ʃuã ²¹³	ʃi ³¹	tʰhi ⁵¹	ʃi ²¹³
SF	tsin ⁵⁵	tsi ⁵³	tsʰyn ⁵⁵	tsʰi ³⁵	sĕŋ ³³	sen ³³	si ⁴²	tsʰi ⁵⁵	si ³³

⁸ According to Zou (2016), the final -a² is a diphthong that has a very short and weak second vowel ending. The older generation (above 50s) still preserves the contrast between -a² and -a, while the younger generation mostly simply have the two merged to plain -a.

⁹ In the finals -iĕŋ and -iĕk, the main vowel is i, and the ĕ is a 後滑音 (off glide) (Zou 2016).

In sum, in most dialects of Yuè, the 知 *zhī* group and 照 *zhào* group characters have merged with the 精 *jīng* group characters into just one set of coronal affricate, commonly ts- and ts^h- or tʃ- and tʃ^h-. There may be some common 知 *zhī* group and 照 *zhào* group characters that have dental stop readings, but they appear sporadically. On the other hand, the Siyi subgroup is known to have 精 *jīng* group characters read with dental stops in many of its dialects. Since a related common change in these dialects is change of dental stops to zero initial or glottal fricatives, a reasonable explanation is a pull chain at work. In the more linguistically complex Yue-speaking areas, where many of the local Chinese dialects are still in debate of their classification, there appears to be the feature of 精 *jīng* group characters read as dental stops as well. However, these dialects do not have the accompanying sound change of dental stops to zero initial or glottal fricatives, so the pull chain alone is not an adequate explanation for these sound changes.

1.2.5 The Mandarin dialect group

Mandarin is the most well-known Chinese dialect group and the dialect group that has the most speakers. Most scholars agree that Mandarin can at least be separated into a northern subtype, in the areas of the Yellow River regions and China's northeast, and a southern subtype, including the Yangtze River watershed and China's southwest. Based on other different criteria, different scholars further separate Mandarin into other subgroups. Li (1985) identifies seven different Mandarin subgroups based on the development of the 入聲 *rùshēng* 'rù tone'. Liu (1995) further refined Mandarin into three subgroups based on Li's subgrouping: (1) 北方官話 *Běifāng Guānhuà* 'Northern Mandarin', a subgroup of the northern type, including Li's 膠遼 *Jiāoliáo*, 北京 *Běijīng*, and 北方 *Běifāng* (renamed 冀魯 *Jìlǔ*), and adding in a 東北 *Dōngběi* category; (2) 中原官話

Zhōngyuán Guānhuà ‘Central Plains Mandarin’, also a northern type, including Li’s 中原 Zhōngyuán and 蘭銀 Lányín; and (3) 南方官話 Nánfāng Guānhuà ‘Southern Mandarin’, a southern type, including Li’s 江淮 Jiānghuái and 西南 Xīnán ‘Southwestern Mandarin’. The 晉語 Jìn dialects, though considered another major Chinese dialect group by some scholars, conform to the criteria for the identification of the Mandarin dialect group, and will be treated as a dialect under Mandarin dialect group here, under the southern type Mandarin (Simmons 2015).

Mandarin is a dialect group in general that does not have the *dú rú duān zǔ* phenomenon. The 知 *zhī* group- and 照 *zhào* group-initial characters are usually read as dental or retroflex affricates in various Mandarin dialects. The readings of the 知 *zhī* group and 照 *zhào* group characters can be classified into several different types. The first one is a full merger between these groups. The most common result is all initials merging into retroflex affricates, such as in the Beijing dialect, but it can also be a merger into dental affricates, as in 山東定陶 Shāndōng Dìngtáo, 河南靈寶 Hénán Língbǎo, 山西太原 Shānxī Tàiyuán, and in most of Li’s Southwestern Mandarin dialects (Mou 2013). If we take the modern fricatives, i.e. the Middle Chinese 崇 *chóng*, 生 *shēng*, 船 *chuán*, 書 *shū*, and 禪 *shàn* initial characters, in these dialects into consideration, this type can be further grouped into two different subtypes. The first one is where the fricatives have the same place of articulation as the affricates, whether a retroflex or a dental, as in Beijing and 重慶 Chóngqìng dialects. The second subtype is where the fricatives develop into a different place of articulation to the affricates, most commonly a labiodental fricative. This phenomenon is referred to as 擦音游離現象 *cāyīn yóulí xiànxàng* ‘fricative dissociating phenomenon’ in Sang (2008). This subtype occurs in many of the Jìn, Zhōngyuán, and Lányín dialects (Sang 2010). The table

below shows some example characters of this type in Běijīng, Tàiyuán, 揚州 Yángzhōu, and 合肥 Héféi. 泰興根思 Tàixìng Gēnsī represents the subtype where in some characters the fricative has a different place of articulation to the affricates.

Table 19. First type of 知 *zhī* group and 照 *zhào* group initial characters in the Mandarin dialect group. Table modified from Simmons 2015. B -- Běifāng Guānhuà, Z -- Zhōngyuán Guānhuà, N -- Nánfāng Guānhuà.

		知 <i>zhī</i> group		莊 <i>zhuāng</i> group		章 <i>zhāng</i> group	
		-Voi, -Asp	+Voi	+Voi	-Voi, Fri.	-Voi, -Asp	-Voi, Fri.
		豬 <i>zhū</i>	茶 <i>chá</i>	床 <i>chuáng</i>	刷 <i>shuā</i>	紙 <i>zhǐ</i>	手 <i>shǒu</i>
MC		遇開三平魚知	假開二平麻澄	宕開三平陽崇	山合二人點生	止開三上紙章	流開三上有書
QYS		tjwo ^平	da ^平	dzjang ^平	ʃwāt ^入	tʃjě ^上	ʃjəu ^上
Běijīng	B	tʃu ¹	tʃ'a ²	tʃ'uan ²	ʃua ¹	tʃɿ ³	ʃou ³
Tàiyuán	N	tsu ¹	ts'a ¹	ts'ua ¹	suaʔ ⁷	tsɿ ³	səu ³
Yángzhōu	N	tsu ¹	ts'a ²	ts'uan ²	suæʔ ⁷	tsɿ ³	sɿu ³
Héféi	N	tʃu ¹	tʃ'a ²	tʃ'ua ²	ʃueʔ ⁷	tʃɿ ³	ʃɿu ³
Tàixìng Gēnsī	N	tʃu ¹	tʃ'a ²	tʃ'ua ²	ʃueʔ ⁷	tʃɿ ³	ʃɿu ³

The second type is having a two-way distinction in the 知 *zhī* group and 照 *zhào* group character readings. Characters are read as dental, palato-alveolar, alveolo-palatal, and/or retroflex affricates based on different Qiēyùn and rhyme table conditions such as *kāihékǒu*, 內外轉 *nèiwài zhuǎn*, divisions, and/or 攝 *shè*. Some dialects make a distinction between 知 *zhī* group division II and 莊 *zhuāng* group versus 知 *zhī* group division III and 章 *zhāng* group. There could be several different subtypes of these dialects depending on how the *hékǒu* characters are read. These *hékǒu* characters can either be read the same as the 知 *zhī* group division III and 章 *zhāng* group *kāikǒu* characters, typically retroflex affricates, in places majorly in Li's Zhōngyuán Guānhuà and Lányín Guānhuà regions, such as 河南洛陽 Hénán Luòyáng, 甘肅敦煌 Gānsù Dūnhuáng, 陝西渭南 Shǎnxī Wèinán, 山西大同 Shǎnxī Dàtóng (Sang 2008), and 寧夏海原 Níngxià Hǎiyuán (Cao 2006). Or they could be read the same as 知 *zhī* group division II and 莊 *zhuāng* group *kāikǒu* characters,

typically dental affricates, majorly in the Jin dialect regions like 山西臨縣 Shānxī Lín County, 祈縣 Qí County, 忻州 Xīnzhōu (Sang 2008), and 興縣 Xīng County (Shi & Zhang 2014). The following table shows some character readings of these different subtypes.

Table 20. Second type readings of some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters in the Mandarin dialect group. 河南洛陽 Hénán Luòyáng (LY) data from You (2014 & 2015), 寧夏海原 Níngxià Hǎiyuán (HY) from Cao (2006), 山西興縣 Shānxī Xīng County (XX) from Shi & Zhang (2014).

	-Voi, -Asp			-Voi, +Asp		+Voi		-Voi, Fri.			
知 <i>zhī</i> Div II	站 <i>zhàn</i>					茶 <i>chá</i>					
MC	咸開二 去陷知					假開二 平麻澄					
QYS	tām ^去					da ^平					
HY	tsǎ̃ ⁴⁴					ts ^h a ²⁴					
LY	tsan ³¹					ts ^h a ⁵³					
XX	tsǎ̃ ⁵³					ts ^h A ⁵⁵					
知 <i>zhī</i> Div III	知 <i>zhī</i>	豬 <i>zhū</i>	追 <i>zhuī</i>			住 <i>zhù</i>	軸 <i>zhóu</i>				
MC	止開三 平支知	遇開三平 魚知	止合三 平脂知			遇合三 去遇澄	通開三入 屋澄				
QYS	tje ^平	tjwo ^平	tjwi ^平			dju ^去	djuk ^入				
HY	tʂɿ ²²³	tʂu ²²³	tʂuei ²²³			tʂu ⁴⁴	tʂu ²⁴				
LY	tʂɿ ²⁴	tʂu ²⁴	tʂuei ²⁴			tʂu ³¹	tʂu ⁵³				
XX	tʂɿ ³²⁴	tsu ³²⁴	tey ³²⁴ (白)			tsu ⁵³	tʂou ⁵⁵				
莊 <i>zhuāng</i>	抓 <i>zhuā</i>			初 <i>chū</i>		查 <i>chá</i>	床 <i>chuáng</i>	刷 <i>shuā</i>	生 <i>shēng</i>	瘦 <i>shòu</i>	
MC	效開二 平肴莊			遇開三平 魚初		蟹開二 平佳崇	宕開三平 陽崇	山合二入 點生	梗開二 平庚生	流開三 去宥生	
QYS	tʂau ^平			tʂhjwo ^平		dza ^平	dzjang ^平	ʂwăt ^入	ʂeng ^平	ʂjəu ^去	
HY	tʂua ²²³			tʂ ^h u ²²³		ts ^h a ²⁴	tʂ ^h uaŋ ²⁴	ʂua ²²³	səŋ ²²³	səu ⁴⁴	
LY	tʂua ²⁴			tʂ ^h u ²⁴		ts ^h a ²⁴	tʂ ^h uaŋ ⁵³	ʂua ²⁴	səŋ ²⁴	səu ³¹	
XX	tsua ³²⁴			ts ^h u ³²⁴		ts ^h A ⁵⁵	ts ^h ux ⁵⁵	sua [?] 55	ʂɿ ³²⁴ (白), səŋ ³²⁴ (ɤ)	sou ⁵³	
章 <i>zhāng</i>	紙 <i>zhǐ</i>	戰 <i>zhàn</i>		出 <i>chū</i>	車 <i>chē</i>						
MC	止開三 上紙章	山開三去 線章		臻合三入 術昌	假開三 平麻昌						
QYS	tʂjě ^上	tʂjǎn ^去		tʂhjwet ^入	tʂhja ^平						
HY	tsj ⁵³	tʂǎ̃ ⁴⁴		tʂ ^h u ²²³	tʂ ^h ə ²²³						
LY	tsj ⁴⁴	tʂan ³¹		tʂ ^h u ²⁴	tʂ ^h ə ²⁴						
XX	tsj ³²⁴	tʂɛn ⁵³		ts ^h uə [?] 55	tʂ ^h ɿ ³²⁴						
	-Voi							+Voi			

章 zhāng fri.	叔 shū	翅 chī	水 shuǐ	書 shū	說 shuō	手 shǒu	升 shēng	熟 shóu	時 shí	樹 shù
MC	通開三 入屋書	止開三去 寘書	止合三 上旨書	遇開三平 魚書	蟹合三 去祭書	流開三 上有書	曾開三平 蒸書	通開三入 屋禪	止開三 平之禪	遇合三 去遇禪
QYS	ʃjuk ^入	ʃje ^去	ʃwi ^上	ʃjwo ^平	ʃjwäi ^去	ʃjou ^上	ʃjɔŋ ^平	ʒjuk ^入	ʒi ^平	ʒju ^去
HY	ʃu ²²³	ts ^h ₁ ⁴⁴	ʃuei ⁵³	ʃu ²²³	ʃuo ²²³	ʃəu ⁵³	ʃəŋ ²²³	ʃu ²⁴	sɿ ²⁴	ʃu ⁴⁴
LY	--	ts ^h ₁ ³¹	ʃuei ⁴⁴	ʃu ²⁴	ʃuo ²⁴	ʃəu ⁴⁴	ʃəŋ ²⁴	ʃu ⁵³ , ʃəu ⁵³	sɿ ⁵³	ʃu ³¹
XX	suəʔ ⁵⁵	ts ^h ₁ ⁵³	ɛy ^{324 (白)}	su ³²⁴	suəʔ ⁵⁵	ʃou ³²⁴	ʃ ^{55 (白)} , ʃəŋ ^{324 (文)}	suəʔ ³¹²	sɿ ⁵⁵	su ⁵³

Another subtype shows a two-way distinction in the 知 *zhī* group and 莊 *zhuāng* group characters. The 莊 *zhuāng* group characters combined with division II rhymes are read the same as the 知 *zhī* group and 章 *zhāng* group characters, while the 知 *zhī* group and 莊 *zhuāng* group characters combined with the division III rhymes are read differently. This distinction roughly matches up with the *nèiwài zhuǎn* distinction shown in the rhyme tables. Some of the 知 *zhī* group division II characters also have the same reading as the 照 *zhào* group with division III rhyme characters (Sang 2008, Bao 2012). An example dialect of this type, the 安慶 Ānqìng dialect from 安徽 Ānhuī Province, is given in the following table.

Table 21. Readings of some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters in the 安慶 Ānqìng dialect. (a) 知 *zhī* group division II and 莊 *zhuāng* group initial characters, (b) 知 *zhī* group division III and 章 *zhāng* group affricate initial characters, (c) 章 *zhāng* group fricative initial characters. Data from Bao (2012).

(a)

	知 <i>zhī</i> div II		莊 <i>zhuāng</i> group						-Voi, Fri.
	-Voi, -Asp	+Voi	-Voi, -Asp	-Voi, +Asp	+Voi				
	摘 zhāi	茶 chá	抓 zhuā	初 chū	崇 chóng	事	床 chuáng	刷 shuā	
MC	梗開二入麥 知	假開二平麻 澄	效開二平肴 莊	遇開三平魚初	通開三平 東崇	止開三去志 崇	宕開三平陽 崇	山合二入黠 生	
QYS	tək ^入	ɕa ^平	tɕau ^平	tɕhjwo ^平	dzjung ^平	dzi ^去	dzjang ^平	ɕwāt ^入	
Ānqìng	tse ⁵⁵	tɕ ^h a ³⁵	tɕua ³⁵	ts ^h əu ³⁵	ts ^h oŋ ³⁵	sɿ ⁵³	tɕ ^h uan ³⁵	ɕua ⁵⁵	

(b)

知 <i>zhī</i> div III	章 <i>zhāng</i> group
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	-Voi, -Asp			+Voi	-Voi, -Asp	-Voi, +Asp	
	知 <i>zhī</i>	豬 <i>zhū</i>	追 <i>zhuī</i>	住 <i>zhù</i>	紙 <i>zhǐ</i>	出 <i>chū</i>	車 <i>chē</i>
MC	止開三平支知	遇開三平魚知	止合三平脂知	遇合三去遇澄	止開三上紙章	臻合三入術昌	假開三平麻昌
QYS	tje ^平	tjwo ^平	tjwi ^平	dju ^去	tšjě ^上	tšhjwet ^入	tšhja ^平
Ānqing	tɕ ³¹	tɕu ³¹	tɕuei ³¹	tɕu ⁵³	tɕ ²¹²	tɕ ^h u ⁵⁵	tɕ ^h e ³¹

(c)

	-Voi					+Voi			
	叔 <i>shū</i>	翅 <i>chì</i>	水 <i>shuǐ</i>	書 <i>shū</i>	說 <i>shuō</i>	手 <i>shǒu</i>	熟 <i>shóu</i>	時 <i>shí</i>	樹 <i>shù</i>
MC	通開三入屋書	止開三去寘書	止合三上旨書	遇開三平魚書	蟹合三去祭書	流開三上有書	通開三入屋禪	止開三平之禪	遇合三去遇禪
QYS	šjuk ^入	šje ^去	šwi ^上	šjwo ^平	šjwäi ^去	šjəu ^上	žjuk ^入	ží ^平	žju ^去
Ānqing	ɕu ⁵⁵	tɕ ^h ɿ ⁵³	ɕuei ²¹²	ɕu ³¹	ɕo ^{55(ㄨ)}	ɕəu ²¹²	ɕu ⁵⁵	ɕ ³⁵	ɕu ⁵³

A third type shows a three-way distinction in the 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng*

group characters. This type mostly occurs in the 山東 Shāndōng and 河北 Héběi regions (Sang

2008). According to Liu (1990), 江蘇贛榆 Gànyú, Jiāngsū Province is also a dialect of this type.

The following table gives some example characters in the Gànyú dialect.

Table 22. Readings of some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters in the 贛榆 Gànyú dialect. (a) 知 *zhī* group division II and 莊 *zhuāng* group initial characters, (b) 知 *zhī* group division III and 章 *zhāng* group affricate initial characters, (c) 章 *zhāng* group fricative initial characters. Data from Liu (1990).

(a)

	知 <i>zhī</i> div II	莊 <i>zhuāng</i> group			
	+Voi	-Voi, -Asp	-Voi, +Asp	+Voi	-Voi, Fri.
	茶 <i>chá</i>	抓 <i>zhuā</i>	初 <i>chū</i>	床 <i>chuáng</i>	刷 <i>shuā</i>
MC	假開二平麻澄	效開二平肴莊	遇開三平魚初	宕開三平陽崇	山合二入黠生
QYS	da ^平	tɕau ^平	tɕhjwo ^平	dɕjang ^平	ɕwǎt ^入
Gànyú	ts ^h a ⁵⁵	tsua ²¹⁴	tɕ ^h u ²¹⁴	tɕ ^h uaŋ ⁵⁵	sua ²¹⁴

(b)

	知 <i>zhī</i> div III					章 <i>zhāng</i> group			
	-Voi, -Asp					+Voi	-Voi, -Asp	-Voi, +Asp	
	竹 <i>zhú</i>	知 <i>zhī</i>	追 <i>zhuī</i>	豬 <i>zhū</i>	軸 <i>zhóu</i>	住 <i>zhù</i>	紙 <i>zhǐ</i>	車 <i>chē</i>	出 <i>chū</i>
MC	通開三入屋知	止開三平支知	止合三平脂知	遇開三平魚知	通開三入屋澄	遇合三去遇澄	止開三上紙章	假開三平麻昌	臻合三入術昌
QYS	tjuk ^入	tje ^平	tjwi ^平	tjwo ^平	djuk ^入	dju ^去	tšjě ^上	tšhja ^平	tšhjwet ^入
Gànyú	tɕu ²¹⁴	tɕi ²¹⁴	tɕuei ²¹⁴	tɕy ²¹⁴	tɕy ⁵⁵	tɕy ⁵¹	tɕ ²⁴	tɕ ^h ə ²¹⁴	tɕ ^h y ²¹⁴

(c)

	-Voi					+Voi			
	叔 <i>shū</i>	翅 <i>chì</i>	水 <i>shuǐ</i>	書 <i>shū</i>	說 <i>shuō</i>	手 <i>shǒu</i>	熟 <i>shóu</i>	時 <i>shí</i>	樹 <i>shù</i>

MC	通開三入 屋書	止開三去 寘書	止合三上 旨書	遇開三平 魚書	蟹合三去 祭書	流開三上 有書	通開三入 屋禪	止開三平 之禪	遇合三去 遇禪
QYS	ʃjuk ^入	ʃje ^去	ʃwi ^上	ʃjwo ^平	ʃjwǎi ^去	ʃjəu ^上	ʒjuk ^入	ʒi ^平	ʒju ^去
Gànyú	ʃu ²¹⁴	tʃh ⁵¹	ʃuei ²⁴	ʃy ²¹⁴	ʃuə ²¹⁴	ʃəu ²⁴	ʃu ⁵⁵	ʃl ²¹⁴	ʃy ⁵¹

A special type of reading noticed by many scholars is where the *hékǒu* characters of 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group are read as labiodental affricates and/or fricatives. This type occurs in many of the dialects in the Zhōngyuán Guanhua regions, especially in Li’s Zhōngyuán and Lányín dialects. The *kāikǒu* characters in these dialects can be read as either dental and/or retroflex affricates and fricatives, depending on different dialects and environments. For instance, in 蘭州 Lánzhōu the 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group *kāikǒu* characters are all read as retroflex affricates and fricatives, whereas in 西安 Xī’ān, there is a distinction between the *kāikǒu* 知 *zhī* group division II, 莊 *zhuāng* group, and 章 *zhāng* group 止 *zhǐ shè* rhyme characters versus the *kāikǒu* 知 *zhī* group division III and 章 *zhāng* group non-止 *zhǐ shè* characters. The former group of characters are read as dental affricates and fricatives, while the later are retroflex (Sang 2008). The table below shows some example characters of the 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group in these dialects. In some other places of Li’s Zhōngyuán and Lányín dialect regions, the *hékǒu* characters of 知 *zhī* group are not read as labiodental affricates, but are read as some other kinds of dental affricates and/or fricatives. For example, there are documentations of [tʃ, tʃ^h, f] in 回民老派 Huímín lǎopài ‘the older generation of the Huí people’ readings of Xī’ān, [tsf, tsf^h] in 陝西周至 Shǎnxī Zhōuzhì, 眉 Méi County, 新疆霍城 Xīnjiāng Huòchéng, and 甘肅武都 Gānsù Wūdū (with the fricatives read as [sf, zf]), and [tʃf, tʃf^h, f] or [tʃ, tʃ^h, f] in 新疆烏魯木齊 Xīnjiāng Ūrümqi and 吉木薩爾 Jimsar (蘭銀官話 Lányín Mandarin) (Zhang 2004, Sang 2008). The Ūrümqi and 青海湟源 Qīnghǎi Huángyuán dialects as shown in

the chart represents such a type. The Shǎnxī Zhōuzhì dialect as shown here does not have the interesting sounds of [tsf, tsf^h, sf] as reported in Sang (2008), but it does have the labiodental fricatives as in Lánzhōu and Xī’ān dialects.

Table 23. Readings of some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters, focusing on labiodentalization. (a) 知 *zhī* group division II and 莊 *zhuāng* group initial characters, (b) 知 *zhī* group division III and 章 *zhāng* group affricate initial characters, (c) 章 *zhāng* group fricative initial characters. 甘肅蘭州 Gānsù Lánzhōu (LZ) data from Gao (1980) and Zhang (2003:10) ^(Z), 陝西西安 Shǎnxī Xī’ān (XA) from Wang (1996), 陝西周至 Shǎnxī Zhōuzhì (ZZ) from Dong (2000), 新疆烏魯木齊 Xīnjiāng Ürümqi (UR) from Zhou (1995), 青海湟源 Qīnghǎi Huángyuán (HY) from Lu (2011). The labiodental affricate or fricative readings of interest are marked green and bolded here after.

(a)

	-Voi, -Asp			-Voi, +Asp		+Voi		-Voi, Fri.		
知 <i>zhī</i> div II	站 <i>zhàn</i>	桌 <i>zhuō</i>	摘 <i>zhāi</i>			茶 <i>chá</i>				
MC	咸開二 去陷知	江開二 入覺知	梗開二入 麥知			假開二平 麻澄				
QYS	tām ^去	tāk ^入	tək ^入			ɕa ^平				
LZ	--	--	--			ts ^h a ⁵⁵				
XA	tsǎ ⁴⁴	pfo ²¹	--			ts ^h a ²⁴				
ZZ	--	--	--			ts ^h a ³⁴				
UR	tsan ²¹³	tɕur ²¹³	tsai ⁵¹			ts ^h a ⁵¹				
HY	tsǎ ²¹³	tɕu ⁴⁴	tsi ²⁴			ts ^h a ²⁴				
莊 <i>zhuāng</i>	抓 <i>zhuā</i>			窗 <i>chuāng</i>	初 <i>chū</i>	查 <i>chá</i>	床 <i>chuáng</i>	刷 <i>shuā</i>	沙 <i>shā</i>	帥 <i>shuài</i>
MC	效開二 平肴莊			江開二平 江初	遇開三平 魚初	蟹開二平 佳崇	宕開三平 陽崇	山合二入 黠生	假開二平 麻生	止合三去 至生
QYS	tɕau ^平			tɕhǎŋ ^平	tɕhjwo ^平	dɕa ^平	dɕjang ^平	ɕwāt ^入	ɕa ^平	ɕwi ^去
LZ	pfa ³¹			pf^hǎ ³¹ (Z)	pf^hu ³¹	--	pf^hǎ ⁵³	fa ³¹	ɕa ³¹	fɛ ²⁴
XA	pfa ²¹			pf^hǎŋ ²¹	pf^hu ²¹	ts ^h a ²⁴	pf^hǎŋ ²⁴	fa ²¹	sa ²¹	fɛ ⁴⁴
ZZ	pfa ³¹			--	--	--	--	--	--	--
UR	tɕua ⁴⁴			tɕ ^h uaŋ ⁴⁴	tɕ ^h u ⁴⁴	--	tɕ ^h uaŋ ⁵¹	ɕua ²¹³	sa ⁴⁴	fai ²¹³ , ɕuai ²¹³
HY	tɕua ⁴⁴			tɕ ^h uǎ ⁴⁴	tɕ ^h y ⁴⁴ 10	ts ^h a ²⁴	tɕ ^h uǎ ⁴⁴	--	sa ⁴⁴	fɛ ²⁴

(b)

	-Voi, -Asp	-Voi, +Asp	+Voi
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¹⁰ In the original article, ‘y’ is used to mark a syllabic consonant that can also be combined with other consonants. It has a very strong fricativizing feature that when combined with other initial consonants the fricativization starts from the onset (Lu 2011: 69).

知 <i>zhī</i> div II	知 <i>zhī</i>	追 <i>zhuī</i>	住 <i>zhù</i>	竹 <i>zhú</i>	豬 <i>zhū</i>			軸 <i>zhóu</i>
MC	止開三平支 知	止合三平脂 知	遇合三去遇 澄	通開三入屋 知	遇開三平魚 知			通開三入屋 澄
QYS	tje ^平	tjwi ^平	ɖju ^去	tjuk ^入	tjwo ^平			ɖjuk ^入
LZ	tʂɿ ³¹	pfɛi ³¹	pfu ²⁴	pfu ^去	pfu ³¹ (Z)			pfu ⁵³
XA	tʂɿ ²¹	pfɛi ²¹	pfu ²⁴	pfu ²¹	pfu ²¹			pfu ²⁴
ZZ	--	pfɛi ³¹	--	--	pfu ³¹			--
UR	tʂɿ ⁴⁴	tʂuei ⁴⁴	tʂu ²¹³	tʂu ²¹³	tʂu ⁴⁴			tʂu ⁵¹
HY	tʂɿ ^{z 44 11}	tʂui ⁴⁴	tʂy ²¹³	tʂy ⁴⁴	tʂy ⁴⁴			tʂy ²⁴
章 <i>zhāng</i>	專 <i>zhuān</i>	戰 <i>zhàn</i>	紙 <i>zhǐ</i>			車 <i>chē</i>	出 <i>chū</i>	蛇 <i>shé</i>
MC	山合三平仙 章	山開三去線 章	止開三上紙 章			假開三平麻 昌	臻合三入術 昌	假開三平麻 船
QYS	tʂjwän ^平	tʂjän ^去	tʂjɛ ^上			tʂhja ^平	tʂhjwet ^入	dʒja ^平
LZ	fɛ ³¹	tʂɛ ²⁴	--			tʂ ^h y ³¹	pf ^h u ²⁴	--
XA	pfæ ²¹	--	tsɿ ⁵³			tʂ ^h y ²¹	pf ^h u ²¹	ʂy ²⁴
ZZ	--	--	--			tʂ ^h y ³¹	pf ^h u ³¹	--
UR	--	tʂan ²¹³	tsɿ ⁵¹			tʂ ^h y ⁴⁴	tʂ ^h u ²¹³	ʂy ⁵¹
HY	tʂuæ ⁴⁴	tʂæ ²⁴	tsɿ ^{z 5 12}			tʂ ^h i ⁴⁴	tʂ ^h y ⁴⁴	ʂi ²⁴

(c)

	-Voi						+Voi			
	書 <i>shū</i>	說 <i>shuō</i>	水 <i>shuǐ</i>	手 <i>shǒu</i>	濕 <i>shī</i>	叔 <i>shū</i>	熟 <i>shóu</i>	樹 <i>shù</i>	時 <i>shí</i>	
MC	遇開三平 魚書	蟹合三去 祭書	止合三上 旨書	流開三上 有書	深開三入 緝書	通開三入 屋書	通開三入 屋禪	遇合三去 遇禪	止開三平 之禪	
QYS	ʂjwo ^平	ʂjwäi ^去	ʂwi ^上	ʂjəu ^上	ʂjəp ^入	ʂjuk ^入	ʂjuk ^入	ʂju ^去	ʂi ^平	
LZ	fu ³¹	fɿ ²⁴	fei ³³	ʂəu ³³	--	f ^{陽平}	f ^{陽平}	f ^{陽平}	ʂɿ ⁵³	
XA	fu ²¹	ʂy ²¹	fei ⁵³	ʂou ⁵³	ʂɿ ²¹	fu ²¹	fu ²⁴	fu ⁴⁴	ʂɿ ²⁴	
ZZ	fu ³¹	ʂy ³¹	fei ⁵¹	--	--	--	--	--	--	
UR	fu ⁴⁴ , ʂu ⁴⁴	ʂuy ²¹³	fei ⁵¹ , ʂuei ²¹³	ʂyu ⁵¹	--	ʂu ⁴⁴	ʂu ⁵¹	fu ²¹³ , ʂu ²¹³	ʂɿ ⁵¹	
HY	f ^陽 ⁴⁴	f ^陽 ⁴⁴	f ^陽 ⁵	ʂu ⁵	ʂɿ ^{z 44}	f ^陽 ⁴⁴	f ^陽 ²⁴	f ^陽 ²¹³	ʂɿ ^{z 24}	

According to Sang (2008), there is a special type of reading where the Middle Chinese 知 *zhī* group and 照 *zhào* group *kāikǒu* affricate characters are read as retroflex or dental affricates, while the characters with a following rounding element in the modern reading, except for the two finals -u and -uə (Huang 2009), are read as velar stops. This type occurs in some places in 甘肅 Gānsù

¹¹ The superscripts ‘z’ and ‘z’ are used to mark a fricative-like sound on the apical vowels in the original article (Lu 2011: 69).

¹² 上聲 is marked as ‘5’ in the original article. The original article has a note saying ‘the readings of shangsheng are very short, and there is a slight glottal tightness at the end of the pronunciation’ (上聲讀音短促，發音結束時有輕微的緊喉感) (Lu 2011: 69).

Province such as 張掖 Zhāngyē, 民樂 Mínlè, 臨澤 Línzé, 高台 Gāotái, and 肅南 Sùnnán, and also 廣濟 Guǎngjì in 湖北 Húběi Province. For example, in 張掖 Zhāngyē, 民樂 Mínlè, 臨澤 Línzé, 高台 Gāotái, and 肅南 Sùnnán, the character 豬 *zhū* is read as [ku], and 出 *chū* is [k^hu]. In the same five locations, the Middle Chinese fricative character 書 *shū* is read as a labiodental fricative [fu] (Zhang & Zhang 1986, tones omitted from the original source). This phenomenon of the 知 *zhī* group and 照 *zhào* group characters turning into a velar stop actually fits my definition of velarization. However, it is different to the velarization seen in the Xiāng dialect Liányuán in several aspects, as will be discussed later (see section 3.3). The velarization of Liányuán occurs to the *chóngniǔ* rhymes of 知 *zhī* group division III and 章 *zhāng* group characters, and the 知 *zhī* group division III and 章 *zhāng* group fricatives appear to have a parallel change, turning into voiced velar fricatives under the same condition. The case in these Mandarin dialects, on the other hand, occur to all 知 *zhī* group and 照 *zhào* group affricates with a following *hékǒu* or rounding element. Furthermore, the fricatives of the 知 *zhī* group and 照 *zhào* group initials do not appear to have a parallel change as the affricates, but are read as f-. Scholars have noticed the phenomenon of a velar stop reading in these Mandarin dialects, but no good explanation for the reason and motivation have been proposed so far (Huang 2009). The tables below provide some readings for the 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters in Zhāngyē documented by different scholars. Huang's data show some tonal and vowel variations to Zhang's. In addition, Huang's documentation shows that before -u and -uə the retroflex affricate initials turn into labiodentals, while they change to velar stops when there is a medial -u-.

Table 24. Readings of some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters in 張掖 Zhāngyē. Data from (a) Zhang (2003 :10), and (b) Huang (2009).

(a)

	知 <i>zhī</i> group			照 <i>zhào</i> group					
	-Voi, -Asp		+Voi	-Voi, -Asp	-Voi, +Asp		+Voi	-Voi, Fri.	
Div II			茶 <i>chá</i>		窗 <i>chuāng</i>	初 <i>chū</i>	愁 <i>chóu</i>	問 <i>shuān</i>	沙 <i>shā</i>
MC			假開二平麻澄		江開二平江初	遇開三平魚初	流開三平尤崇	山合二平刪生	假開二平麻生
QYS			ɬa ^平		tʂhɑŋ ^平	tʂhjo ^平	dʒjəu ^平	ʂwan ^平	ʂa ^平
Zhāngyē			tʂ ^h a ⁵³		k ^h æ ⁴⁴	k ^h ɤ ⁴⁴	tʂ ^h ou ⁵³	fæ ⁴⁴	ʂa ⁴⁴
Div III	知 <i>zhī</i>	豬 <i>zhū</i>		支 <i>zhī</i>				書 <i>shū</i>	
MC	止開三平支知	遇開三平魚知		止開三平支章				遇開三平魚書	
QYS	tʂe ^平	tʂwo ^平		tʂjě				ʂjwo ^平	
Zhāngyē	tʂɿ ⁴⁴	kɿ ⁴⁴ 13		tʂɿ ⁴⁴				fɿ ⁴⁴	

(b)

Division II

	知 <i>zhī</i> group		照 <i>zhào</i> group						
	-Voi, - Asp	+Voi	-Voi, - Asp	-Voi, +Asp		+Voi	-Voi, Fri.		
	桌 <i>zhuō</i>	茶 <i>chá</i>	抓 <i>zhuā</i>	窗 <i>chuāng</i>	初 <i>chū</i>	愁 <i>chóu</i>	沙 <i>shā</i>	問 <i>shuān</i>	山 <i>shān</i>
MC	江開二入覺知	假開二平麻澄	效開二平肴莊	江開二平江初	遇開三平魚初	流開三平尤崇	假開二平麻生	山合二平刪生	山開二平山生
QYS	tʂak ^入	ɬa ^平	tʂau ^平	tʂhɑŋ ^平	tʂhjo ^平	dʒjəu ^平	ʂa ^平	ʂwan ^平	ʂɑn ^平
Zhāngyē	pfuə ³¹	tʂ ^h A ⁵³	kuA ³⁴	k ^h æ ⁴⁴	k ^h ɤ ⁴⁴	tʂ ^h əu ⁵³	ʂA ³⁴	fæ ⁴⁴	ʂA ³⁴

Division III

	-Voi, -Asp				+Voi					
	知 <i>zhī</i>	追 <i>zhuī</i>	豬 <i>zhū</i>	中 <i>zhōng</i>	軸 <i>zhóu</i>					
MC	止開三平支知	止合三平脂知	遇開三平魚知	通開三平東知	通開三入屋澄					
QYS	tʂe ^平	tʂwi ^平	tʂwo ^平	tʂung ^平	dʒuk ^入					
Zhāngyē	tʂɿ ⁴⁴	kuəi ³⁴	kɿ ⁴⁴	kuɔ̃ ³⁴	pfu ⁵³					
	-Voi, -Asp				-Voi, +Asp	-Voi, Fri.			+Voi, Fri.	
	支 <i>zhī</i>	章 <i>zhāng</i>			吹 <i>chuī</i>	翅 <i>chì</i>	說 <i>shuō</i>	書 <i>shū</i>	時 <i>shí</i>	樹 <i>shù</i>
MC	止開三平支章	宕開三平陽章			止合三平支昌	止開三去真書	蟹合三去祭書	遇開三平魚書	止開三平之禪	遇合三去遇禪
QYS	tʂjě	tʂjang ^平			tʂhjwe ^平	ʂjɛ ^去	ʂjwäi ^去	ʂjwo ^平	ʂi ^平	ʂju ^去
Zhāngyē	tʂɿ ⁴⁴	tʂÄ ³⁴			k ^h uəi ³⁴	tʂ ^h ɿ ⁵³	fə ³¹	fɿ ⁴⁴	ʂɿ ⁵³	fɿ ³¹

¹³ The original data given for this character is kv⁴⁴. Since [v] is not a vowel, the guess here is that this is a typo and the intended vowel is ɿ instead. Same for the two other characters 初 *chū* and 書 *shū* here.

To sum up, generally speaking the Mandarin dialects do not have the *dú rú duān zǔ* phenomenon. The Middle Chinese 知 *zhī* group and 照 *zhào* group are read more commonly as retroflex, dental, and/or palate-alveolar affricates, and in some cases labiodental affricates. There is a specific location in and around Zhāngyē in Gānsù province that have velar stops instead. This meets my definition for velarization, but the condition and possible sound change route shown in Zhāngyē are not the same as in Liányuán dialect of the Xiāng group. The following table sums up all the different types of 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group character readings as discussed for the Mandarin dialect group. For the purpose of a clear comparison, certain details are left out.

Table 25. Summary of the distribution of 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters in the Mandarin dialect group.

Type	Subtype	Example dialect	知 <i>zhī</i> group Div II	知 <i>zhī</i> group Div III	莊 <i>zhuāng</i>	章 <i>zhāng</i>
1: full merger	1-1 fricatives have the same POA as affricates	Beijing	tʂ-, tʂʰ-, ʂ-	tʂ-, tʂʰ-, ʂ-	tʂ-, tʂʰ-, ʂ-	tʂ-, tʂʰ-, ʂ-
		Shānxī Tàiyuán	ts-, tsʰ-, s-	ts-, tsʰ-, s-	ts-, tsʰ-, s-	ts-, tsʰ-, s-
	1-2 fricatives have a different POA to affricates	Jiāngsū Tàixìng Gēnsī	tʂ-, tʂʰ-, ʃ-	tʂ-, tʂʰ-, ʃ-	tʂ-, tʂʰ-, ʃ-	tʂ-, tʂʰ-, ʃ-
2: 2-way distinction based on different conditions	2-1 <i>hékǒu</i> all merging with 知 <i>zhī</i> group Div III and 章 <i>zhāng</i>	Níngxià Hǎiyuán	ts-, tsʰ-, s-	止 <i>zhǐ shè</i> <i>kāikǒu</i> : ts-, tsʰ-, s-	ts-, tsʰ-, s-	止 <i>zhǐ shè</i> <i>kāikǒu</i> : ts-, tsʰ-, s-
			<i>hékǒu</i> : tʂ-, tʂʰ-, ʂ-	tʂ-, tʂʰ-, ʂ-	<i>hékǒu</i> : tʂ-, tʂʰ-, ʂ-	tʂ-, tʂʰ-, ʂ-
	2-2 <i>hékǒu</i> all merging with 知 <i>zhī</i> group Div II and 莊 <i>zhuāng</i>	Shānxī Xìngxiàn	ts-, tsʰ-, s-	tʂ-, tʂʰ-, ʂ-	ts-, tsʰ-, s-	tʂ-, tʂʰ-, ʂ-
			<i>hékǒu</i> : ts-, tsʰ-, s-		<i>hékǒu</i> : ts-, tsʰ-, s-	
	2-3 <i>nèi/wài zhuǎn</i>	Ānhuī Ānqìng	some Div II: ts-, tsʰ-, s- tʂ-, tʂʰ-, ʂ-	tʂ-, tʂʰ-, ʂ-	Div II rhymes: tʂ-, tʂʰ-, ʂ- Div III rhymes: ts-, tsʰ-, s-	tʂ-, tʂʰ-, ʂ-
3: 3-way distinction		Jiāngsū Gànyú	ts-, tsʰ-, s-	<i>kāikǒu</i> : tʃ-, tʃʰ-, ʃ-	Div II rhymes: ts-, tsʰ-, s-	<i>kāikǒu</i> : tʃ-, tʃʰ-, ʃ-

of 知 <i>zhī</i> , 莊 <i>zhuāng</i> , 章 <i>zhāng</i>				<i>hékǒu</i> : tʂ-, tʂʰ-, ʂ-	Div III rhymes: tʂ-, tʂʰ-, ʂ-	止 <i>zhǐ shè</i> <i>hékǒu</i> : tʂ-, tʂʰ-, ʂ-
4: <i>hékǒu</i> read as labiodental affricates		Gānsù Lánzhōu	<i>kāikǒu</i> : tʂ-, tʂʰ-, ʂ-			
			<i>hékǒu</i> : pf-, pfʰ-, f-			
5: <i>hékǒu</i> read as velar stops		Gānsù Zhāngyē	<i>kāikǒu</i> : tʂ-, tʂʰ-, ʂ-			
			before -u and -uo: pf-, pfʰ-, f-			
			<i>hékǒu</i> : k-, kʰ-, f-			

1.2.6 The Gàn dialect group

Spoken primarily in the 江西 Jiāngxī Province but also used in some places in the 湖南 Húnán and 湖北 Húběi Provinces as well as Fújiàn and Ānhuī, the Gàn dialect is a dialect group that shares many features with the Hakka dialect group that until recent years they were considered as one dialect group, called the Gàn-Hakka group. There has been a shift to consider them as separate dialect groups, but the actual criteria for classification as well as the essential question of whether they are one group or not remain under debate. According to Chiang (2015), the Gàn dialect group can be further classified to nine subgroups: (1) 昌都 Chāngdū subgroup, including 南昌 Nánchāng, the capital city of Jiāngxī Province; (2) 宜瀏 Yíliú subgroup, including some places in Jiāngxī such as 宜春 Yíchūn, 新余 Xīnyú, 奉新 Fèngxīn, and 銅鼓 Tóngǔ, and also 瀏陽 Liúyáng in Húnán Province; (3) 吉茶 Jíchá subgroup, including places in Jiāngxī like 吉安 Jí'ān and 蓮花 Liánhuā, and also four counties in Húnán including 攸縣 Yōu County, 茶陵 Chá líng, 炎陵 Yán líng, and 醴陵 Lǐ líng; (4) 撫廣 Fǔguǎng subgroup, including places in Jiāngxī such as 撫州 Fǔzhōu, 廣昌 Guǎngchāng, 南城 Nánchéng, and 黎川 Líchuān, and also two Fújiàn counties 建寧 Jiànníng and 泰寧 Tàiníng; (5) 鷹弋 Yīngyì subgroup, including 鷹潭 Yīngtán, 弋陽 Yìyáng, 樂平 Lèpíng, and 景德鎮 Jǐngdé Town in Jiāngxī; (6) 大通 Dàtōng subgroup, including nine cities or counties

in Húběi such as 大冶 Dàyě and 通城 Tōngchéng, and four cities or counties in Húnán such as 平江 Píngjiāng and 岳陽 Yuèyáng; (7) 耒資 Lěizī subgroup, including five cities or counties in Húnán, namely 耒陽 Lěiyáng, 常寧 Chángníng, 安仁 Ānrén, 永興 Yǒngxīng, and 資興 Zīxīng; (8) 洞綏 Dòngsuī subgroup, including three counties in Húnán: 洞口 Dòngkǒu, 綏寧 Suīníng, and 隆回 Lónghuí; (9) 懷岳 Huáiyuè subgroup, including nine cities or counties in Ānhuī such as 懷寧 Huáníng, 岳西 Yuèxī, and 太湖 Tàihú.

1.1.6.1 The *dú rú duān zǔ* phenomenon in the Gàn dialects

It has been noticed by many scholars that the readings of 知 *zhī*, 莊 *zhuāng*, and 章 *zhāng* group characters are rather complex in the Gàn dialects. The major trend seems to be a distinction between 知 *zhī* group division II plus 莊 *zhuāng* group on the one hand versus 知 *zhī* group division III plus 章 *zhāng* group on the other. The 知 *zhī* group division II and 莊 *zhuāng* group characters are read as dental affricates in most places and retroflex stops in some other places, while the 知 *zhī* group division III plus 章 *zhāng* group characters can be read as palato-alveolar, retroflex, and/or alveolo-palatal affricates, and/or even dental stops. The dental stop readings are most commonly seen in the core areas of Gàn, in the Chāngdū, Fǔguǎng, and Yíliú subgroups (Sang 2008, Chang & Wan 2002). The following table gives some 知 *zhī*, 莊 *zhuāng*, and 章 *zhāng* group characters read in various Gàn dialects.

Table 26. Readings of some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters in various Gàn dialects. Table modified from Chang & Wan (2002). Tones omitted in the original table. 南昌 Nánchāng (NC), 修水 Xiūshuǐ (XS), 安義 Ānyì (AY), 都昌 Dūchāng (DC), 餘干 Yúgān (YG), 臨川 Línchuān (LC), 永新 Yǒngxīn (YX), 醴陵 Lǐlíng (LL), 宜豐 Yífēng (YF), 南城 Nánchéng (NC). Subgrouping: 昌都 Chāngdū – CD, 鷹弋 Yīngyì – YY, 撫廣 Fǔguǎng – FG, 吉茶 Jíchá – JC, 宜瀏 Yíliú – YL.

		-Voi, -Asp		-Voi, +Asp	+Voi		-Voi, Fri.	+Voi, Fri.
知 <i>zhī</i> div II		罩 <i>zhào</i>	摘 <i>zhāi</i>	拆 <i>chāi</i>	茶 <i>chá</i>	賺 <i>zhuàn</i>		
MC		效開二去效知	梗開二入麥知	梗開二入陌徹	假開二平麻澄	咸開二去陷澄		
QYS		tau ^去	tək ^入	tʰək ^入	da ^平	dām ^去		
NC	CD	tsau	tsaʔ	tsʰaʔ	tsʰa	tsʰan		
XS	CD	tsau	tsaʔ	dzʰaʔ	dzʰa	dzʰan		
AY	CD	tsau	tsaʔ	tsʰaʔ	tsʰa	tsʰən		
DC	CD	tsau	tsak	dzak	dza	dzan		
YG	YY	tsau	tsakŋ	tsʰakŋ	tsʰa	tsʰən		
LC	FG	--	--	--	--	--		
YX	JC	tsɒ	tsa	tsʰa	tsʰa	tsʰã		
LL	JC	tsau	tsa	tsʰa	tsʰa	tsʰŋ		
YF	YL	tsau	tsaʔ	tsʰaʔ	tsʰa	tsʰən		
NC	FG	tsau	tsaʔ	tʰaʔ	tʰa	tʰan		
莊 <i>zhuāng</i>		債 <i>zhài</i>	斬 <i>zhǎn</i>	初 <i>chū</i>	查 <i>chá</i>		沙 <i>shā</i>	
MC		蟹開二去卦莊	咸開二上賺莊	遇開三平魚初	蟹開二平佳崇		假開二平麻生	
QYS		tʂai ^去	tʂäm ^上	tʂhjwo ^平	dʒa ^平		ʂa ^平	
NC	CD	tsai	tsan	tsʰu	tsʰa		sa	
XS	CD	tsai	tsan	dzsʰu	dzʰa		sa	
AY	CD	tsai	tsam	tsʰɿ	tsʰa		sa	
DC	CD	tsai	tsan	dzu	dza		sa	
YG	YY	tsai	tsan	tsʰɿ	tsʰa		sa	
LC	FG	--	--	--	--		--	
YX	JC	tsai	tsã	tsʰu	tsa		sa	
LL	JC	tsai	tsaŋ	tsʰəu	tsʰa		sa	
YF	YL	tsai	tsan	tsʰu	tsʰa		sa	
NC	FG	tsai	tsan	tʰu	tʰa		sa	
知 <i>zhī</i> div III		豬 <i>zhū</i>	張 <i>zhāng</i>	抽 <i>chōu</i>	綢 <i>chóu</i>	丈 <i>zhàng</i>		
MC		遇開三平魚知	知 <i>zhī</i>	流開三平尤徹	流開三平尤澄	宕開三上養澄		
QYS		tjwo ^平	tjang ^平	tʰjəu ^平	djəu ^平	djang ^去		
NC	CD	tey	tsəŋ	teʰiu	teʰiu	tsʰəŋ		
XS	CD	tu	təŋ	dʰu	dʰu	dʰəŋ		
AY	CD	tu	təŋ	tʰu	tʰu	tʰəŋ		
DC	CD	tʂu	tʂəŋ	dzəu	dzəu	dzʰəŋ		
YG	YY	tʂu	tʂəŋ	tʂʰu	tʂʰu	tʂʰəŋ		
LC	FG	tu	təŋ	tʰiu	tʰiu	tʰəŋ		
YX	JC	ty	tõ	teʰiu	teʰiu	tʰõ		
LL	JC	ky	tõŋ	tʰəu	tʰəu	tʰõŋ		
YF	YL	tu	təŋ	tʰəu	tʰəu	təŋ		
NC	FG	teie	təŋ	teʰiu	teʰiu	tʰəŋ		
章 <i>zhāng</i>		帚 <i>zhǒu</i>		臭 <i>chòu</i>	舌 <i>shé</i>		手 <i>shǒu</i>	仇 <i>chóu</i>
MC		流開三上有章		流開三去宥昌	山開三入薛船		流開三上有書	流開三平尤禪
QYS		tʂjəu ^上		tʂhjəu ^去	dʒjät ^入		ʂjəu ^上	ʒjəu ^平
NC	CD	teiu		teʰiu	set		eiu	teʰiu
XS	CD	tu		dʰu	set		su	dʰu
AY	CD	tu		tʰu	set		tu	tʰu
DC	CD	tʂəu		dzəu	səl		ʂəu	dzəu
YG	YY	tʂu		tʂʰu	fetn		fʊ	tʂʰu
LC	FG	tʰiu		tʰiu	set		eiu	eiu

YX	JC	te ^h iu		te ^h iu	eiɛ		eiu	te ^h iu
LL	JC	təu		t ^h əu	se		təu	t ^h əu
YF	YL	təu		t ^h əu	sæt		təu	t ^h əu
NC	FG	teiu		te ^h iu	eiet		eiu	eiu

In the dialects that have the *dú rú duān zǔ* phenomenon, there are also different types. The first type is the more common type in the core Gàn dialects, as the examples given in the above table except Nánchāng and Nánchéng. In these dialects, the 知 *zhī* group division III and 章 *zhāng* group characters show the *dú rú duān zǔ* phenomenon. There are also several different subtypes. The first subtype shows the *dú rú duān zǔ* phenomenon all across the 知 *zhī* group division III and 章 *zhāng* group characters. This subtype is found in dialects such as 臨川 Línchuān, 貴溪 Guìxī, 修水 Xiūshuǐ, 靖安 Jìng'ān, and 宜豐 Yífēng. In the 知 *zhī* group division II and 莊 *zhuāng* group characters, the initials are generally all dental affricates ts- and ts^h- (Jiang 1992). The following table shows some examples from the Línchuān dialect of the Fǔguǎng subgroup.

Table 27. Readings of some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters in the Línchuān dialect. Data from Jiang (1992). Characters that are read as dental stops are marked with a darker shade. Tones left unmarked are unmarked in the source.

	-Voi, -Asp		-Voi, +Asp			+Voi		
知 <i>zhī</i> div II	罩 <i>zhào</i>	站 <i>zhàn</i>		詫 <i>chà</i>	撐 <i>chēng</i>		茶 <i>chá</i>	撞 <i>zhuàng</i>
MC	效開二去 陷知	咸開二去 陷知		假開二去 禡徹	梗開二平 庚徹		假開二平 麻澄	江開二去 絳澄
QYS	təu ^去	təm ^去		tʰa ^去	tʰeŋ ^平		ɕa ^平	ɕaŋ ^去
	tsau ^{陰去}	tsən ^{陰去}		ts ^h a ^{陰去}	ts ^h aŋ ^{陰平}		ts ^h a ^{陽平}	ts ^h oŋ ^{陽去}
莊 <i>zhuāng</i>	渣 <i>zhā</i>	榛 <i>zhēn</i>		炒 <i>chǎo</i>	初 <i>chū</i>		巢 <i>cháo</i>	愁 <i>chóu</i>
MC	假開二平 麻莊	臻開三平 臻莊		效開二上 巧初	遇開三平 魚初		效開二平 肴崇	流開三平 尤崇
QYS	tʂa ^平	tʂjen ^平		tʂʰau ^上	tʂhjo ^平		dzau ^平	dzjəu ^平
	tsa ^{陰平}	tʂen ^{陰平}		ts ^h au ^上	ts ^h u ^{陰平}		ts ^h au ^{陽平}	tseu
知 <i>zhī</i> div III	朝 <i>zhāo</i>	轉 <i>zhuǎn</i>	知 <i>zhī</i>	超 <i>chāo</i>	耻 <i>chǐ</i>		潮 <i>cháo</i>	治 <i>zhì</i>
MC	效開三平 宵知	山合三上 獮知	止開三平 支知	效開三平 宵徹	止開三上 止徹		效開三平 宵澄	止開三平 之澄
QYS	tʂəu ^平	tʂwän ^上	tʂe ^平	tʂjəu ^平	tʂi ^上		dʂəu ^平	ɕi ^去
	tʂeu ^{陰平}	ton ^上	tʂi ^{陰平}	tʂeu ^{陰平}	tʂi ^上		tʂeu ^{陽平}	tʂi ^{陽去}
章 <i>zhāng</i>	昭 <i>zhāo</i>	專 <i>zhuān</i>	枝 <i>zhī</i>	車 <i>chē</i>	春 <i>chūn</i>	吹 <i>chuī</i>		
MC	效開三平 宵章	山合三平 仙章	止開三平 支章	假開三平 麻昌	臻合三平 諱昌	止合三平 支昌		

QYS	tʃjäu ^平	tʃjwän ^平	tʃjě ^平	tʃhja ^平	tʃhjuěn ^平	tʃhjwe ^平		
	tʃea ^{陰平}	ton ^{陰平}	tʃi ^{陰平}	tʃ ^h a ^{陰平}	tʃ ^h un ^{陰平}	tʃ ^h ui ^{陰平}		

The second subtype has the *dú rú duān zǔ* phenomenon in the 知 *zhī* group division III and 章 *zhāng* group characters except in 止 *zhǐ shè kāikǒu* rhymes. The 知 *zhī* group division III and 章 *zhāng* group characters are read as dental stops, while when combined with 止 *zhǐ shè* rhymes they are read as dental affricates ts- and ts^h-, the same as 知 *zhī* group division II and 莊 *zhuāng* group initials (Jiang 1992). An example dialect of this type is Liúyáng of the Yíliú subgroup as shown in the table below.

Table 28. Readings of some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters in the Liúyáng dialect of Yíliú subgroup. Data from Jiang (1992).

	-Voi, -Asp			-Voi, +Asp			+Voi	
知 <i>zhī</i> div II	罩 <i>zhào</i>			撐 <i>chēng</i>			茶 <i>chá</i>	
MC	效開二去效知			梗開二平庚徹			假開二平麻澄	
QYS	tau ^去			theng ^平			ɕa ^平	
	tsau ^去			ts ^h aj ^{陰平}			ts ^h a ^{陰平}	
知 <i>zhī</i> div III	肘 <i>zhǒu</i>	中 <i>zhōng</i>	追 <i>zhuī</i>	超 <i>chāo</i>			朝 ^(朝向) <i>cháo</i>	錘 <i>chuí</i>
MC	流開三上有知	通開三平東知	止合三平脂知	效開三平宵徹			效開三平宵澄	止合三平支澄
QYS	tjəu ^上	tjung ^平	tjwi ^平	thjäu ^平			djäu ^平	djwi ^平
	təu ^上	təŋ ^{陰平}	tei ^{陰平}	t ^h au ^{陰平}			t ^h au ^{陽平}	t ^h ei ^{陽平}
莊 <i>zhuāng</i>	渣 <i>zhā</i>	裝 <i>zhuāng</i>		抄 <i>chāo</i>			床 <i>chuáng</i>	鋤 <i>chú</i>
mC	假開二平麻莊	宕開三平陽莊		效開二平肴初			宕開三平陽崇	遇開三平魚崇
QYS	tʃa ^平	tʃjang ^平		tʃhau ^平			dʒjang ^平	dʒjwo ^平
	tʃa ^{陰平}	tʃoŋ ^{陰平}		ts ^h au ^{陰平}			tʃoŋ ^{陽平}	ts ^h əu ^{陽平}
章 <i>zhāng</i>	遮 <i>zhē</i>	專 <i>zhuān</i>	錐 <i>zhuī</i>	痣 <i>zhì</i>	吹 <i>chuī</i>	齒 <i>chǐ</i>		船 <i>chuán</i>
MC	假開三平麻章	山合三平仙章	止合三平脂章	止開三去志章	止合三平支昌	止開三上止昌		山合三平仙船
QYS	tʃja ^平	tʃjwän ^平	tʃwi ^平	tʃi ^去	tʃhjwe ^平	tʃhī ^上		dʒjwän ^平
	tʃa ^{陰平}	tʃjwän ^{陰平}	tei ^{陰平}	tʃi ^去	t ^h ei ^{陰平}	ts ^h i ^上		t ^h jwän ^{陽平}

Liúyáng also represents a second subtype where the 知 *zhī* group division III and 章 *zhāng* group characters are read as velar stops before certain conditions, more specifically before a final -y in the case of Liúyáng. Besides Liúyáng, Lǐlíng in Húnán Province of the Jíchá subgroup is also a dialect that have velar stop readings in 知 *zhī* group division III and 章 *zhāng* group characters. The condition for Lǐlíng is mainly before a medial or final -y. However, Lǐlíng does not show the *dú rú duān zǔ* phenomenon in the other 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters (Jiang 1992). Having velar stops in 知 *zhī* group division III and 章 *zhāng* group *hékǒu* characters is also found in some other Gàndialects such as Yuèyáng in Húnán Province, 廣濟 Guǎng in Húběi Province, and Yǒngfēng in Jiāngxī Province (Sun 2002). For the 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters that do not show the *dú rú duān zǔ* phenomenon, they are generally read as dental affricates ts- and ts^h- (Sang 2008). The following table gives examples of 知 *zhī* group division III and 章 *zhāng* group characters read as velar stops in the dialects of Liúyáng and Lǐlíng.

Table 29. Examples of 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters that are read as velar stops in Liúyáng (LY, Yíliú subgroup) and Lǐlíng (LL, Jíchá subgroup) dialects. (a) 知 *zhī* group division II and 莊 *zhuāng* group, (b) 知 *zhī* group division III, (c) 章 *zhāng* group. Data from Jiang (1992).

(a)

	知 <i>zhī</i> group division II		莊 <i>zhuāng</i> group	
	-Voi, -Asp	-Voi, +Asp	-Voi, -Asp	-Voi, +Asp
	罩 <i>zhào</i>	撐 <i>chēng</i>	斬 <i>zhǎn</i>	窗 <i>chuāng</i>
MC	效開二去效知	梗開二平庚微	咸開二上賺莊	江開二平江初
QYS	ʈau 去	ʈhɛŋ 平	tʂám 上	tʂhɑŋ 平
LY	tsau 去	ts ^h ɑŋ 陰平	tsan 上	ts ^h oŋ 陰平
LL	tsau 去	ts ^h ɛŋ 陰平	tsaŋ 上	ts ^h oŋ 陰平

(b)

	-Voi, -Asp				-Voi, +Asp	+Voi			
	張 <i>zhāng</i>	綴 <i>zhuì</i>	追 <i>zhuī</i>	豬 <i>zhū</i>	超 <i>chāo</i>	蟲 <i>chóng</i>	篆 <i>zhuàn</i>	除 <i>chú</i>	柱 <i>zhù</i>

MC	宕開三平 陽知	蟹合三去 祭知	止合三平 脂知	遇開三 平魚知	效開三平宵 微	通開三平 東澄	山合三上 獮澄	遇開三平 魚澄	遇合三上 麌澄
QYS	tʃang ^平	tʃwäi ^去	tʃwi ^平	tʃwo ^平	thjäu ^平	dʒung ^平	dʒwän ^上	dʒwo ^平	dʒu ^上
LY	təŋ ^{陰平}	tei ^去	tei ^{陰平}	ky ^{陰平}	tʰau ^{陰平}	tʰəŋ ^{陽平}	tʰōy ^去	kʰy ^{陽平}	kʰy ^去
LL	tʂəŋ ^{陰平}	kye ^去	kye ^{陰平}	ky ^{陰平}	tʂʰeu ^{陰平}	tʂʰəŋ ^{陽平}	kʰyɛŋ ^去	ky ^{陽平}	ky ^去

(c)

	-Voi, -Asp					-Voi, +Asp		+Voi
	周 zhōu	主 zhǔ	專 zhuān	錐 zhuī	諸 zhū	充 chōng	春 chūn	船 chuán
MC	流開三平尤 章	遇合三上麌 章	山合三平仙 章	止合三平脂 章	遇開三平魚 章	通開三平東 昌	臻合三平諄 昌	山合三平仙 船
QYS	tʃjəu ^平	tʃju ^上	tʃjwän ^平	tʃwi ^平	tʃjwo ^平	tʃhjung ^平	tʃhjuən ^平	dʒjwän ^平
LY	təu ^{陰平}	ky ^上	tōy ^{陰平}	tei ^{陰平}	ky ^{陰平}	tʰəŋ ^{陰平}	tʰən ^{陰平}	tʰōy ^{陽平}
LL	tʂəu ^{陰平}	ky ^上	kyəŋ ^{陰平}	kyei ^{陰平}	ky ^{陰平}	tʂʰəŋ ^{陰平}	kʰuəŋ ^{陰平}	kyəŋ ^{陽平}

The second type is *dú rú duān zǔ* phenomenon shown in some 知 *zhī* group division III characters but not in 知 *zhī* group division II, 莊 *zhuāng* group, or 章 *zhāng* group characters. This type is found in places such as Liánhuā and Jí’ān in Jiāngxī Province, and 安仁 Ānrén in Húnán Province. According to Zhuang (2007), these dialects actually do not have *dú rú duān zǔ* phenomenon throughout all the 知 *zhī* group division III characters, but only show a few hardening characters, and the characters are all common characters. Furthermore, these dialects are all located at the more peripheral places of the Gàndialect group, close to other dialect groups such as Yuè, Xiāng, Píng huà, and other local dialects. It has been reported that the characters that have the *dú rú duān zǔ* phenomenon in these local dialects show the same distribution as the Gàndialects in these regions. Zhuang therefore believes that the *dú rú duān zǔ* phenomenon in these Gàndialects are actually retention of Old Chinese. Of the characters that do not show the *dú rú duān zǔ* phenomenon, they are generally read as dental affricates, and alveolo-palatal affricates before high front medials or vowels. The following table gives some example characters in some of these Gàndialects.

Table 30. Readings of some 知 *zhī* group characters in various Gàndialects of the first type. Table modified from Zhuang (2007). 蓮花 Liánhuā (LH) in Jiāngxī

Province, Jíchá subgroup; 吉安 Jí'ān (JA) in Jiāngxī Province, Jíchá subgroup; 安仁 Ānrén (AR) in Húnán Province, Lěizī subgroup.

	-Voi, -Asp							+Voi
	張 <i>zhāng</i>	漲 <i>zhǎng</i>	脹 <i>zhàng</i>	帳 <i>zhàng</i>	豬 <i>zhū</i>	竹 <i>zhú</i>	著(著衣)	柱 <i>zhù</i>
MC	宕開三平陽知	宕開三去漾知	宕開三去漾知	宕開三去漾知	遇開三平魚知	通開三入屋知	宕開三入藥知	遇合三上慶澄
QYS	tjang ^平	tjang ^去	tjang ^去	tjang ^去	tjwo ^平	tjuk ^入	tjak ^入	dju ^上
LH	--	tᶢᶥ ⁵³ 白, tsᶢᶥ ⁵³ 文	tᶢᶥ ²² 白, tsᶢᶥ ²² 文	tᶢᶥ ²² 白, tsᶢᶥ ²² 文	tᶢiu ⁴⁴ 白, tᶢey ⁴⁴ 文	tᶢio ⁴⁴ 白, tᶢey ⁴⁴ 文	tᶢio ⁴⁴ 白, tᶢey ⁴⁴ 文	--
JA	tᶢᶥ ⁵⁵	tᶢᶥ ⁵¹	tᶢᶥ ³³	--	tᶢy ⁵⁵	tᶢiu ⁵⁵	tᶢio ⁵⁵	tᶢy ³³
AR	tᶢioŋ ²¹	--	--	tᶢioŋ ²¹³	tᶢy ²¹	tᶢy ⁵³	--	tᶢəu ⁵⁵ 白, tᶢey ²¹³ 文

The third type is where 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters are all read as dental stops. This type is found in dialects such as 新喻 Xīnyù (or 新余 Xīnyú), Fèngxīn, 餘干 Yúgān and 峽江 Xiájiāng in Jiāngxī Province. The following table gives some examples from the Xīnyù dialect of the Yíliú subgroup (Jiang 1992).

Table 31. Readings of some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters in Xīnyù dialect of the Yíliú subgroup. Data from Jiang (1992).

	Voiceless unaspirated			Voiceless aspirated		Voiced			
知 <i>zhī</i>	中 <i>zhōng</i>	展 <i>zhǎn</i>	知 <i>zhī</i>	撐 <i>chēng</i>	超 <i>chāo</i>	撞	陣 <i>zhèn</i>		
MC	通開三平東知	山開三上獮知	止開三平支知	梗開二平庚徹	效開三平宵徹	江開二去絳澄	臻開三去震澄		
QYS	tjung ^平	tjǎn ^上	tje ^平	theng ^平	thjǎu ^平	dǎng ^去	djǎn ^去		
	tᶢuŋ ^{陰平}	tᶢən ^上	tᶢi ^{陰平}	tᶢaŋ ^{陰平}	tᶢeu ^{陰平}	tᶢoŋ ^去	tᶢin ^{陽平}		
莊 <i>zhuāng</i>				差 <i>chā</i>	初 <i>chū</i>	巢 <i>cháo</i>	愁 <i>chóu</i>	讒 <i>chán</i>	狀 <i>zhuàng</i>
MC				蟹開二平佳初	遇開三平魚初	效開二平肴崇	流開三平尤崇	咸開二平咸崇	宕開三去漾崇
QYS				tᶢsha ^平	tᶢhjwo ^平	dzau ^平	dzjǎu ^平	dzǎm ^平	dzjang ^去
				tᶢa ^{陰平}	tᶢhu ^{陰平}	tᶢau ^{陽平}	tᶢəu ^{陽平}	tᶢan	tᶢaŋ ^{陽平}
章 <i>zhāng</i>	終 <i>zhōng</i>		枝 <i>zhī</i>	穿 <i>chuān</i>	吹 <i>chuī</i>				
MC	通開三平東章		止開三平支章	山合三平仙昌	止合三平支昌				
QYS	tᶢjung ^平		tᶢjǎ ^平	tᶢshjwǎn ^平	tᶢshjwe ^平				
	tᶢuŋ ^{陰平}		tᶢi ^{陰平}	tᶢon ^{陰平}	tᶢui ^{陰平}				

A fourth type is found in places such as Nánchéng, Xiájiāng, 黎川 Líchuān, 廣昌 Guǎngchāng, 宜黃 Yíhuáng, 南豐 Nánfēng, and 崇仁 Chóngrén in Jiāngxī Province. In this type, there are two other changes that are commonly found: 精 *jīng* group changing to dental stops and merging with 知 *zhī* group division II and 莊 *zhuāng* group, and 透 *tòu*- and 定 *dìng*-initials changing to glottal fricative h- (Chang & Wan 2002, Sun 2002). In the Nánchéng dialect, the distribution and relation of these Middle Chinese initial groups have become very complicated. The following table shows the consonant phoneme inventory for the initials of the Nánchéng dialect. The next table presents the general distribution of modern readings of initials in the Middle Chinese 端 *duān*, 精 *jīng*, 知 *zhī*, 莊 *zhuāng*, 章 *zhāng*, and 見 *jiàn* initial groups according to their Middle Chinese manner of articulation and divisions.

Table 32. Consonant phoneme inventory for the initials in the Nánchéng dialect (Qiu 1991).

p	p ^h	m	f	
t	t ^h	n		l
ts			s	
te	te ^h		ɕ	
k	k ^h	ŋ	h	
∅				
(zero initial)				

Table 33. The distribution of Middle Chinese 端 *duān*, 精 *jīng*, 知 *zhī*, 莊 *zhuāng*, 章 *zhāng*, and 見 *jiàn* group initials according to Middle Chinese manner of articulation and divisions in modern Nánchéng dialect. Organized according to Wan (1987).

MC	-Voi, -Asp				-Voi, +Asp				+Voi			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
1: 端 <i>duān</i>	t-			t-	h-			t ^h -, h-	h-			t ^h -, h-
2: 精 <i>jīng</i>	ts-		te-	te-	t ^h -		ts- (止 <i>zhǐ</i> <i>shè kāikǒu</i> div III) t ^h - te ^h -	te ^h -	t ^h -		ts- (止 <i>zhǐ</i> <i>shè kāikǒu</i> div III) t ^h - te ^h -	te ^h -

3: 知 <i>zhī</i>		ts-	t-, tɛ-			t ^h -	t ^h -, tɛ ^h -			t ^h -	t ^h -, tɛ ^h -	
4: 莊 <i>zhuāng</i>		ts-	ts-			t ^h -	ts- (止 <i>zhǐ shè kāikǒu</i> div III) t ^h - tɛ ^h -			t ^h -	ts-(止 <i>zhǐ shè kāikǒu</i> div III) t ^h - tɛ ^h - s-, ɛ-	
5: 章 <i>zhāng</i>			t-, tɛ-				t ^h -, tɛ ^h -				t ^h -, tɛ ^h -	
6: 見 <i>jiàn</i>	k-	k-	k-, t-	k-, t-	k ^h -	k ^h -	k ^h -, t ^h -	k ^h -, t ^h -	k ^h -	k ^h -	k ^h -, t ^h -	k ^h -, t ^h -

In row 1, the 端 *duān* group initials, 端 *duān* initial remains a voiceless unaspirated dental stop, but the 透 *tòu* and 定 *dìng* initials, i.e. the Middle Chinese *t^h- and *d- have changed to glottal fricative h- in most cases. In row 2 of the 精 *jīng* group initials, the voiceless unaspirated affricate 精 *jīng* initial remains ts- or tɛ- before high front vowels. The voiceless aspirated affricate 清 *qīng* initial and voiced affricate 從 *cóng* initial change to voiceless aspirated dental stop t^h-, except becoming the unaspirated affricate ts- before 止 *zhǐ shè kāikǒu* division III rhymes and aspirated alveolopalatal tɛ^h- before high front vowels. As a result, Nánchéng dialect does not have the voiceless aspirated dental affricate ts^h- initials, as can be seen in the phoneme chart. In row 4, the 莊 *zhuāng* group initials mainly have the same distribution as the 精 *jīng* group initials: the voiceless unaspirated affricate 莊 *zhuāng* initial remains ts-, while for the voiceless aspirated affricate 初 *chū* initial and voiced affricate 崇 *chóng* initial are read majorly as t^h-, except as unaspirated affricate ts- before 止 *zhǐ shè kāikǒu* division III rhymes and aspirated alveolopalatal tɛ^h- before high front vowels. There are also some 崇 *chóng* initial characters that are read as fricatives s- or ɛ-. In row 5, the 章 *zhāng* initials show the *dú rú duān zǔ* phenomenon in most cases, regardless of the manner of articulation, except before high front vowels or medials where they are read as alveolopalatal affricates tɛ-, tɛ^h-. In row 3, there appears to be a split in the 知 *zhī*

group characters according to the Middle Chinese divisions. The 知 *zhī* group division II characters follow the distribution of the 精 *jīng* group and 莊 *zhuāng* group ones, where the voiceless unaspirated 知 *zhī* is read as affricate ts-, while the voiceless aspirated 徹 *chè* and voiced 澄 *chéng* are read as voiceless aspirated dental stop t^h-. The 知 *zhī* group division III initials, on the other hand, has the same distribution as the 章 *zhāng* group ones, where they are all read as dental stops t- and t^h-, except reading as tɛ- and tɛ^h- before high front vowels or medials. Lastly, in row 6, divisions III and IV 見 *jiàn* group characters are read as dental stops in the rhymes 通 *tōng shè hékǒu* division III, 梗 *gěng shè kāikǒu* divisions III and IV, 宕 *dàng shè kāikǒu* division III, and 果 *guǒ shè kāikǒu* division III (Wan 1987, Qiu 1991). To sum up, in the 端 *duān* group initials, Middle Chinese voiceless unaspirated 端 *duān* stays as stop t-, while voiceless aspirated 透 *tòu* and voiced 定 *dìng* change into h-. 精 *jīng* group, 莊 *zhuāng* group, and 知 *zhī* group division II initials have the same distribution, where the voiceless unaspirated ones are read as affricate ts- (精 *jīng* initial, 莊 *zhuāng* initial, and division II 知 *zhī* initial), while the voiceless aspirated and voiced initials are read as voiceless aspirated dental stop t^h- in most cases (清 *qīng*, 從 *cóng*, 初 *chū*, 崇 *chóng*, 徹 *chè* division II, and 澄 *chéng* division II initials). 知 *zhī* group division III and 章 *zhāng* group initials have the same distribution, where the voiceless unaspirated initials are read as voiceless unaspirated dental stop t- (division III 知 *zhī* and 章 *zhāng* initials), while the voiceless aspirated and voiced initials are read as voiceless aspirated dental stop t^h- (division III 徹 *chè* and 澄 *chéng* initials, and 昌 *chāng* and 船 *chuán* initials). On the other hand, 見 *jiàn* group also shows the *dú rú duān zǔ* phenomenon in divisions III and IV characters in some rhymes. The following

table gives some example readings of characters in the 端 *duān*, 精 *jīng*, 知 *zhī*, 莊 *zhuāng*, 章 *zhāng*, and 見 *jiàn* group initials in the Nánchéng dialect.

Table 34. Readings of some 端 *duān*, 精 *jīng*, 知 *zhī*, 莊 *zhuāng*, 章 *zhāng*, and 見 *jiàn* group initial characters in Nánchéng dialect of the Fǔguǎng subgroup. Data from Qiu (1991) and Wan (1987) (marked with superscript ^W). The 端 *duān* group characters with initials read as glottal fricative h- are marked green and bolded, and the 精 *jīng* group, 知 *zhī* group, 莊 *zhuāng* group, 章 *zhāng* group, and 見 *jiàn* group characters with initials read as dental stops are marked red and bolded.

MC	-Voi, -Asp			-Voi, +Asp			+Voi		
端 <i>duān</i>	多 <i>duō</i>	刀 <i>dāo</i>	丁 <i>dīng</i>	拖 <i>tuō</i>	胎 <i>tāi</i>	梯 <i>tī</i>	台 <i>tái</i>	頭 <i>tóu</i>	條 <i>tiáo</i>
MC	果開一平 歌端	效開一平 豪端	梗開四平 青端	果開一平 歌透	蟹開一平哈 透	蟹開四平 齊透	蟹開一平 哈定	流開一平 侯定	效開四平 蕭定
QYS	tâ ^平	tâu ^平	tieng ^平	thâ ^平	thâi ^平	thiei ^平	dâi ^平	dâu ^平	diou ^平
	to ^{陰平}	tou ^{陰平}	tin ^{陰平}	ho ^{陰平}	hai ^{陰平}	tʰi ^{陰平}	hai ^{陽平}	hiou ^{陽平}	tʰiau ^{陽平}
精 <i>jīng</i>	最 <i>zuì</i>	尖 <i>jiān</i>	資 <i>zī</i>	猜 <i>cāi</i>	青 <i>qīng</i>	雌 <i>cí</i>	才 <i>cái</i>	晴 <i>qíng</i>	瓷 <i>cí</i>
MC	蟹合一去 泰精	咸開三平 鹽精	止開三平 脂精	蟹開一平 哈清	梗開四平青 清	止開三平 支清	蟹開一平 哈從	梗開三平 清從	止開三平 脂從
QYS	tswâi ^去	tsjâm ^平	tsi ^平	tshâi ^平	tshiang ^平	tshjě ^平	dzâi ^平	dzjäng ^平	dzi ^平
	tey ^{陰去}	teien ^{陰平}	tsɿ ^{陰平}	tʰai ^{陰平}	te ^h iaŋ ^{陰平}	tsɿ ^{陰平 W}	tʰai ^{陽平}	te ^h iaŋ ^{陽平}	tsɿ ^{陽平 W}
知 <i>zhī</i> Div II	站 <i>zhàn</i>	摘 <i>zhāi</i>		撐 <i>chēng</i>					
MC	咸開二去 陷知	梗開二入 麥知		梗開二平 庚徹					
QYS	tām ^去	tek ^入		theng ^平					
	tsan ^{陰去}	tsa? ^入		tʰaŋ ^{陰去}					
知 <i>zhī</i> Div III	帳 <i>zhàng</i>	豬 <i>zhū</i>		超 <i>chāo</i>	抽 <i>chōu</i>		趙 <i>zhào</i>	傳 <i>chuán</i>	陳 <i>chén</i>
MC	宕開三去 漾知	遇開三平 魚知		效開三平 宵徹	流開三平尤 徹		效開三上 小澄	山合三平 仙澄	臻開三平 真澄
QYS	tjang ^去	tjwo ^平		thjäu ^平	thjəu ^平		djäu ^上	djwän ^平	djĕn ^平
	to? ^{陰去}	teie ^{陰平}		tʰau ^{陰平} w	te ^h iau ^{陰平}		tʰau ^{陽去}	tʰuon ^{陽平}	te ^h in ^{陰平}
莊 <i>zhuāng</i>	斬 <i>zhǎn</i>	莊 <i>zhuāng</i>		抄 <i>chāo</i>	初 <i>chū</i>	廁 <i>cè</i>	查 <i>chá</i>	床 <i>chuáng</i>	
MC	咸開二上 賺莊	宕開三平 陽莊		效開二平 肴初	遇開三平魚 初	止開三去 志初	蟹開二平 佳崇	宕開三平 陽崇	
QYS	tsām ^上	tsjang ^平		tshau ^平	tshjwo ^平	tshĭ ^去	dza ^平	dzjang ^平	
	tsan ^上	tsoŋ ^{陰平}		tʰau ^{陰平}	tʰu ^{陰平}	tsɿ ^{去 W}	tʰa ^{陽平}	soŋ ^{陽平}	
章 <i>zhāng</i>	照 <i>zhào</i>	周 <i>zhōu</i>		車 <i>chē</i>	川 <i>chuān</i>	出 <i>chū</i>	船 <i>chuán</i>		
MC	效開三去 笑章	流開三平 尤章		假開三平 麻昌	山合三平仙 昌	臻合三人 術昌	山合三平 仙船		

QYS	tʂjäu ^去	tʂjəu ^平		tʂja ^平	tʂjwän ^平	tʂjwet ^入	dʒjwän ^平		
	tau ^{陰去}	teiəu ^{陰平}		tʰa ^{陰平}	tʰuon ^{陰平}	te ^h y? ^入	suon ^{陽平}		
見 jiàn	功 gōng	拱 gǒng	金 jīn	空 kōng	恐 kǒng	慶 qìng	喬 qiáo	共 gòng	權 quán
MC	通開一平 東見	通開三上 腫見	深開三平 侵 B 見	通開一平 東溪	通開三上腫 溪	梗開三去 映溪	效開三平 宵 B 羣	通開三去 用羣	山合三平 仙 B 羣
QYS	kung ^平	kjung ^上	kjiəm ^平	khung ^平	khjwong ^上	khjəng ^去	gjiäu ^平	gjwong ^去	gjwiän ^平
	kuŋ ^{陰平}	kuŋ ^上 , tuŋ ^{上 w}	tein ^{陰平}	k ^h uŋ ^{陰平}	t ^h uŋ ^上	te ^h in ^去	t ^h au ^{陽平}	t ^h uŋ ^{陽去}	k ^h uan ^{陽平}

For the other Gàn dialects that do not show the *dú rú duān zǔ* phenomenon, the 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters have mostly merged together and are primarily read as dental affricates ts- and ts^h-, with some dialects having alveolo-palatal affricates tɕ- and tɕ^h- before high front medials or vowels. Dialects such as Nánchāng in Jiāngxī Province and Jiànníng in Fújiàn Province are of this type (Chang & Wan 2002). In the places that have distinctions, the distinction is between the 知 *zhī* group division II and 莊 *zhuāng* group versus the 知 *zhī* group division III and 章 *zhāng* group initials, where the 知 *zhī* group division II and 莊 *zhuāng* group characters are read with dental affricate initials, and the 知 *zhī* group division III and 章 *zhāng* group with palate-alveolar or retroflex affricates. Some of the dialects also have an alveolo-palatal affricate series before high front medials or vowels in either the 知 *zhī* group division II and 莊 *zhuāng* group or the 知 *zhī* group division III and 章 *zhāng* group initial group, or in both. Some example dialects of this are Dūchāng and 德安 Dé'ān (Sun 2002).

The following table provides a summary of the different types of the *dú rú duān zǔ* phenomenon as discussed in the Gàn dialects.

Table 35. Summary of the distributional patterns in correspondences to MC of 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters in the Gàn dialect group.

Type	Subtype	Example dialect	知 <i>zhī</i> Div II	知 <i>zhī</i> Div III	莊 <i>zhuāng</i>	章 <i>zhāng</i>
1: <i>dú rú duān zǔ</i> phenomenon in 知 <i>zhī</i> Div III & 章 <i>zhāng</i>	1-1: all across 知 <i>zhī</i> Div III & 章 <i>zhāng</i>	Línchuān, Jiāngxī (Fúguǎng subgroup)	ts-, ts ^h -	t-, t ^h -	ts-, ts ^h -	t-, t ^h -
	1-2: all across 知 <i>zhī</i> Div III & 章 <i>zhāng</i> , except 止 <i>zhǐ shè</i>	Liúyáng, Húnán (Yíliú subgroup)	ts-, ts ^h -	t-, t ^h -	ts-, ts ^h -	t-, t ^h -
				ts-, ts ^h - before 止 <i>zhǐ shè</i> rhymes		ts-, ts ^h - before 止 <i>zhǐ shè</i> rhymes
	1-3: k- before medial or final -y	Lǐlíng, Húnán (Jíchá subgroup)	ts-, ts ^h -	ts-, ts ^h -/ t-, t ^h -	ts-, ts ^h -	ts-, ts ^h -/ t-, t ^h -
k-, k ^h - before medial or final -y				k-, k ^h - before medial or final -y		
1-4: only in some 知 <i>zhī</i> Div III characters	Liánhuā, Jiāngxī (Jíchá subgroup)	ts-, ts ^h -	ts-, ts ^h - (only some t-, t ^h - in some common characters)	ts-, ts ^h -	ts-, ts ^h -	
2: <i>dú rú duān zǔ</i> phenomenon in all 知 <i>zhī</i> , 莊 <i>zhuāng</i> , & 章 <i>zhāng</i>		Xīnyù, Jiāngxī (Yíliú subgroup)	t-, t ^h -	t-, t ^h -	t-, t ^h -	t-, t ^h -
3: <i>dú rú duān zǔ</i> phenomenon coupling with fricativization in 透 <i>tòu</i> and 定 <i>dìng</i> initials		Nánchéng, Jiāngxī (Fúguǎng subgroup)	ts-, t ^h - (徹 <i>chè</i> and 澄 <i>chéng</i> initials)	t-, t ^h -/ tɕ-, tɕ ^h -	ts-, t ^h - (初 <i>chū</i> and 崇 <i>chóng</i> initials)	t-, t ^h -/ tɕ-, tɕ ^h -
4: no <i>dú rú duān zǔ</i> phenomenon at all	5-1: full merger	Nánchāng, Jiāngxī (Chāngdū subgroup)	ts-, ts ^h -/ tɕ-, tɕ ^h -	ts-, ts ^h -/ tɕ-, tɕ ^h -	ts-, ts ^h -/ tɕ-, tɕ ^h -	ts-, ts ^h -/ tɕ-, tɕ ^h -
	5-2: distinction between 知 <i>zhī</i> Div II & 莊 <i>zhuāng</i> versus 知 <i>zhī</i> Div III & 章 <i>zhāng</i>	Dūchāng (Chāngdū subgroup)	ts-, ts ^h -/ tɕ-, tɕ ^h -	tʃ-, tʃ ^h -/ tɕ-, tɕ ^h - or tʂ-, tʂ ^h -/ tɕ-, tɕ ^h -	ts-, ts ^h -/ tɕ-, tɕ ^h -	tʃ-, tʃ ^h -/ tɕ-, tɕ ^h - or tʂ-, tʂ ^h -/ tɕ-, tɕ ^h -

1.1.6.2 Explanations for the *dú rú duān zǔ* phenomenon in the Gàn dialects

Many scholars in Chinese linguistics and dialectology have noticed the phenomenon of *dú rú duān zǔ* in the Gàn dialects, and many proposals have been made in an attempt to explain the source and reason for the phenomenon. There are basically three different theories: retention, contact, and innovation. For the convenience of discussion, the different *dú rú duān zǔ* phenomena in the Gàn dialects will be referred to as Type 1-3 as according to the previous table (Table 34). That is, Type 1 represents *dú rú duān zǔ* phenomenon in 知 *zhī* group division III and 章 *zhāng* group initials, Type 2 in 知 *zhī* group divisions II and III, 莊 *zhuāng* group, and 章 *zhāng* group initials, and Type 3 in 徹 *chè* of the 知 *zhī* group and 崇 *chóng* of the 莊 *zhuāng* group initials.

Luo in 1940 first observes the Type 1 *dú rú duān zǔ* phenomenon in 臨川| Línchuān dialect, and considers it to be a retention from Old Chinese. He first cites 清 Qīng Dynasty scholar 錢大昕 Qián Dàxīn's examples and conclusion that "The ancient people had more tongue sounds (端 *duān* group, likely dental stops), and many of them later changed to tooth sounds (精 *jīng* group and 照 *zhào* group, likely dental and alveolopalatal or palate-alveolar affricates), not just the three initials of 知 *zhī*, 徹 *chè*, and 澄 *chéng* that do so¹⁴." Luo also cites Karlgren's observation that the 端 *duān*, 透 *tòu*, and 定 *dìng* (MC *t-, *t^h-, *d-) initial characters can 互諧 *hùxié* 'share phonetic components' with both 知 *zhī*, 徹 *chè*, and 澄 *chéng* (MC *t-, *t^h-, *d-) and 章 *zhāng*, 昌 *chāng*, 船 *chuán*, and 禪 *shàn* (MC *tɕ-, tɕ^h-, dz^h-, dz-) characters of the same manner of articulation, but not with the 精 *jīng* (MC *ts-), 清 *qīng*, and 從 *cóng* initial characters. Karlgren therefore concludes that the Middle Chinese alveolopalatal affricates (章 *zhāng* group) were alveolopalatal stops *t-,

¹⁴ Original statement: 「古人多舌音，後代多變為齒音，不獨知徹澄三母為然也。」 (Luo 1940: 108)

*t^h-, *d_l- in Old Chinese. After the 章 *zhāng* group initials changed to alveolopalatal affricates, 知 *zhī* group division III changed to alveolopalatal stops in Middle Chinese under the influence of the division III medial: OC *t_lja > MC *t_lja > *t_lja. According to Karlgren's conclusion, Luo argues that the *dú rú duān zǔ* phenomenon in the 知 *zhī* group division III and 章 *zhāng* group initials in Línchuān must be a retention because first, the 章 *zhāng* group initials changing from Old Chinese alveolopalatal stops *t_l-, *t^h-, *d_l- to *t_lʔ-, t^hʔ- in 隋 Suí and 唐 Táng Dynasties and then to modern t-, t^h- would be going to much in circles¹⁵. Secondly, as the 知 *zhī* group characters have not gone through palatalization in Línchuān, Luo thinks it means this dialect is not accustomed to alveolopalatal stops. If the Old Chinese alveolopalatal stops did not change into alveolopalatal affricates in Línchuān, it is likely for them to change into dental stops, which have the same manner of articulation and a close place of articulation (Luo 1940: 106-111). On the other hand, he considers the phenomenon of 透 *tòu* and 定 *dìng* initials reading as h- a change of losing the stop feature but keeping the aspiration part (Luo 1940: 106)¹⁶. Luo's arguments are rather weak because they do not rule out the possibility of the *dú rú duān zǔ* phenomenon being an innovation in Línchuān at all. Some other scholars that consider the *dú rú duān zǔ* phenomenon in the Gàndialects as retention from Old Chinese are Chen (1997) and Zhuang (2007). Chen (1997) also believes the possibility that some of these could come from early 百越 Bǎiyuè languages during Old Chinese time, but does not explain the exact source and influence from the Bǎiyuè languages.

¹⁵ Original statement: 「假使高本漢所擬的上古音可以承認的話，那麼，若說章昌在這個方言裡先從上古的 [t_l-, t^h-] 變成隋唐的 [t_lʔ-, t^hʔ-]，再由隋唐的舌面擦音 [t_lʔ-, t^hʔ-] 變成近代的舌尖塞音 [t-, t^h-]，那就未免太迂曲了！」 (Luo 1940: 111)

¹⁶ Original statement: 「這是遺失閉塞成分而保留送氣的結果。」 (Luo 1940: 106)

Ho (1987) also thinks the Type 1 *dú rú duān zǔ* phenomenon in the Gàn dialects is due to contact, but considers the source of contact to be the Min dialects, since the Min dialect group is one of the surrounding neighbors of the Gàn dialects. Ho recognizes the differences of reading distribution in the 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group initials in the Min and the Gàn dialects: in the Min dialects, the 知 *zhī* group initials have completely merged with the 端 *duān* group ones, while 莊 *zhuāng* group, 章 *zhāng* group, and 精 *jīng* group initials merge together. Whereas in the Gàn dialects, 知 *zhī* group and 章 *zhāng* group merge together, and some dialects even merge with 莊 *zhuāng* group initials. This distribution has been noticed by many scholars. However, Ho takes this as evidence showing that the *dú rú duān zǔ* phenomenon occurred after the 知 *zhī* group and 章 *zhāng* group initials merged together. On the other hand, Ho also notices the chain effect of 清 *qīng* and 從 *cóng* initials (*ts^h-, *dz-) changing to t^h- and 透 *tòu* and 定 *dìng* initials (*t^h-, *d-) to h-, or Type 2 *dú rú duān zǔ* phenomenon, in several of the Gàn dialects, such as Nánchéng, Líchuān, and Fèngxīn. He points out that the chain effect of *t- > h-, then *ts- > t- can be found in a large region, from the old 金山 Jīnshān dialect of Wú located at the estuary of the Yangtze River, to Sìyì dialects of Yuè and 海南 Hǎinán dialect of Mǐn. Furthermore, the closer to the border of 桂 Guì and Vietnam, the chain effect is more complete. Ho therefore thinks that the chain effect in the Gàn dialects is part of the effect found distributed in this wide region. However, he is not certain if the chain effect in the Gàn dialects represents a fossilized layer from contact influence with the Tai-Kadai and the South Asian languages, or a change due to regional spreading of the effect. Another scholar that thinks the *dú rú duān zǔ* phenomena in the Gàn dialects are results through contact is Chen (1996). He believes that they are from influences from the so called Bǎiyuè people.

Sagart (1993: 203-205, 244-260) considers both the Type 1 and Type 3 *dú rú duān zǔ* phenomenon as innovations. He states that since in these dialects only the MC aspirated alveolar stops are affected by the change but not the MC affricates, this shows that the deaffrication change must have happened after the debuccalization change of t^h- > h-, which must occur after devoicing. In addition, in some of the Gà n dialects there is a change of l- > d- > t-/t^h-. For Type 1 *dú rú duān zǔ* phenomenon, Sagart proposes the following route:

*te- > te- > tʃ- > (a) ts- (Nánchéng)

*tj- ↗ ↘ (b) t- (Línchuān)

In regard to Luo's 1940 proposal that the Type 1 phenomenon in Línchuān is a retention, Sagart mentions that it is rejected by Hirayama (cited in Yu 1975: 148-149) and Ho (1986:9). Sagart's own reasoning against retention is that the 知 *zhī* group division III and 章 *zhāng* group characters should have turned to h- as well if they were retention from Old Chinese, since Línchuān is a dialect that has both Type 1 and Type 3 phenomena. Sagart also does not agree with Ho's idea of influence from contact with Mǐn, because this theory cannot explain why the 知 *zhī* group division II characters are not affected by the Mǐn dialects. Some other scholars that consider the *dú rú duān zǔ* phenomena in the Gà n dialects as innovations are Jiang (1992), Oshima (1996), Sun (2002), Liu (2004), Wan (2010), Li & Zong (2013),

In sum, most scholars agree there are at least two types of the *dú rú duān zǔ* phenomena in the Gà n dialects. Type 1 and 2 are often discussed together, which involve the 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group initials showing the *dú rú duān zǔ* phenomenon variously under different conditions in different Gà n dialects. Type 3 is where only the previous aspirated affricates 徹 *chè* of the 知 *zhī* group and 崇 *chóng* of the 莊 *zhuāng* group initials are influenced, and in most if not all cases involve a change of 透 *tòu* and 定 *dìng* initials to h-. For these types, scholars

such as Luo (1940) consider them to be retention from Old Chinese. Ho (1987) thinks they could be from contact with the Mǐn dialect group. Chen (1997) also takes the possibility of influence through contact, but considers the possible source to be Bǎiyuè languages from Old Chinese time. On the other hand, scholars like Sagart take the innovation viewpoint, and have proposed various sound change routes attempting to explain the phenomenon.

1.3 THE HARDENING PHENOMENON IN THE XIĀNG DIALECTS

The *dú rú duān zǔ* phenomenon in the Xiāng dialects is quite similar to the phenomena in the Gàn dialects as discussed above, although there are still differences in detail. In fact, many scholars analyze and discuss the *dú rú duān zǔ* phenomena in the Gàn and Xiāng dialects together, and propose the same explanations for common developments in both dialect groups. In the following section, I will review the phenomenon in the Xiāng dialects and note the parallels in Gàn. In section 1.2.2, I will go through the proposed explanations and note the differences for the Xiāng dialects that have not yet been brought up in the previous discussion in the Gàn dialects as in section 1.1.6.

1.3.1 The distribution of the phenomenon

Many scholars have noticed the *dú rú duān zǔ* phenomenon in the Xiāng dialects. The phenomenon is found in the 知 *zhī* group division III and 章 *zhāng* group initials (Zhou 2007). Coblin first observes the hardening phenomenon in the Xiāng dialects in his 2011 book on the Central Xiāng dialects. He defines such a change as “the change of earlier ‘shibilants’, i.e. retroflex and secondary palatal affricates (the ones that palatalized from earlier velars), to stops. He notes that in the Xiāng dialects, this change is common in the retroflexes and palatals from previous velars, but is not found in general of the dental sibilants. The hardening result is mainly to a retroflex

and/or dental stop (Coblin 2011: 47). I will adopt this definition and call this specific change as hardening hereon.

Coblin identifies several CCX finals that would cause hardening:

*-iau, *-iaŋ, *-iɔ, *-iɔŋ, *-iəu, *-iəŋ, *-ien, *-in, *-io¹⁷, *-ioŋ; *-i

*-y, *-yi, *-yn, *-yen

With this, he gives the following two generalizations: (1) hardening occurs under the condition of a following vowel (or medial) *-y, and (2) hardening also occurs under the condition of a following vowel (or medial) *-i, as long as there is another element following *-i. There are two exceptions to (2) though, the first one is that there are no identified hardening cases for the CCX final *-ie, and the other one is that the only Xiāng dialect that allows hardening before the CCX final *-i. In any case, it is clear that hardening is associated with the high front vowels *i and *y, although there remains a significant difference between the two vowels when they act as plain finals by themselves, which is that the plain *y can act as a hardening-inducing final while the plain *i cannot (Coblin 2011: 211-212).

Besides the two generalizations, he also gives several observations on the behavior of these finals (Coblin 2011: 212). The following descriptions are characteristic of the finals that may cause hardening or velarization for the CCX retroflex affricates:

(1) The CCX finals *-ien, *-yen, *-yi, and *-yn cause velarization rather than hardening in

Liányuán. Velarization will be discussed later in this chapter. Of these four finals, *-yen,

¹⁷ This CCX final is found in Coblin's list of CCX finals that may induce hardening (2011: 211), but it is not found in Coblin's more detailed discussions for hardening-inducing finals for the retroflex affricates. It is only found as a final that would trigger hardening for the secondary palatal affricates. It is therefore excluded from the table summarizations and discussions for the retroflex affricates.

*-yi, and *-yn cause hardening to retroflex stops in Lóudǐ-b, which is the normal result for hardening in Lóudǐ-b. On the other hand, *-ien causes hardening only in Shuāngfēng, Ānhuà, and Huìtóng-a.

(2) Of the same four finals above, *-yen, *-y, and *-yn do not cause hardening in Ānhuà. Furthermore, *-y does not induce hardening in Lóudǐ-a. In addition, finals containing the vowel *y never trigger hardening in Huìtóng-a.

(3) The following finals cause hardening to retroflex stops in both Lóudǐ-b and Liányuán: *-iaŋ, *-iau, *-in, *-iɔŋ, *-iəŋ, *-ien, *-iɒ, *-iəu, and *-y. Note, however, that for the final *-iəu, Lóudǐ-b only shows hardening under rù tone.

(4) The following finals induce hardening in Huìtóng-a: *-iau, *-iaŋ, *-iɒ, *-iəu, *-ien, *-in, *-iɔŋ, and *-i.

The finals that may cause hardening and/or velarization for CCX retroflex affricates can be summarized by the table below (H-D: hardening to dental stops, H-R: hardening to retroflex stops, V: velarization, x: no hardening or velarization):

Table 36. The finals that may cause hardening and/or velarization for CCX retroflex affricates.

CCX finals	*-i	*-iau	*-iaŋ	*-iɒ	*-iɔŋ	*-iəu	*-ien	*-in	*-iɒ	*-iɔŋ	*-iəŋ
XX	x	H-D	H-D	H-D	H-D	H-D	x	H-D		H-D	
SF	x	H-D	H-D	H-D	H-D	H-D	H-D	H-D		H-D	
LDa	x	H-D	H-D	x	H-D	x	x	H-D		x	
LDb	x	H-R	H-R	H-R	H-R	H-R (only rù)	x	H-R		H-R	H-R
LY	x	H-R	H-R	H-R	H-R	H-R	V	H-R		H-R	H-R
AH	x	H-D	H-D	H-D	H-D	H-D	H-D	H-D		H-D	
HTa	H-D	H-D	H-D	H-D	H-D	H-D	H-D	H-D		H-D	

CCX finals	*-y	*-yi	*-yn	*-yen

XX	H-D	H-D	H-D	H-D
SF	H-D	H-D	H-D	H-D
LDa	x	x	H-D	H-D
LDb	H-R	H-R	H-R	H-R
LY	H-R	V	V	V
AH	x		x	x
HTa	x	x	x	x

As for hardening for the secondary palatal affricates, Coblin gives the following observations concerning the finals:

- (1) Before the CCX finals *-yen and *-yn, Liányuán has velar initials, although it is uncertain if these are the results of velarization or simply retention from the original CCX velars. On the other hand, Ānhuà does not show hardening before these two finals. In addition, before the final *-ien, both Shuāngfēng and Liányuán have velar initials.
- (2) For the final *-iəu, hardening in Lóudǐ-b only occurs under rù tone, same as in the CCX retroflex affricate initials.
- (3) For the finals *-iɒ, *-iaŋ, *-iau, *-in, *-y, *-iɒŋ, and *-io, Lóudǐ-b and Liányuán show hardening to retroflex stops. Before these same finals, Lóudǐ-a show hardening to dental stops for voiceless initials, but CCX *g- becomes dz-, except before the final *-iɒ, where the Lóudǐ-a reflex would be dz-.
- (4) Huìtóng-a does not have hardening of secondary palatal affricates from CCX velars.

The finals that may cause hardening and/or velarization for secondary palatal affricates derived from CCX velar stops can be summarized by the table below (H-D: hardening to dental stops, H-R: hardening to retroflex stops, V: velarization or retention as velars from CCX, x: no hardening or velarization):

Table 37. The finals that may cause hardening and/or velarization for secondary palatal affricates derived from CCX velar stops.

CCX finals	*-i	*-iau	*-iaŋ	*-iɒ	*-iɒŋ	*-iəu	*-ien	*-in	*-io	*-ioŋ	*-iəŋ
XX											
SF							V				
LDa		H-D	H-D	H-D (except CCX *g-)	H-D			H-D	H-D		
LDb		H-R	H-R	H-R	H-R	H-R (only rù)		H-R	H-R		
LY		H-R	H-R	H-R	H-R		V	H-R	H-R		
AH											
HTa	x	x	x	x	x	x	x	x	x	x	x

CCX finals	*-y	*-yi	*-yn	*-yen
XX				
SF				
LDa	H-D			
LDb	H-R			
LY	H-R		V	V
AH			x	x
HTa	x	x	x	x

Another similar type of sound change discussed by Coblin is velarization, as mentioned above, where the affected initials also include both earlier retroflexes and secondary palatal affricates, but the result of such a process is to a velar stop. Velarization, however, is a phenomenon not as widely spread as hardening. In the Xiāng dialects, it mainly only occurs Liányuán and very few cases in Shuāngfēng (Coblin 2011: 51). For example:

展 zhǎn QYS tǎn[±] (山開三上獮知) CCX *tʂien[±]

XX [tʂɿ[±]]; SF [kǐ[±]]; LDa [tʂi[±]]; LDb [tei[±]]; LY [ki[±]]; AH [tʂ[±]]; XH [tʂɛ̃[±]]; XP [tsɛ̃[±]]; CX [tsɛ[±]]; LX [tsǎ̃[±]]; HTa [tan[±]]; HTb [tʂɛn[±]]

Coblin lists four finals that would cause velarization: *-ien, *-yen, *-yi, and *-yn.

Many Chinese scholars have also noticed this phenomenon in the few Xiāng dialects. It is basically found in the 知 *zhī* and 章 *zhāng* group *hékǒu* division III initials (Zhou 2007).

1.3.2 Explanation of hardening and velarization in the Xiāng dialects

The first comprehensive recent study on the *dú rú duān zǔ* phenomenon is Luo's 1940 book on a Gàn dialect Línchuān, a Gàn dialect as discussed previously. Luo's view is that the *dú rú duān zǔ* phenomenon in the Línchuān dialect is a retention from Old Chinese. Since then, many scholars have looked into the phenomenon, mostly focusing on the Gàn dialects. As discussed in section 1.2.6, besides Luo's retention view, there are also other scholars that hold the opinion that the phenomenon in the Gàn dialects is actually an innovation. Sagart, for one, considers the phenomenon to be a later change (1993).

Coblin's view on the *dú rú duān zǔ* phenomenon in the Xiāng dialects is essentially that it is an innovation. For one thing, the retention theory would not be able to explain the development into retroflex stops in Lóudǐ-b and Liányuán. For example, consider the following examples:

掉 *diào* QYS *dieu*^去 LDb *tɿ*^{陰去} and LY *tiə*^{陰去} ~ *diə*^{陰去}

兆 *zhào* QYS *djäu*^上 LDb *tʰə*^{陽去} and LY *tə*^{陽去}

照 *zhào* QYS *tɕjäu*^去 LDb *tɕ*^{陰去} and LY *tə*^{陰去}

The retention scenario would have dental stops preserved from Old Chinese as the source for the characters 兆 *zhào* and 照 *zhào*. However, it would be extremely difficult to explain the

development into retroflex stops in the cases of Lóudǐ-b and Liányuán. Coblin therefore reaches the conclusion that the *dú rú duān zǔ* phenomenon in the Xiāng dialects is an innovation, same as Sagart's conclusion for the change in the Gàn dialects (2011: 215-217).

On the other hand, the issue of velarization remains more of an open question. It has also been noticed by many Chinese scholars, but no consensus has been reached. One of the explanation is that since there are many characters of 知 *zhī* and 章 *zhāng* group initials that share phonetic series with 見 *jiàn* group initials, the 知 *zhī* and 章 *zhāng* group characters that are read as velar stops are probably retention from Old Chinese (Zhou 2007).

For the few cases of velarization found in Shuāngfēng, Coblin states that the reason is still unsure. For one thing, the dialect data documented for different subtypes of the Shuāngfēng dialect vary widely. For instance, the same character 展 *zhǎn* is recorded as [teĩ̃[±]] and [teyě̃[±]] in Bao (2006: 189), and [keiŋ[±]] in Nakajima (1990: 98). He also mentions that there are Gan dialects that show the process of velarization, such as 平江 Píngjiāng 展 *zhǎn* [kɤŋ[±]] (Li & Zhang et al. 1992: 98). Shuāngfēng, the Xiāng dialect that shows velarization, lies in the area of Gàn -speaking immigrants in the Ming and Qing periods. Coblin therefore suspects that the velarization phenomenon of Shuāngfēng may be due to influence from contact with the Gàn dialects (Coblin 2011: 52, 212). Other than that, velarization has not been discussed much in Coblin's book.

1.4 HARDENING PHENOMENA IN OTHER LANGUAGE FAMILIES

Hardening, or sometimes known as strengthening, fortition, etc., is the notion that a sound becomes stronger in articulation after the change. Various processes with these names have been reported in some of the world's languages.

Coblin (2011: 211) mentions a sharpening phenomenon found in the Germanic languages, also known as Holtzmann's Law, where the intervocalic *j* and *w* after short vowels may show the strengthening phenomenon. This process has Proto-Germanic *jj* > *ddj* and *ww* > *ggw* intervocalically in Gothic, under the East Germanic branch, and *jj* > *ddj* and *ww* > *ggv* in Old Norse, under the North Germanic branch. In contrast, in other branches such as Old Highland German of the West Germanic branch, there is no occurrence of the sharpening phenomenon. Some of the more commonly cited examples are as follows (Robinson 1992: 59, 87) (Pons-Sanz 2006):

Old Norse	Gothic	Old Highland German	
tveggja	twaddje	zweiio	'of two'
hoggva		houwan	'strike'
	triggws	(gi)triuwi	'true'

Smith (1997, 1999) suggests a theory of syllable accent as the explanation for gemination in these Germanic languages. Following Holtzmann, she notices that the sharpening phenomenon occurs before an accented syllable segment. She therefore proposes a differential syllabification as the reason behind sharpening.

Another process mentioned by Coblin is found in the early development of Old English discussed in Lass (1977: 71). In the immediate ancestor of Old English, which is inherited from Proto-West Germanic, there is only one phonemic palatal /j/, and there is no contrast of palatal versus velar in any manner of articulation. The consonant system of this language is as follows:

Stops	p	t	k
	b	d	
Fricatives	f θ	s	x
		j	ɣ
Nasals	m	n	
Liquids	w	r l	

During the development of early Old English, the velar fricative */ɣ/ and velar stop */k/ palatalized under certain conditions. The palatal allophone of */ɣ/ merged with the original */j/, and then hardened to [g]. Lass does not discuss the trigger or the reason behind the change, although he mentions that a similar situation still exists in Modern Swedish.

A similar process mentioned by Hock is gemination in the Indo-European languages, also called geminate strengthening. This process most frequently occur in intervocalic consonant clusters, and the most common triggers are semivowels. Hock attributes this as a kind of complete assimilation (Hock 1992: 138-139). The following table gives some examples of gemination.

Table 38. Gemination examples in the Indo-European languages. From Hock 1992 (138).

Prom.	*sapyā	:	It.	sappia [-ppy-]	‘would know’
PGerm.	*sitjan	>	pre-OE	*sittjan > OE sittan	‘sit’
	*apla-	>	OE æppel, MLowGerm.	appel	
	*akra-	>	OSaxon	akkar	
Skt.	anya-	>	‘dial’	annya-	‘other’
	patra-	>		pattra-	‘leaf’
	pakṣa-	>		pakṣa-	‘wing’

Romance languages also show a process of what Hock calls ‘initial strengthening’. Hock summarizes that this process occurs to initial sonorants, and only in languages that have medial weakening of obstruents. This initial strengthening process may therefore be due to the goal of bringing about pattern symmetry of ‘strong initial segments : weak medial segments’ to the sonorants. In other words, since there is a pattern of weak medial obstruent : strong initial obstruent,

in place of a weaker medial sonorant, the initial position, or target X in the analogy given below, may have the tendency to become a strong initial sonorant to keep a symmetry of the pattern. The charts below give some examples that illustrate this process. In (1)a. and (2)a., the languages Spanish, Catalan, Leonese, and Middle Indo-Aryan (dial. MIAr.) show initial strengthening. These languages show medial weakening of obstruents, as in (1)c. and (2)b., but tend to preserve the medial sonorants without weakening, as in (1)d. and (2)c. (Hock 1992: 162-163). Note that the strengthening process here includes not just changes to stops, but also lengthening or changes that have a strengthening effect on the articulation manner.

Medial	Weaker obstruent	:	Initial	Stronger obstruent
	Weaker sonorant	:	X = Stronger sonorant	

Table 39. Examples of initial strengthening in some Indo-European languages.

Table from Hock 1992 (162-163). In (1), a. shows initial hardening in the languages on the right-side row, b. shows that the initial hardening cases have the same result as reflexes to Latin medial geminates, c. shows medial weakening of obstruents in Spanish, and d. shows that Spanish tends to not have medial weakening for sonorants. In (2), examples show strengthening of sonorants into similar stops: a. shows initial hardening in the languages on the right-side row, b. shows medial weakening of obstruents in dialectal Middle Indo-Aryan (dial. MIAr.), and d. shows that Middle Indo-Aryan tends to not have medial weakening for sonorants.

(1)

a.	Lat.	rēgem leōnem nārēs	Span. Catal., Leon. Leon. Dial.	[r̄ey] [λeon] [ñaris]	‘king’ ‘lion’ ‘nose’
b.	Lat.	terram illa annum	Span.	[tiēra] [ēla] [año]	‘earth’ ‘she’ ‘year’
c.	Lat.	vidēre habēre pacatum cippus	Span.	veøer [aβer] [paɣaðo] cepo	‘to see’ ‘to have’ ‘pleased’ ‘pole, branch’
d.	Lat.	amarum	Span.	amaro	‘bitter’

(2)

a.	Skt.	ya- vasanta-	dial. MIAr.	ṣa- basanta-	‘who (rel. pron.)’ ‘spring (season)’
b.	Skt.	mata- kṛtaka-	dial. MIAr.	mada, maøa kidaya, ki(y)aøa	‘thought’ ‘done’
c.	Skt.	karōti	dial. MIAr.	kara(d)ṣi	‘does’

Bybee and Easterday (2019) study fortition by using 81 languages sampled from different language families. They first define a string of consonant scale as: central approximant > fricative > affricate > stop. Any process going from any point on the string leftwards is defined a lenition, and rightwards fortition. They identify a total of 107 weakening and strengthening processes, and find that the case numbers for lenition and strengthening are not even: lenition occurs more frequently than fortition. According to Bybee and Easterday, this result concur with most previous studies. The following table shows their count for different processes.

Table 40. Comparison of lenition and fortition process types. Table modified from Bybee & Easterday (2019).

Lenition process type	N processes (<i>N languages</i>)	Fortition process type	N processes (<i>N languages</i>)
stop → affricate	14 (<i>11 lgs</i>)	affricate → stop	--
stop → fricative	28 (<i>22 lgs</i>)	fricative → stop	5 (<i>5 lgs</i>)
stop → approximant	11 (<i>9 lgs</i>)	approximant → stop	3 (<i>3 lgs</i>)
affricate → fricative	7 (<i>5 lgs</i>)	fricative → affricate	1 (<i>1 lgs</i>)
affricate → approximant	--	approximant → affricate	1 (<i>1 lgs</i>)
fricative → approximant	8 (<i>7 lgs</i>)	approximant → fricative	12 (<i>9 lgs</i>)
debuccalization	8 (<i>8 lgs</i>)	buccalization	6 (<i>3 lgs</i>)
Total	76 (<i>43 lgs</i>)		31 (<i>21 lgs</i>)

Besides counting the occurrences of these two processes, they also analyze the characteristics of strengthening and weakening, and find some major differences between the two.

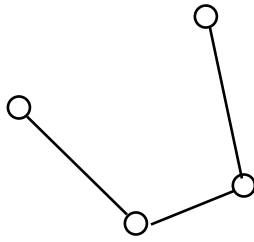
Table 41. Major characteristics of strengthening and weakening. Summarized from Bybee & Easterday 2019.

	Strengthening	Weakening
Most common process type	Increased constriction of central approximants, particularly glides	Decreased constriction of stops, particularly with a fricative outcome

POA affected	Typically palatal or labial consonants (usually glides), and/or have outcomes at those places of articulation	A diverse range of POA
Conditioning environments	Tend to include high and/or front vowels or domain-initial positions	Diverse, with intervocalic and specific vocalic contexts conditioning different kinds of processes

The traditional view for sound change is that sound change is a result from sloppy or lazy articulation. Bybee and Easterday state that this cannot explain the consistency across speakers of the same speech variety. They propose the idea of “efficiency as achieved through automatization”, which would lead to reduction and overlap of sequences of gestures, including the coarticulatory effects. The view of automatization can serve as the articulatory basis for strengthening. The basic idea is that a shorter trail of movement may not actually be the most efficient one. It has been observed that when linking four points together with lines, as given in the graph below, novice task performers tend to use straight lines and sharp turns in between, with a slowing or stopping motion as each point. However, after repeated practice, performers are able to link the points without the stopping or slowing motion and instead would produce a curvier line. Even though the length of the line after practice has increased, the time spent actually decreases. Bybee and Easterday take this scenario to explain the strengthening of glides to fricatives, since this is the most common type of strengthening in their finding. Since glides are pronounced with a bulkier articulator, it takes more time to slow down and change directions. In some cases, the glide movement becomes higher than necessary due to inertia. At the maximal curving point, there would be a slight slowing down of movement for directional change. This slight slow down lengthens the duration, creating the motion needed for pronouncing fricatives, which are produced by vocal tracts held for a noticeable period of time, thereby causing strengthening to fricatives to occur (Bybee & Easterday 2019).

Novice:



After practice:

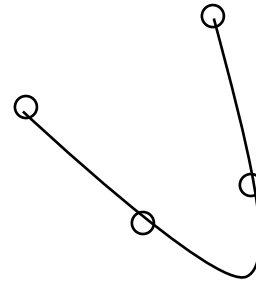


Figure 3. Changes of strategy for drawing lines to connect target points. From Bybee & Easterday (2019).

Four sound change processes that variously have the names of hardening, sharpening, strengthening, etc., have been discussed previously: (1) Holtzmann's Law of sharpening in the Germanic languages, involving the changes of $jj > ddj$ and $ww > ggw$; (2) hardening of velars in the early development of Old English, involving the changes $*\gamma > j > g$; (3) gemination, or geminate strengthening, in the Indo-European languages, involving intervocalic consonant clusters becoming geminate stops; (4) initial strengthening in the Romance languages, involving strengthening of consonants at syllable-initial positions. Most of these sound changes do involve results to stops, but they also commonly include glides or semi-vowels as trigger or starting point. This actually concurs with Bybee and Easterday's results as discussed above. The property of these strengthening processes, however, are different to the hardening changes found in the Xiāng as well as the Gàndialects, where the sound change appears to start with affricates and end with stops. It is especially interesting that in Bybee and Easterday's survey there are no cases of strengthening from affricates to stops found, when this appears to be phenomena abundantly found in the Xiāng and Gàndialects. In sum, the hardening sound change of affricates to stops in the Xiāng dialects seems to be a sound change rarely found in the other language families.

CHAPTER 2. GEOGRAPHICAL AND PHONOLOGICAL OVERVIEW OF THE XIĀNG DIALECTS

湘 Xiāng is the ancient name for the region of modern 湖南 Húnán Province, where most of the dialects of this group are spoken. As Coblin (2011) states in his book *Comparative Phonology of Central Xiāng Dialects*, most Chinese linguists accept Xiāng as one of the major dialect groups, although there may be some discrepancies on the classification of some dialects into this group, especially on the peripherals. The criteria that Coblin selects for identifying a Xiāng dialect is the shared innovation of the tone change 陽入 yángrù to 陰去 yīnqù, commonly accompanied with the change of voiced stop and affricate initials in this tone becoming voiceless aspirates. With this condition, Coblin identifies 12 eligible dialect data points that he calls the Central Xiāng dialects,

since these dialects mostly locate in the central part of the Húnán Province: 湘鄉 Xiāngxiāng (XX), 雙峰 Shuāngfēng (SF), 婁底老街 Lóudǐ (Lǎojiē) (LDA), 婁底蛟龍村 Lóudǐ (Jiāolóngcūn) (LDB), 漣源 Liányuán (LY), 安化 Ānhuà (AH), 新化 Xīnhuà (XH), 溆浦 Xùpǔ (XP), 辰溪 Chénxī (CX), 瀘溪 Lúxī (LX), 會同林城 Huìtóng (Línchéng) (HTa), and 會同縣 Huìtóng (County) (HTb) (Coblin 2011: 1-3). The following list gives the dialects that show the hardening phenomenon, which will be discussed in the present study, their abbreviations, and their data source as used in Coblin (2011). The data used in this study are all drawn directly from Coblin (2011).

1. 湘鄉 Xiāngxiāng (XX). The primary data used in Coblin (2011) is from Bao (2006: 72-73, 87-317), and the supplementary data is from Nakajima (1987, 1990), labeled as XXn when used.
2. 雙峰 Shuāngfēng (SF). Data from Běijīng dàxué (2003, 2005).
3. 婁底老街 Lóudǐ (Lǎojiē) (LDA). Data from Húnánshěng gōng'āntīng (1993).
4. 婁底蛟龍村 Lóudǐ (Jiāolóngcūn) (LDB). Data from Chen (2006: 190-212).
5. 漣源 Liányuán (LY). Data from Chen (1999).
6. 安化 Ānhuà (AH). Data from Bao (2006: 71-72, 87-317).
7. 會同林城 Huìtóng (Línchéng) (HTa). Data from Bao (2006: 78-79, 87-317).

The following parts give the sound systems of the Xiang dialects to be discussed as given in Coblin 2011 (8-20).

2.1 THE 湘鄉 XIANGXIANG SOUND SYSTEM

Initials

p	p ^h	b	m		
t	t ^h	d	n	l	
ts	ts ^h	dz		s	
tʂ	tʂ ^h	dʐ		ʂ	
tɕ	tɕ ^h	dʑ	ŋ	ɛ	
k	k ^h	g	ŋ	x	ɣ
∅					

Finals

ɿ	i	u	y
ʅ			
a	ia	ua	ya
ɔ	iɔ		
o	io		
ai		uai	
		ui	yi
au	iau		
	iɛi		
ã	iã	uã	
õ	iõ		
ĩ	iĩ	uĩ	yĩ
ʌn	iʌn	uʌn	yʌn
	in		
ɱ	ɱ	ŋ	

Tones

陰平 yīnpíng (1) 55	陽平 yángpíng (2) 13	次陽平 cìyángpíng (2') 23
上聲 shàngshēng (3) 21		
陰去 yīnqù (5) 45	次陰去 cìyīnqù (5') 35	陽去 yángqù (6) 33

2.2 THE 雙峰 SHUĀNGFÈNG SOUND SYSTEM

Initials

p	p ^h	b	m		
t	t ^h	d		l	
ts	ts ^h	dz		s	
tʂ	tʂ ^h	dʐ		ʂ	
tɕ	tɕ ^h	dʑ	ŋ	ɛ	
k	k ^h	g	ŋ	x	ɣ
∅					

Finals

ɿ	i	u	y
ʅ			
a	ia	ua	ya
e	ie	ue	ye
		ui	
ɚ	ɪɚ		
o	io		
ɔ	io		
əu			
ǎ̃			
ĩ	ĩĩ	uĩ	
an	iɛn	uan	yɛn
ɔŋ	iɔŋ		
ɱ	ŋ		

Tones

陰平 yīnpíng (1) 55	陽平 yángpíng (2) 13
上聲 shàngshēng (3) 31	
陰去 yīnqù (5) 35	陽去 yángqù (6) 33

2.3 THE 婁底老街 LÓUDǐ Lǎojiē SOUND SYSTEM

Initials

p	p ^h	b	m		
t	t ^h	d	n	l	
ts	ts ^h	dz		s	
tɕ	tɕ ^h	dʒ	ŋ	ɕ	ʒ
k	k ^h	g	ŋ	x	ɣ
∅					

Finals

ɿ	i	u	y
a	ia	ua	
e	ie	ue	
o	io		
ɔ	io		
ɚ	ɪɚ		
ɚu			
		ui	
ǎ̃		uǎ̃	

ẽ		uẽ
õ	iõ	
	ĩ	uĩ
	in	un
ɔŋ	iɔŋ	uɔŋ
ɤŋ	iɤŋ	
ɱ	ŋ	

Tones

陰平 yīnpíng (1) 44	陽平 yángpíng (2) 13
上聲 shàngshēng (3) 42	
陰去 yīnqù (5) 35	陽去 yángqù (6) 11

2.4 THE 婁底蛟龍村 LÓUDǐ JIĀOLÓNGCŪN SOUND SYSTEM

Initials

p	p ^h	m		
t	t ^h	n	l	
ts	ts ^h		s	
t̚	t̚ ^h			
tɕ	tɕ ^h	ŋ	ɕ	
k	k ^h	ŋ	x	ɣ
∅				

Finals

ɿ	i	u	y
a	ia	ua	ya
e	ie	ue	ye
ɤ	iɤ		
o	io		
ɔ	iɔ		
		ui	yi
əu			
ã			
ẽ		uẽ	
	ĩ		
õ	iõ		
en	ien	uen	yen
aŋ	iaŋ		
oŋ	ioŋ		
ɱ	ŋ	ŋ	

Tones

陰平 yīnpíng (1) 44	陽平 yángpíng (2) 13
上聲 shàngsheng (3) 42	
陰去 yīnqù (5) 35	陽去 yángqù (6) 21

2.5 THE 漣源 LIÁNYUÁN SOUND SYSTEM

Initials

p	p ^h	m	
t	t ^h		l
ts	ts ^h		s
t̚	t̚ ^h	ŋ	ʃ
tɕ	tɕ ^h		ɕ
k	k ^h	ŋ	x
∅			

Finals

ɿ	i	u	y
a	ia	ua	
o	io		
ə	iə		
ɔ	iɔ		
ɛ		uɛ	
		ui	
au	iau		
en	in	uən	
aŋ	iaŋ		
oŋ	ioŋ		
ŋ	ŋ	ŋ	

Tones

陰平 yīnpíng (1) 44	陽平 yángpíng (2) 13
上聲 shàngsheng (3) 42	
陰去 yīnqù (5) 55	陽去 yángqù (6) 11
入聲 rùshēng (7) 33	

2.6 THE 安化 ĀNHUÀ SOUND SYSTEM

Initials

p	p ^h	m	f
t	t ^h		l
ts	ts ^h		s z
tɕ	tɕ ^h	ŋ	ɛ
k	k ^h	ŋ	x
∅			

Finals

ɿ	i	u	y
a	ia	ua	ya
e	ie	ue	ye
o	io		
ə		uə	
	ie		ye
ɔ	io		
ai		uai	
ei		uei	
əu	iəu		
ã	iẽ	uã	yẽ
an		uan	
aŋ	iaŋ	uaŋ	
ən	in	uən	yn

Tones

陰平 yīnpíng (1) 33

陽平 yángpíng (2) 13

上聲 shàngsheng (3) 31

陰去 yīnqù (5) 45

次陰去 cìyīnqù (5') 24

陽去 yángqù (6) 21

2.7 THE 會同 A HUÌTÓNG-A SOUND SYSTEM

Initials

p	p ^h	m	f
t	t ^h	n	
ts	ts ^h		s z
tɕ	tɕ ^h	ŋ	ɛ
k	k ^h	ŋ	x
∅			

Finals

ɿ	i	u	y
a	ia	ua	ya
e	ie	ue	ye
o	io		
ɤ			
ai		uai	
ei		uei	
au	iau		
əu	iəu		
an	ien	uan	yen
on			
ən	in	uən	yn
oŋ	ioŋ		

Tones

陰平 yīnpíng (1) 21	陽平 yángpíng (2) 31
上聲 shàngshēng (3) 24	
陰去 yīnqù (5) 55	陽去 yángqù (6) 22

CHAPTER 3. HARDENING PHENOMENON IN THE XIĀNG DIALECTS

3.1 TYPE I: HARDENING OF MC DENTAL AFFRICATES IN THE XIĀNG DIALECTS

The first type of hardening occurs to Middle Chinese 知 *zhī* group division III and 章 *zhāng* group characters. Coblin calls this type the hardening of Common Central Xiang retroflex affricates (2011: 212). For the convenience of discussion, this type will be called Type I hardening hereon. Of the Xiang dialects, Type I hardening occurs in the dialects of Xiāngxiāng, Shuāngfēng, Lóudǐ Lǎojiē, Lóudǐ Jiāolóngcūn, Liányuán, Ānhuà, and Huìtóng-a. For example, 沾 *zhān* ‘to moisten, to stick on’, a 知 *zhī* group division III character, is pronounced as [tʂ^h] in Ānhuà.

Xiāngxiāng is a dialect that has a three-way distinction of voiceless unaspirated, voiceless aspirated, and voiced in the stops and affricates. The hardened initials also show this three-way distinction of dental stops *t*-, *tʰ*-, and *d*-. Middle Chinese division III 知 *zhī* initial and 章 *zhāng* initial regularly correspond to voiceless unaspirated *t*- in Xiāngxiāng, division III 徹 *chè* initial and 昌 *chāng* initial to voiceless aspirated *tʰ*-, and division III 澄 *chéng* initial to voiced *d*-. The condition appears to be CCX high front medials or main vowels **-i* and **-y*. The table below gives some examples of hardening characters in Xiāngxiāng. The dialect of interest is marked with a darker shade hereafter.

Table 42. Examples of characters that show hardening in Xiāngxiāng.

Dialect	車 <i>chē</i>	中 <i>zhōng</i>	真 <i>zhēn</i>	豬 <i>zhū</i>	吹 <i>chuī</i>
XX	tʂʰʅ̥ ^{陰平文} ~ tʰo ^{陰平白}	tʰən ^{陰平}	tʰən ^{陰平}	ty ^{陰平}	tʰy ^{陰平}
SF	tʰo ^{陰平}	tan ^{陰平}	tiən ^{陰平}	ty ^{陰平}	tʰy ^{陰平}
LD-a	te'io ^{陰平}	teivŋ ^{陰平文} ~ tɿŋ ^{陰平白}	tin ^{陰平}	tey ^{陰平}	ts'ui ^{陰平文} ~ te'y ^{陰平白}
LD-b	tʰo ^{陰平}	taŋ ^{陰平}	ten ^{陰平}	ty ^{陰平}	tʰy ^{陰平}
LY	tʰo ^{陰平}	taŋ ^{陰平}	ten ^{陰平}	ty ^{陰平}	k'ui ^{陰平文} ~ tʰy ^{陰平白}
AH	tʰə ^{陰平文} ~ tʰa ^{陰平白}	tən ^{陰平}	tən ^{陰平}	tey ^{陰平}	tʰei ^{陰平}
HT-a	tʰe ^{陰平文} ~ tʰa ^{陰平白}	toŋ ^{陰平}	tən ^{陰平}	tey ^{陰平}	te'y ^{陰平}
MC	假開三平麻昌	通開三平東知	臻開三平眞章	遇開三平魚知	止合三平支昌
CNR			O		O
QYS	tʂhja ^平	tʂjŋ ^平	tʂjen ^平	tʂwo ^平	tʂhjwe ^平
CDC	*chia ¹	*ciung ¹	*cin ¹	*cie ¹ (~ *ciu ¹)	*chui ¹
CCX	*tʂ'io ^{陰平}	*tʂioŋ ^{陰平白} (~ *tʂiuŋ ^{陰平文})	*tʂin ^{陰平}	*tʂy ^{陰平}	*tʂ'y ^{陰平白} ~ *tʂ'yi ^{陰平文}

None of the 止 *zhǐ shè kāikǒu* characters or characters that have a high apical vowel show hardening. Coblin (2011) reconstructs these characters with the CCX final **-i*. The initials are all retroflexes *tʂ*-, *tʂʰ*-, or *dʂ*- in these cases. The character 尺 *chǐ* [tʂʰʅ̥^{陽平文} ~ tʰo^{陽平白}] has a literary reading with an affricate and a vernacular reading with a dental stop. One character of interest is

愁 *chóu* [dɿei^{陽平}], where although it is a 崇 *chóng* initial character, and does not have the condition of a CCX high front medial or main vowel *-i or *-y, it shows hardening in Xiāngxiāng. This character does not have stop readings in the other Xiang dialects, and nor does Xiāngxiāng have other characters with 莊 *zhuāng* group characters exhibiting similar changes. Coblin notes that in another source from Nakajima, this character is read as [dzai^{陽平}] (Coblin 2011: 267). One thing to note here is that the three characters 沾 *zhān*, 展 *zhǎn*, and 戰 *zhàn* have the final -ɿ and do not show hardening in Xiāngxiāng. The three characters are reconstructed with the CCX final *-ien and commonly show hardening in the other Xiāng dialects. The following table gives the characters mentioned above.

Table 43. Character readings of 尺 *chǐ*, 愁 *chóu*, 沾 *zhān*, 展 *zhǎn*, and 戰 *zhàn* in Xiāngxiāng and other Xiāng dialects.

Dialect	尺 <i>chǐ</i>	愁 <i>chóu</i>	沾 <i>zhān</i>	展 <i>zhǎn</i>	戰 <i>zhàn</i>
XX	tʂʰɿ ^{陽平文} ~ tʰo ^{陽平白}	dɿei ^{陽平}	tʂɿ ^{陰平}	tʂɿ ^上	tʂɿ ^{陰去}
SF	tʂʰɿ ^{陽平文} ~ tʰo ^{陽平白}	dze ^{陽平}	tʰɿ ^{陰平}	kɿ ^上	tʰɿ ^{陰去}
LD-a	teʰi ^{陽平文} ~ teʰio ^{陽平白}	dziɿ ^{陽平}	teɿ ^{陰平}	teɿ ^上	teɿ ^{陰去}
LD-b	tʰo ^{陽平白}	tsʰiɿ ^{陽平}	teɿ ^{陰平}	teɿ ^上	teɿ ^{陰去}
LY	teʰi ^{入文} ~ tʰo ^{入白}	teio ^{陽平}	kɿ ^{陰平}	kɿ ^上	kɿ ^{陰去}
AH	tsʰɿ ^{次陰去文} ~ tʰa ^{次陰去白}	tsəu ^{陽平文} ~ teio ^{陽平}	tʰɿ ^{陰平}	tʰɿ ^上	--
HT-a	tʰe ^上	tsəu ^{陽平文} ~ teio ^{陽平}	tsan ^{陰平文} ~ ten ^{陰平白}	tan ^上	--
MC	梗開三入昔昌	流開三平尤崇	咸開三平鹽知	山開三上獮知	山開三去線章
CNR			O	O	O
QYS	tʂhjak ^入	dʒjəu ^平	tjäm ^平	tjän ^上	tʂjän ^去
CDC	*chiak ⁷	*jeu ²	*ciam ¹	*cian ³	*cian ⁵
CCX	*tʂʰio ^{入白} ~ tʂʰi ^{陽平文}	*dzeu ^{陽平}	*tʂien ^{陰平}	*tʂien ^上	*tʂien ^{陰去}

In addition to the Middle Chinese initial groups mentioned above, there are several characters from the initial groups of 船 *chuán* initial and 禪 *shàn* initial that are read as stops: 船 *chuán* [dyɿ^{陽平}] (船 *chuán* initial), 臣 *chén* [dɿn^{陽平}], 承 *chéng* [dɿn^{陽平}], 成 *chéng* [dɿn^{陽平}], and 城 *chéng* [dɿn^{陽平}] (禪 *shàn* initial). The normal turnout for 船 *chuán* initial and 禪 *shàn* initial characters in

Xiāngxiāng seems to be a voiced velar fricative [ɣ] (discussed later in 3.3). The reason that these characters turn out as voiced dental stops instead of the voiced velar fricative is unclear.

Table 44. Character readings of the five 船 *chuán* and 禪 *shàn* initial characters 船 *chuán*, 臣 *chén*, 承 *chéng*, 成 *chéng*, and 城 *chéng* in Xiāngxiāng and other Xiāng dialects.

Dialect	船 <i>chuán</i>	臣 <i>chén</i>	承 <i>chéng</i>	成 <i>chéng</i>	城 <i>chéng</i>
XX	d yĩ ^{陽平}	d ʌn ^{陽平}	d ʌn ^{陽平}	d ʌn ^{陽平}	d ʌn ^{陽平}
SF	d uĩ ^{陽平}	d iɛn ^{陽平}	d iɛn ^{陽平}	d iɛn ^{陽平文} ~ ɣiɔŋ ^{陽平白}	d iɛn ^{陽平}
LD-a	d uĩ ^{陽平}	d in ^{陽平}	d in ^{陽平}	d in ^{陽平}	d in ^{陽平}
LD-b	t 'ui ^{陽平}	t 'ɛn ^{陽平}	t 'ɛn ^{陽平}	t 'ɛn ^{陽平文} ~ ɕio ^{陽平白}	t 'ɛn ^{陽平}
LY	k ui ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}
AH	tɛ'yɛ ^{陽平}	t ɔn ^{陽平}	t ɔn ^{陽平}	t ɔn ^{陽平}	t ɔn ^{陽平}
HT-a	teyen ^{陽平}	t ɔn ^{陽平}	t ɔn ^{陽平}	t ɔn ^{陽平}	t ɔn ^{陽平}
MC	山合三平仙船	臻開三平真禪	曾開三平蒸禪	梗開三平清禪	梗開三平清禪
CNR	O	O			
QYS	dʒjwän ^平	ʒjen ^平	ʒjɔŋ ^平	ʒjǎŋ ^平	ʒjǎŋ ^平
CDC	*jin ²	*jin ²	*zhiŋ ² ~ *jiŋ ²	*zhiang ² ~ *jiang ²	*zhiang ² ~ *jiang ²
CCX	*dzyen ^{陽平} ~ *syen ^{陽平} (?)	*dzin ^{陽平}	*dzin ^{陽平}	*dzin ^{陽平文} ~ *ziɔŋ ^{陽平白}	*dzin ^{陽平}

Shuāngfēng also has a three-way distinction of the stops and shows the three-way distinction of dental stops t-, t^h-, and d- in hardening as well. Middle Chinese division III 知 *zhī* initial and 章 *zhāng* initial regularly correspond to voiceless unaspirated t-, division III 徹 *chè* initial and 昌 *chāng* initial to voiceless aspirated t^h-, and division III 澄 *chéng* initial to voiced d-, unless palatalization occurs, where in that case the initials become palatalized affricates tɛ-, tɛ^h-, or dz-.

The condition for Type I hardening in Shuāngfēng appears to be a CCX medial or main vowel *-i or *-y, except in front of the CCX final *-iəu. The two characters that show hardening in front of this final are 竹 *zhú* and 粥 *zhōu*, which are both MC 通 *tōng shè rù* tone characters, while the other characters that have the CCX final *-iəu but do not show hardening are all in MC 流 *liú shè*.

An interesting case is the character 者 *zhě*. Although it has the CCX final *-ə, which does not meet

the condition of a high front medial or main vowel, it still shows hardening in Shuāngfēng. Note that the MC hexagram assigns the character as a division III character, which indicates that the character should have a high front medial, just as QYS shows. Further studies on the history of this character in these dialects and hardening would be required to give a clearer explanation on the sound changes of this character. The two charts below show some examples of hardening characters and the different initials in front of the CCX final *-iəu.

Table 45. Examples of characters that show hardening in Shuāngfēng.

Dialect	車 <i>chē</i>	中 <i>zhōng</i>	真 <i>zhēn</i>	豬 <i>zhū</i>	吹 <i>chuī</i>	者 <i>zhě</i>
XX	tʂʰɿ̄ ^{陰平文} ~ tʰo ^{陰平白}	tʌn ^{陰平}	tʌn ^{陰平}	ty ^{陰平}	tʰy ^{陰平}	--
SF	tʰo ^{陰平}	tan ^{陰平}	tien ^{陰平}	ty ^{陰平}	tʰy ^{陰平}	ta ^上
LD-a	te'io ^{陰平}	teivŋ ^{陰平文} ~ tɿŋ ^{陰平白}	tin ^{陰平}	tey ^{陰平}	ts'ui ^{陰平文} ~ te'y ^{陰平白}	tie ^上
LD-b	tʰo ^{陰平}	taŋ ^{陰平}	ten ^{陰平}	ty ^{陰平}	tʰy ^{陰平}	--
LY	tʰo ^{陰平}	taŋ ^{陰平}	ten ^{陰平}	ty ^{陰平}	k'ui ^{陰平文} ~ t'y ^{陰平白}	te ^上
AH	tʰo ^{陰平文} ~ t'a ^{陰平白}	tən ^{陰平}	tən ^{陰平}	tey ^{陰平}	t'ei ^{陰平}	--
HT-a	t'e ^{陰平文} ~ t'a ^{陰平白}	toŋ ^{陰平}	tən ^{陰平}	tey ^{陰平}	te'y ^{陰平}	--
MC	假開三平麻昌	通開三平東知	臻開三平眞章	遇開三平魚知	止合三平支昌	假開三上馬章
CNR			O		O	
QYS	tʂhja ^平	tʂung ^平	tʂjen ^平	tʂwo ^平	tʂhjwe ^平	tʂja ^上
CDC	*chia ¹	*ciung ¹	*cin ¹	*cie ¹ (~ *ciu ¹)	*chui ¹	*cia ³
CCX	*tʂʰiə ^{陰平}	*tʂiəŋ ^{陰平白} (~ *tʂiəŋ ^{陰平文})	*tʂin ^{陰平}	*tʂy ^{陰平}	*tʂ'y ^{陰平白} ~ *tʂ'yi ^{陰平文}	*tʂə ^上

Table 46. Different initial readings for the CCX final *-iəu in Shuāngfēng.

Dialect	竹 <i>zhú</i>	粥 <i>zhōu</i>	州 <i>zhōu</i>	抽 <i>chōu</i>	畜 “livestock, domestic animals”
XX	tʂei ^{次陽平}	tʂei ^{次陽平}	tiə ^{陰平}	tʰiei ^{陰平}	tʰiei ^{陽平}
SF	tʰio ^{陽平}	tʰio ^{陽平}	tʰio ^{陰平}	te'io ^{陰平}	te'io ^陽
LD-a	teio ^{陽平}	teio ^{陽平}	teio ^{陰平}	te'io ^{陰平}	te'io ^{陽平}
LD-b	tʰo ^{陽平}	tʰo ^{陽平}	teio ^{陰平}	te'io ^{陰平}	tʰo ^{陽平}
LY	tʰau ^入	--	tʰau ^{陰平}	tʰau ^{陰平}	tʰau ^入
AH	təu ^{陰去}	təu ^{陰去}	--	t'əu ^{陰平}	t'əu ^{次陰去}
HT-a	təu ^上	təu ^上	təu ^{陰平}	t'əu ^{陰平}	t'əu ^上
MC	通開三入屋知	通合三入屋章	流開三平尤章	流開三平尤微	流開三去宥微

CNR					
QYS	tjuk ^入	tʃjuk ^入	tʃjəu ^平	thjəu ^平	thjuk ^入
CDC	*ciuk ⁷	*ciuk ⁷	*cieu ¹	*chieu ¹	*chiuk ⁷
CCX	*tʃiəu ^入	*tʃiəu ^入 ~ *tʃiəu ^{陰平}	*tʃiəu ^{陰平}	*tʃ'iəu ^{陰平}	*tʃ'iəu ^入

Same as in Xiāngxiāng, none of the 止 *zhǐ shè kāikǒu* characters or characters that have a high apical vowel show hardening. The initials are all retroflexes tʃ-, tʃ^h-, or dz₋ in these cases. The character 尺 *chǐ* [tʃ'ɿ^{陽平文} ~ t'o^{陽平白}] has a literary reading with an affricate and a vernacular reading with a dental stop. One interesting character is 展 *zhǎn* [kǐ^上], read with a velar initial. Shuāngfēng does not have other characters with the same Middle Chinese initial source that has a velar initial. Coblin has a paragraph discussing about this pronunciation in Shuāngfēng. First, different sources with different Shuāngfēng sub-types have been reported with different initials, with Bao (2006:189) reading [tei^上] and [teyẽ^上], and Nakajima (1990:98) [kei^上]. Second, Shuāngfēng is located in the area of Húnán which was influenced by the Gàn dialects during Míng and Qīng dynasties, and some of the Gàn dialects such as 平江 Píngjiāng are known to have velarized readings for this character and others (Coblin 2011: 52).

Table 47. Character readings of 尺 *chǐ* and 展 *zhǎn* in Shuāngfēng and other Xiāng dialects. 知 *zhī* represents a normal 止 *zhǐ shè kāikǒu* character reading, which does not have hardening.

Dialect	知 <i>zhī</i>	尺 <i>chǐ</i>	展 <i>zhǎn</i>
XX	tʃɿ ^{陰平}	tʃ ^h ɿ ^{陽平文} ~ t ^h o ^{陽平白}	tʃɿ ^上
SF	tʃɿ ^{陰平}	tʃ ^h ɿ ^{陽平文} ~ t ^h o ^{陽平白}	kǐ ^上
LD-a	tei ^{陰平}	te ^h i ^{陽平文} ~ te'io ^{陽平白}	teĩ ^上
LD-b	tei ^{陰平}	t ^h o ^{陽平白}	tei ^上
LY	tei ^{陰平}	te ^h i ^{入文} ~ t ^h o ^{入白}	ki ^上
AH	tsɿ ^{陰平}	ts ^h ɿ ^{次除去文} ~ t ^h a ^{次除去白}	tõ ^上
HT-a	te ^{陰平}	t ^h e ^上	tan ^上
MC	止開三平支知	梗開三入昔昌	山開三上獮知
CNR	O		O

QYS	tje ^平	tshjäk ^入	tjän ^上
CDC	*ci ¹	*chiak ⁷	*cian ³
CCX	*tʂi ^{陰平}	*tʂ ^h i ^{入白} ~ tʂ ^h i ^{陽平文}	*tʂien ^上

Another interesting thing worth mentioning is the several 船 *chuán* initial and 禪 *shàn* initial characters 船 *chuán* [duĩ^{陽平}] (船 *chuán* initial), 臣 *chén* [dien^{陽平}], 承 *chéng* [dien^{陽平}], 成 *chéng* [dien^{陽平文} ~ yioŋ^{陽平白}], and 城 *chéng* [dien^{陽平}] (禪 *shàn* initial). Same as Xiāngxiāng, Shuāngfēng also has the regular correspondence of Middle Chinese 船 *chuán* initial and 禪 *shàn* initial to voiced velar fricative ɣ-, except in these characters that hardened instead. Note that here in 成 *chéng*, the hardened reading is marked as the literary reading, and the velar fricative vernacular.

Table 48. Character readings of the five 船 *chuán* and 禪 *shàn* initial characters 船 *chuán*, 臣 *chén*, 承 *chéng*, 成 *chéng*, and 城 *chéng* in Shuāngfēng and other Xiāng dialects.

Dialect	船 <i>chuán</i>	臣 <i>chén</i>	承 <i>chéng</i>	成 <i>chéng</i>	城 <i>chéng</i>
XX	d̪yĩ ^{陽平}	d̪ʌn ^{陽平}	d̪ʌn ^{陽平}	d̪ʌn ^{陽平}	d̪ʌn ^{陽平}
SF	duĩ ^{陽平}	dien ^{陽平}	dien ^{陽平}	diɛn ^{陽平文} ~ yioŋ ^{陽平白}	diɛn ^{陽平}
LD-a	duĩ ^{陽平}	d̪in ^{陽平}	d̪in ^{陽平}	d̪in ^{陽平}	d̪in ^{陽平}
LD-b	t̪ ^h ui ^{陽平}	t̪ ^h en ^{陽平}	t̪ ^h en ^{陽平}	t̪ ^h en ^{陽平文} ~ ɛio ^{陽平白}	t̪ ^h en ^{陽平}
LY	kui ^{陽平}	t̪en ^{陽平}	t̪en ^{陽平}	t̪en ^{陽平}	t̪en ^{陽平}
AH	te'yē ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}
HT-a	teyen ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}
MC	山合三平仙船	臻開三平真禪	曾開三平蒸禪	梗開三平清禪	梗開三平清禪
CNR	O	O			
QYS	d̪zjwän ^平	zjen ^平	zjɔŋ ^平	zjäng ^平	zjäng ^平
CDC	*jion ²	*jin ²	*zhiŋ ² ~ *jing ²	*zhiang ² ~ *jiang ²	*zhiang ² ~ *jiang ²
CCX	*dzyen ^{陽平} ~ *syen ^{陽平} (?)	*dz̪in ^{陽平}	*dz̪in ^{陽平}	*dz̪in ^{陽平文} ~ *ziŋ ^{陽平白}	*dz̪in ^{陽平}

Lóudǐ Lǎojiē (Lóudǐ-a) is also a dialect that has a three-way distinction in the stops and affricates and shows the three-way distinction of dental stops [t], [t^h], and [d] in the hardened stops. Middle Chinese division III 知 *zhī* initial and 章 *zhāng* initial regularly correspond to voiceless unaspirated

[t], division III 徹 *chè* initial and 昌 *chāng* initial to voiceless aspirated *t^h-*, and division III 澄 *chéng* initial to voiced *d-*, unless palatalization occurs, where in that case the initials become palatalized affricates *tɕ-*, *tɕ^h-*, or *dʒ-*. The condition for Type I hardening in Lóudǐ Lǎojiē appears to be a CCX medial or main vowel **-i* or **-y*. There are, however, a few exceptions to the condition: (1) the CCX finals **-iəu* (including MC 通 *tōng shè* and 流 *liú shè* characters), **-ien* (including the characters 展 *zhǎn*, 戰 *zhàn*, and 沾 *zhān*), **-iə* (including the characters 遮 *zhē* and 車 *chē*), and **-iaŋ* (including the characters 杖 *zhàng* and 丈 *zhàng*), and (2) the CCX finals **-y* and **-yi* (including the characters 錐 *zhuī* and 追 *zhuī*). An interesting case is the character 者 *zhě*. Just as in Shuāngfēng, although it has the CCX final **-ə*, which does not meet the condition of a high front medial or main vowel, it still shows hardening in Lóudǐ Lǎojiē. Another two characters 丈 *zhàng* [dzəŋ^{陽去}] and 杖 *zhàng* [dzəŋ^{陽去}] are interesting here because they show hardening in all the other dialects but not Lóudǐ Lǎojiē. The two tables below give examples of characters that show hardening, and the exceptions mentioned above.

Table 49. Examples of characters that show hardening in Lóudǐ Lǎojiē.

Dialect	兆 <i>zhào</i>	中 <i>zhōng</i>	真 <i>zhēn</i>	棼, 蠢 <i>chǔn</i>	傳 <i>chuán</i>	者 <i>zhě</i>
XX	d au ^{陽去}	t ʌn ^{陰平}	t ʌn ^{陰平}	t' uʌn ^上	d yī ^{陽平}	--
SF	d x ^{陽去}	t an ^{陰平}	t ien ^{陰平}	t' uan ^上	du i ^{陽平}	t a ^上
LD-a	d iɿ ^{陽去}	t eɪɿŋ ^{陰平文} ~ t xŋ ^{陰平白}	t in ^{陰平}	t' un ^上	du i ^{陽平}	t ie ^上
LD-b	t' x ^{陽去}	t aŋ ^{陰平}	t en ^{陰平}	t' uen ^上	t' ui ^{陽平}	--
LY	t ə ^{陽去}	t aŋ ^{陰平}	t en ^{陰平}	k' uən ^上	k ui ^{陽平}	t e ^上
AH	t ə ^{陽去}	t ən ^{陰平}	t ən ^{陰平}	te'yn ^上	te'yē ^{陽平}	--
HT-a	t au ^{陽去}	t oŋ ^{陰平}	t ən ^{陰平}	te'yn ^上	tɛyen ^{陽平}	--
MC	效開三上小澄	通開三平東知	臻開三平真章	臻合三上準昌	山合三平仙澄	假開三上馬章
CNR	O		O	O	O	
QYS	djäu ^上	tjung ^平	tʃjen ^平	tʃhjuen ^上	djwän ^平	tʃja ^上
CDC	*jiau ⁵	*ciung ¹	*cin ¹	*chiun ³	*jion ²	*cia ³
CCX	*dzjau ^{陽去}	*tʃioŋ ^{陰平白} (~ *tʃiuŋ ^{陰平文})	*tʃin ^{陰平}	*tʃ'yn ^上	*dzjen ^{陽平}	*tʃə ^上

Table 50. Character examples of finals that do not induce hardening in Lǎojiē and other Xiāng dialects.

Dialect	竹 <i>zhú</i>	臭 <i>chòu</i>	展 <i>zhǎn</i>	車 <i>chē</i>	杖 <i>zhàng</i>	丈 <i>zhàng</i>
XX	t̪iei ^{次陽平}	t̪'iei ^{次陰去}	tʂɿ ^上	tʂ'ɿ ^{陰平文 ~ t'o^{陰平}白}	daŋ ^{陽去}	daŋ ^{陽去}
SF	t̪io ^{陽平}	te'io ^{陰去} ~ t̪'io ^{陰去}	k̪i ^上	t̪'o ^{陰平}	daŋ ^{陽去}	daŋ ^{陽去}
LD-a	teio ^{陽平}	te'io ^{陰去}	tei ^上	te'io ^{陰平}	dzəŋ ^{陽去}	dzəŋ ^{陽去}
LD-b	t̪o ^{陽平}	te'io ^{陰去}	tei ^上	t̪'o ^{陰平}	t̪'oŋ ^{陽去}	t̪'oŋ ^{陽去}
LY	t̪au ^入	t̪'au ^{陰去}	ki ^上	t̪'o ^{陰平}	t̪'oŋ ^{陽去}	t̪'oŋ ^{陽去}
AH	t̪əu ^{陰去}	t̪'əu ^{次陰去}	t̪ɿ ^上	t̪'ə ^{陰平文 ~ t'a^{陰平白}}	taŋ ^{陰去}	taŋ ^{陰去文 ~ taŋ^{陽去白}}
HT-a	t̪əu ^上	t̪'əu ^{陰去}	tan ^上	t̪'e ^{陰平文 ~ t'a^{陰平白}}	taŋ ^{陰去}	taŋ ^{陽去}
MC	通開三入屋知	流開三去宥昌	山開三上獮知	假開三平麻昌	宕開三去養澄	宕開三去養澄
CNR			O			
QYS	t̪juk ^入	t̪shjəu ^去	t̪jan ^上	t̪shja ^平	djaŋ ^去	djaŋ ^去
CDC	*ciuk ⁷	*chieu ⁵	*cian ³	*chia ¹	*jiong ⁴	*jiong ⁴
CCX	*t̪ɿəu ^入	*t̪ɿ'əu ^{陰去}	*t̪ɿien ^上	*t̪ɿ'io ^{陰平}	*dzjaŋ ^{陽去}	*dzjaŋ ^{陽上白 ~ 陽去文}

Dialect	知 <i>zhī</i>	豬 <i>zhū</i>	吹 <i>chuī</i>
XX	tʂɿ ^{陰平}	ty ^{陰平}	t̪'y ^{陰平}
SF	tʂɿ ^{陰平}	ty ^{陰平}	t̪'y ^{陰平}
LD-a	tei ^{陰平}	tey ^{陰平}	ts'ui ^{陰平文 ~ te'y^{陰平白}}
LD-b	tei ^{陰平}	ty ^{陰平}	t̪'y ^{陰平}
LY	tei ^{陰平}	ty ^{陰平}	k'ui ^{陰平文 ~ t̪'y^{陰平白}}
AH	tsɿ ^{陰平}	tey ^{陰平}	t̪'ei ^{陰平}
HT-a	te ^{陰平}	tey ^{陰平}	te'y ^{陰平}
MC	止開三平支知	遇開三平魚知	止合三平支昌
CNR	O		O
QYS	t̪je ^平	t̪wo ^平	t̪shjwe ^平
CDC	*ci ¹	*cie ¹ (~ *ciu ¹)	*chui ¹
CCX	*t̪ɿ ^{陰平}	*t̪ɿ'y ^{陰平白 ~ *t̪ɿ'yi^{陰平文}}	*t̪ɿ'y ^{陰平白 ~ *t̪ɿ'yi^{陰平文}}

Same as the previous two dialects, none of the 止 *zhǐ shè kāikǒu* characters or characters that have a high apical vowel show hardening. The initials are all dental affricates ts- or ts^h- in these cases¹⁸, or are palatalized to tɕ-, tɕ^h-, or dz- before a high front unrounded vowel. The 止 *zhǐ shè hékǒu*

¹⁸ There are no cases of 澄 *chéng* initial with [dz] in the data; they have all palatalized.

characters also do not show hardening. They stay as dental affricates ts- or ts^h-, or are palatalized before a high front rounded vowel -y. Note that 吹 *chuī* [ts^hui^{陰平文} ~ tɕ^hy^{陰平白}] has the dental reading marked as literary and the palatalized vernacular. A 止 *zhǐ shè kāikǒu* character 知 *zhī* and the character 吹 *chuī* are given in the table above.

In addition, same as the two previously discussed dialects, Lóudǐ Lǎojiē also has the problem of the several 船 *chuán* initial or 禪 *shàn* initial characters having a hardened reading: 船 *chuán* [duī^{陽平}] (船 *chuán* initial), 臣 *chén* [din^{陽平}], 承 *chéng* [din^{陽平}], 成 *chéng* [din^{陽平}], and 城 *chéng* [din^{陽平}] (禪 *shàn* initial). Lóudǐ Lǎojiē has the Middle Chinese 船 *chuán* initial and 禪 *shàn* initial initials generally reflected as ɕ- or z-, depending on the tone, as will be discussed later.

Table 51. Character readings of the five 船 *chuán* and 禪 *shàn* initial characters 船 *chuán*, 臣 *chén*, 承 *chéng*, 成 *chéng*, and 城 *chéng* in Lóudǐ Lǎojiē and other Xiāng dialects.

Dialect	船 <i>chuán</i>	臣 <i>chén</i>	承 <i>chéng</i>	成 <i>chéng</i>	城 <i>chéng</i>
XX	d̪yī ^{陽平}	d̪ʌn ^{陽平}	d̪ʌn ^{陽平}	d̪ʌn ^{陽平}	d̪ʌn ^{陽平}
SF	duī ^{陽平}	d̪ien ^{陽平}	d̪ien ^{陽平}	d̪ien ^{陽平文} ~ yioŋ ^{陽平白}	d̪ien ^{陽平}
LD-a	duī ^{陽平}	d̪in ^{陽平}	d̪in ^{陽平}	d̪in ^{陽平}	d̪in ^{陽平}
LD-b	t̪'ui ^{陽平}	t̪'en ^{陽平}	t̪'en ^{陽平}	t̪'en ^{陽平文} ~ ɕio ^{陽平白}	t̪'en ^{陽平}
LY	kui ^{陽平}	t̪en ^{陽平}	t̪en ^{陽平}	t̪en ^{陽平}	t̪en ^{陽平}
AH	te'yē ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}
HT-a	teyen ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}	t̪ən ^{陽平}
MC	山合三平仙船	臻開三平真禪	曾開三平蒸禪	梗開三平清禪	梗開三平清禪
CN rhyme	O	O			
QYS	d̪zjwän ^平	ʒjen ^平	ʒjəŋ ^平	ʒjäng ^平	ʒjäng ^平
CDC	*jion ²	*jin ²	*zhiŋ ² ~ *jing ²	*zhiang ² ~ *jiang ²	*zhiang ² ~ *jiang ²
CCX	*dzyen ^{陽平} ~ *gyen ^{陽平} (?)	*dzin ^{陽平}	*dzin ^{陽平}	*dzin ^{陽平文} ~ *ziŋ ^{陽平白}	*dzin ^{陽平}

In Lóudǐ Jiāolóngcūn (Lóudǐ-b), the regular correspondences for Middle Chinese 知 *zhī* group division III and 章 *zhāng* group initials are unaspirated or aspirated voiceless retroflex stops t̪- or

t^h-. Lóudǐ Jiāolóngcūn has a two-way distinction of voiceless unaspirated or aspirated in the stops and the affricates. Middle Chinese 知 *zhī* group division III and 章 *zhāng* group regularly correspond to voiceless unaspirated t-, division III 徹 *chè* initial and 昌 *chāng* initial to voiceless aspirated t^h-, and division III 澄 *chéng* initial to voiceless aspirated t^h-, unless palatalization occurs, where in that case the initials become palatalized affricates tɛ- or tɛ^h-. The condition for Type I hardening in Lóudǐ Jiāolóngcūn is a CCX medial or main vowel *-i or *-y, with the exceptions of CCX final *-ien, which all turn into apical vowels in Lóudǐ Jiāolóngcūn, some CCX final *-iəu characters 綢 *chóu*, 州 *zhōu*, 抽 *chōu*, and 臭 *chòu*, and CCX final *-yi characters. Same as in Shuāngfēng and Lóudǐ Lǎojiē, the character 者 *zhě* shows hardening even though it has the CCX final *-ə, which does not meet the condition of a high front medial or main vowel. The two tables below present some example characters that show hardening and some of the exceptions mentioned above.

Table 52. Examples of characters that show hardening in Lóudǐ Jiāolóngcūn.

Dialect	車 <i>chē</i>	中 <i>zhōng</i>	真 <i>zhēn</i>	豬 <i>zhū</i>	吹 <i>chuī</i>	者 <i>zhě</i>
XX	tɕʰʅ̥ ~ t'o̥	tʌn	tʌn	ty	t'y	--
SF	t'o̥	tan	tiɛn	ty	t'y	ta ^上
LD-a	te'io̥	teivŋ ~ tɿŋ	tin	tey	ts'ui ^{平白} ~ te'y ^陰	tie ^上
LD-b	t'o̥	taŋ	tɛn	ty	t'y	--
LY	t'o̥	taŋ	tɛn	ty	k'ui ^{平白} ~ t'y ^{陰平}	tɛ ^上
AH	t'ə̥ ~ t'ḁ	tən	tən	tey	t'ei ^{陰平}	--
HT-a	t'e̥ ~ t'ḁ	toŋ	tən	tey	te'y ^{陰平}	--
MC	假開三平麻昌	通開三平東知	臻開三平真章	遇開三平魚知	止合三平支昌	假開三上馬章
CNR			O		O	
QYS	tshja ^平	tjung ^平	tsjen ^平	tjwo ^平	tshjwe ^平	tšja ^上
CDC	*chia ¹	*ciung ¹	*cin ¹	*cie ¹ (~ *ciu ¹)	*chui ¹	*cia ³
CCX	*tɕʰ'io̥	*tɕʰioŋ (~ *tɕʰiuŋ ^{陰平文})	*tɕʰin	*tɕʰy	*tɕʰ'y ^{陰平白} ~ *tɕʰ'yi	*tɕʰə ^上

Table 53. Examples of characters that do not show hardening in Lóudǐ Jiāolóngcūn. 竹 *zhú* is provided as a comparison to 臭 *chòu*, which has the same CCX final *-iəu but does not show hardening. The character 吹 *chuī* is given as a comparison to 追 *zhuī*, which is also a 止 *zhǐ shè hékǒu* character but does not show hardening.

Dialect	知 <i>zhī</i>	展 <i>zhǎn</i>	竹 <i>zhú</i>	臭 <i>chòu</i>	吹 <i>chuī</i>	追 <i>zhuī</i>
XX	tʂɿ ^{陰平}	tʂɿ ^上	tʂei ^{次陽平}	tʂei ^{次陰去}	tʂy ^{陰平}	tyi ^{陰平}
SF	tʂɿ ^{陰平}	kɿ ^上	tiəu ^{陽平}	te'io ^{陰去} ~ tʂ'io ^{陰去}	tʂy ^{陰平}	tuī ^{陰平}
LD-a	tei ^{陰平}	teɿ ^上	teio ^{陽平}	te'io ^{陰去}	ts'ui ^{陰平文} ~ te'y ^{陰平白}	tsui ^{陰平}
LD-b	tei ^{陰平}	teɿ ^上	təu ^{陽平}	te'io ^{陰去}	tʂy ^{陰平}	tsui ^{陰平}
LY	tei ^{陰平}	ki ^上	təu ^入	tʂ'au ^{陰去}	k'ui ^{陰平文} ~ tʂy ^{陰平白}	kui ^{陰平}
AH	tsɿ ^{陰平}	tɕ ^上	təu ^{陰去}	tʂ'əu ^{次陰去}	tʂei ^{陰平}	--
HT-a	te ^{陰平}	tan ^上	təu ^上	tʂ'əu ^{陰去}	te'y ^{陰平}	--
MC	止開三平支知	山開三上獮知	通開三入屋知	流開三去宥昌	止合三平支昌	止合三平脂知
CNR	O	O			O	O
QYS	tʂe ^平	tʂän ^上	tʂuk ^入	tʂhjuə ^去	tʂhjwe ^平	tʂwi ^平
CDC	*ci ¹	*cian ³	*ciuk ⁷	*chieu ⁵	*chui ¹	*cui ¹
CCX	*tʂi ^{陰平}	*tʂien ^上	*tʂiəu ^入	*tʂ'iəu ^{陰去}	*tʂ'y ^{陰平白} ~ *tʂ'yi ^{陰平文}	*tʂyi ^{陰平}

The 止 *zhǐ shè kāikǒu* characters or characters that have a high apical vowel also do not show hardening in Lóudǐ Jiāolóngcūn. The initials are all dental affricates [ts] or [ts^h], or palatalized to [tɕ] or [tɕ^h] before a high front unrounded vowel. An example of 止 *zhǐ shè kāikǒu* character 知 *zhī* is given in the table above. For the 止 *zhǐ shè hékǒu* characters, 吹 *chuī* ‘to blow’ [tʂy^{陰平}] and 錘 *chuí* ‘hammer’ [tʂy^{陽平}] show hardening in effect, while the characters 錘 *zhuī* ‘awl’ [tsui^{陰平}] and 追 *zhuī* ‘to chase’ [tsui^{陰平}] do not. These four characters are compared in the table below.

Table 54. Character readings of 錘 *zhuī*, 追 *zhuī*, 吹 *chuī*, and 錘 *chuí* in Lóudǐ Jiāolóngcūn and other Xiāng dialects.

Dialect	錘 <i>zhuī</i>	追 <i>zhuī</i>	吹 <i>chuī</i>	錘 <i>chuí</i>
XX	--	tyi ^{陰平}	tʂy ^{陰平}	dy ^{陽平}
SF	tuī ^{陰平}	tuī ^{陰平}	tʂy ^{陰平}	dy ^{陽平}
LD-a	tsui ^{陰平}	tsui ^{陰平}	ts'ui ^{陰平文} ~ te'y ^{陰平白}	dzy ^{陽平}
LD-b	tsui ^{陰平}	tsui ^{陰平}	tʂy ^{陰平}	tʂy ^{陽平}
LY	tsui ^{陰平}	kui ^{陰平}	k'ui ^{陰平文} ~ tʂy ^{陰平白}	kui ^{陽平文} ~ ty ^{陽平白}

AH	--	--	t'ei ^{陰平}	tei ^{陽平}
HT-a	--	--	te'y ^{陰平}	tey ^{陽平}
MC	止合三平脂章	止合三平脂知	止合三平支昌	止合三平支澄
CN rhyme	O	O	O	O
QYS	t'swi ^平	tjwi ^平	tshjwe ^平	djwi ^平
CDC	*cui ¹	*cui ¹	*chui ¹	*jui ²
CCX	*tɕyi ^{陰平}	*tɕyi ^{陰平}	*tɕ'y ^{陰平白} ~ *tɕ'yi ^{陰平文}	*dzy ^{陽平白} ~ dzyi ^{陽平文}

Same as the previously discussed dialects, Lóudǐ Jiāolóngcūn also has the several 船 *chuán* initial and 禪 *shàn* initial characters read as stops: 船 *chuán* ‘boat, ship’ [t'ui^{陽平}] (船 *chuán* initial), 臣 *chén* ‘vassal’ [t'en^{陽平}], 承 *chéng* ‘to bear’ [t'en^{陽平}], 成 *chéng* ‘to accomplish’ [t'en^{陽平文} ~ ɛio^{陽平白}], and 城 *chéng* ‘city’ [t'en^{陽平}] (禪 *shàn* initial). The regular correspondence of 船 *chuán* initial and 禪 *shàn* initial characters in Lóudǐ Jiāolóngcūn is a voiceless dental fricative [s] or voiceless alveolopalatal fricative [ɕ] if before high front vowels or medials. In these characters, however, similar to the division III 澄 *chéng* initial characters, they turn out as voiceless aspirated in Lóudǐ Jiāolóngcūn. Interestingly, in the character 成 *chéng*, the reading with the voiceless aspirated retroflex stop is marked as literary, while the vernacular reading has a voiceless alveolopalatal fricative.

Table 55. Character readings of the five 船 *chuán* and 禪 *shàn* initial characters 船 *chuán*, 臣 *chén*, 承 *chéng*, 成 *chéng*, and 城 *chéng* in Lóudǐ Jiāolóngcūn and other Xiāng dialects.

Dialect	船 <i>chuán</i>	臣 <i>chén</i>	承 <i>chéng</i>	成 <i>chéng</i>	城 <i>chéng</i>
XX	dyi ^{陽平}	dʌn ^{陽平}	dʌn ^{陽平}	dʌn ^{陽平}	dʌn ^{陽平}
SF	dui ^{陽平}	dien ^{陽平}	dien ^{陽平}	diɛn ^{陽平文} ~ yioŋ ^{陽平白}	diɛn ^{陽平}
LD-a	dui ^{陽平}	din ^{陽平}	din ^{陽平}	din ^{陽平}	din ^{陽平}
LD-b	t'ui ^{陽平}	t'en ^{陽平}	t'en ^{陽平}	t'en ^{陽平文} ~ ɛio ^{陽平白}	t'en ^{陽平}
LY	kui ^{陽平}	ten ^{陽平}	ten ^{陽平}	ten ^{陽平}	ten ^{陽平}
AH	te'yē ^{陽平}	tən ^{陽平}	tən ^{陽平}	tən ^{陽平}	tən ^{陽平}
HT-a	teyen ^{陽平}	tən ^{陽平}	tən ^{陽平}	tən ^{陽平}	tən ^{陽平}
MC	山合三平仙船	臻開三平真禪	曾開三平蒸禪	梗開三平清禪	梗開三平清禪

CN rhyme	O	O			
QYS	dǐwǎn ^平	ǐjen ^平	ǐjəŋ ^平	ǐjǎŋ ^平	ǐjǎŋ ^平
CDC	*jion ²	*jin ²	*zhiŋ ² ~ *jiŋ ²	*zhiang ² ~ *jiang ²	*zhiang ² ~ *jiang ²
CCX	*dzyen ^{陽平} ~ *syen ^{陽平} (?)	*dzjɪn ^{陽平}	*dzjɪn ^{陽平}	*dzjɪn ^{陽平文} ~ *zjɪŋ ^陽 平白	*dzjɪn ^{陽平}

In Liányuán, same as in Lóudǐ Jiāolóngcūn, the regular correspondences for Middle Chinese 知 *zhī* group division III and 章 *zhāng* group initials are unaspirated or aspirated voiceless retroflex stops [t] or [tʰ]. Liányuán has a two-way distinction of voiceless unaspirated or aspirated in the stops and the affricates. Middle Chinese division III 知 *zhī* initial and 章 *zhāng* initial regularly correspond to voiceless unaspirated [t], division III 徹 *chè* initial and 昌 *chāng* initial to voiceless aspirated [tʰ], and division III 澄 *chéng* initial to voiceless aspirated [tʰ]. The condition appears to be CCX high front medial or main vowel *-i, or CCX main vowel *-y. The CCX finals *-yn and *-yen and some other characters do not show hardening, but show velarization. Velarization will be discussed in section 3.3. The characters 吹 *chuī* and 錘 *chuí* are interesting because they have a reading of velar stop initial marked as the literari reading, while the one with a retroflex stop is marked as vernacular. The CCX final *-yi has only one character example in Liányuán, 錘 *zhuī*, and it does not show hardening. Same as in Shuāngfēng, Lóudǐ Lǎojiē, and Lóudǐ Jiāolóngcūn, the character 者 *zhě* shows hardening even though it has the CCX final *-ə, which does not meet the condition of a high front medial or main vowel. The two tables below present some examples of characters that show hardening, and characters that do not show hardening and are read as dental affricates or show velarization instead.

Table 56. Examples of characters that show hardening in Liányuán.

Dialect	車 <i>chē</i>	中 <i>zhōng</i>	真 <i>zhēn</i>	豬 <i>zhū</i>	吹 <i>chuī</i>	錘 <i>chuí</i>	者 <i>zhě</i>
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XX	tɕ'ɿ̯ ^{陰平文} ~ t'o ^{陰平白}	tʌn ^{陰平}	tʌn ^{陰平}	ty ^{陰平}	t'y ^{陰平}	dy ^{陽平}	--
SF	t'o ^{陰平}	tan ^{陰平}	tiɛn ^{陰平}	ty ^{陰平}	t'y ^{陰平}	dy ^{陽平}	ta ^上
LD-a	te'io ^{陰平}	teiɿŋ ^{陰平文} ~ tɿŋ ^{陰平白}	tin ^{陰平}	tey ^{陰平}	ts'ui ^{陰平文} ~ te'y ^{陰平白}	dzy ^{陽平}	tie ^上
LD-b	t'o ^{陰平}	tʌŋ ^{陰平}	tɛn ^{陰平}	ty ^{陰平}	t'y ^{陰平}	t'y ^{陽平}	--
LY	t'o ^{陰平}	tʌŋ ^{陰平}	tɛn ^{陰平}	ty ^{陰平}	k'ui ^{陰平文} ~ t'y ^{陰平白}	kui ^{陽平文} ~ ty ^{陽平白}	tɛ ^上
AH	t'a ^{陰平文} ~ t'a ^{陰平白}	tən ^{陰平}	tən ^{陰平}	tey ^{陰平}	t'ei ^{陰平}	tei ^{陽平}	--
HT-a	t'e ^{陰平文} ~ t'a ^{陰平白}	toŋ ^{陰平}	tən ^{陰平}	tey ^{陰平}	te'y ^{陰平}	tey ^{陽平}	--
MC	假開三平麻昌	通開三平東知	臻開三平眞章	遇開三平魚知	止合三平支昌	止合三平支澄	假開三上馬章
CNR			O		O	O	
QYS	tʃja ^平	tʃung ^平	tʃjen ^平	tʃwo ^平	tʃhwe ^平	dʃwi ^平	tʃja ^上
CDC	*chia ¹	*ciung ¹	*cin ¹	*cie ¹ (~ *ciu ¹)	*chui ¹	*jui ²	*cia ³
CCX	*tɕ'io ^{陰平}	*tɕioŋ ^{陰平白} (~ *tɕiuŋ ^{陰平文})	*tɕin ^{陰平}	*tɕy ^{陰平}	*tɕ'y ^{陰平白} ~ *tɕ'yi ^{陰平文}	*dzy ^{陽平白} ~ dzyi ^{陽平文}	*tɕə ^上

Table 57. Examples of characters that do not show hardening in Liányuán.

Dialect	知 zhī	展 zhǎn	錐 zhuī	尺 chǐ	治 zhì	值 zhí	遲 chí
XX	tɕɿ ^{陰平}	tɕɿ ^上	--	tɕ'ɿ̯ ^{陽平文} ~ t'o ^{陽平白}	dʒɿ ^{陽去}	tɕ'ɿ̯ ^{次陰去}	tɕɿ ^{陽平}
SF	tɕɿ ^{陰平}	kɿ ^上	tui ^{陰平}	tɕ'ɿ̯ ^{陽平文} ~ t'o ^{陽平白}	dʒɿ ^{陽去}	tɕ'ɿ̯ ^{陰去}	dʒɿ ^{陽平}
LD-a	tei ^{陰平}	teĩ ^上	tsui ^{陰平}	te'i ^{陽平文} ~ te'io ^{陽平白}	tsɿ ^{陽去文} ~ te'i ^{陽去白}	te'i ^{陰去}	dzi ^{陽平}
LD-b	tei ^{陰平}	tei ^上	tsui ^{陰平}	t'o ^{陽平白}	te'i ^{陽去}	te'i ^{陰去}	te'i ^{陽平}
LY	tei ^{陰平}	ki ^上	tsui ^{陰平}	te'i ^{入文} ~ t'o ^{入白}	sɿ ^{陽去}	te'i ^{陰去}	sɿ ^{陽平}
AH	tsɿ ^{陰平}	tã ^上	--	ts'ɿ̯ ^{次陰去文} ~ t'a ^{次陰去白}	--	ts'ɿ̯ ^{次陰去}	tsɿ ^{陽平}
HT-a	te ^{陰平}	tan ^上	--	t'e ^上	--	t'e ^{陰去}	te ^{陽平}
MC	止開三平支知	山開三上獮知	止合三平脂章	梗開三入昔昌	止開三去之澄	止開三去志澄	止開三平脂澄
CNR	O	O	O				O
QYS	tʃe ^平	tʃän ^上	tʃwi ^平	tʃhjak ^入	ɕi ^去	ɕi ^去	ɕi ^平
CDC	*ci ¹	*cian ³	*cui ¹	*chiak ⁷	*ji ⁶	*jik ⁸	*ji ²
CCX	*tɕi ^{陰平}	*tɕien ^上	*tɕyi ^{陰平}	*tɕ'io ^{入白} ~ tɕ'i ^{陽平文}	*dʒi ^{陽去}	*tɕ'i ^{陰去}	*dʒi ^{陽平}

The 止 *zhǐ shè* characters or characters that have a high apical vowel also do not show hardening. The initials are all dental affricates [ts] or [ts^h], or palatalized to [tɕ] or [tɕ^h] before a high front unrounded vowel. The character 尺 *chǐ* ‘ruler, unit of length’ [tɕ’i^{入文} ~ tʃ’ɔ^{入白}] has the literary reading with a voiceless aspirated alveolopalatal affricate, while the vernacular a voiceless aspirated retroflex stop. There are two characters in 止 *zhǐ shè kāikǒu*, 治 *zhì* ‘to rule’ [sɿ^{陽去}] and 遲 *chí* ‘to delay’ [sɿ^{陽平}], that in spite of having initials from the 澄 *chéng* initial, have modern readings as the voiceless dental fricative [s]. The character 值 *zhí* ‘value, worth’ [tɕ’i^{陰去}], also a 澄 *chéng* initial character, however, does not have a fricative reading, and instead has a palatalized affricate reading.

Liányuán also has the interesting problem of the few 船 *chuán* initial and 禪 *shàn* initial characters read as stops: 船 *chuán* ‘boat, ship’ [kui^{陽平}] (船 *chuán* initial), 臣 *chén* ‘vassal’ [tɕen^{陽平}], 承 *chéng* ‘to bear’ [tɕen^{陽平}], 成 *chéng* ‘to accomplish’ [tɕen^{陽平}], and 城 *chéng* ‘city’ [tɕen^{陽平}] (禪 *shàn* initial). The regular correspondence for 船 *chuán* initial and 禪 *shàn* initial characters is a voiceless [x] under its velarization condition, or [s] before 止 *zhǐ shè* or characters that have a high apical vowel, or a palatalized [ɕ] before high front vowels or medials, or [ɕ] under all other conditions. The velarization issue in Liányuán is a more complicated one and will be discussed later. Interestingly, unlike Lóudǐ Jiāolóngcūn, where 船 *chuán* initial and 禪 *shàn* initial become voiceless aspirated stops just like 澄 *chéng* initials, in Liányuán 船 *chuán* initial and 禪 *shàn* initial become voiceless unaspirated stops, while 澄 *chéng* initial aspirated. Another character of interest is 整 *zhěng* ‘entire, whole’ [tɕen^{上文} ~ tʃ^{上白}], where the literary reading also shows hardening.

Table 58. Character readings of the five 船 *chuán* and 禪 *shàn* initial characters 船 *chuán*, 臣 *chén*, 承 *chéng*, 成 *chéng*, and 城 *chéng* in Liányuán and other Xiāng dialects.

Dialect	船 <i>chuán</i>	臣 <i>chén</i>	承 <i>chéng</i>	成 <i>chéng</i>	城 <i>chéng</i>
XX	d yī ^{陽平}	d ʌn ^{陽平}	d ʌn ^{陽平}	d ʌn ^{陽平}	d ʌn ^{陽平}
SF	d uĩ ^{陽平}	d ien ^{陽平}	d ien ^{陽平}	d ien ^{陽平文} ~ y iɔŋ ^{陽平白}	d ien ^{陽平}
LD-a	d uĩ ^{陽平}	d in ^{陽平}	d in ^{陽平}	d in ^{陽平}	d in ^{陽平}
LD-b	t 'ui ^{陽平}	t 'en ^{陽平}	t 'en ^{陽平}	t 'en ^{陽平文} ~ e io ^{陽平白}	t 'en ^{陽平}
LY	k ui ^{陽平}	t en ^{陽平}	t en ^{陽平}	t en ^{陽平}	t en ^{陽平}
AH	te'yē ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}
HT-a	teyen ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}
MC	山合三平仙船	臻開三平真禪	曾開三平蒸禪	梗開三平清禪	梗開三平清禪
CN rhyme	O	O			
QYS	dʒjwän ^平	ʒjen ^平	ʒjəŋ ^平	ʒjäng ^平	ʒjäng ^平
CDC	*jion ²	*jin ²	*zhiŋ ² ~ *jing ²	*zhiang ² ~ *jiang ²	*zhiang ² ~ *jiang ²
CCX	*dzyen ^{陽平} ~ *ɣyen ^{陽平} (?)	*dzin ^{陽平}	*dzin ^{陽平}	*dzin ^{陽平文} ~ *ziɔŋ ^{陽平白}	*dzin ^{陽平}

Ānhuà is a dialect that has a two-way distinction between unaspirated and aspirated voiceless ones in the stops and affricates. The regular correspondences for Middle Chinese 知 *zhī* group division III and 章 *zhāng* group initials are unaspirated or aspirated voiceless dental stops [t] or [t^h]. Middle Chinese division III 知 *zhī* initial and 章 *zhāng* initial regularly correspond to voiceless unaspirated [t], division III 徹 *chè* initial and 昌 *chāng* initial to voiceless aspirated [t^h], and division III 澄 *chéng* initial to voiceless unaspirated [t]. The condition looks to be a CCX medial or main vowel *-i. CCX finals *-y, *-yn, and *-yen regularly do not show hardening, except the two characters 吹 *chuī* and 錘 *chuí* with the CCX final *-y. There are no characters in Ānhuà data with the CCX final *-yi. The two tables below show some examples of characters that show hardening in Ānhuà and characters that do not.

Table 59. Examples of characters that show hardening in Ānhuà.

Dialect	車 <i>chē</i>	中 <i>zhōng</i>	真 <i>zhēn</i>	吹 <i>chuī</i>	錘 <i>chuí</i>
XX	tɕ'ɿ ^{陰平文} ~ t 'o ^{陰平白}	t ʌn ^{陰平}	t ʌn ^{陰平}	t 'y ^{陰平}	d y ^{陽平}

SF	t'o ^{陰平}	tan ^{陰平}	tien ^{陰平}	t'y ^{陰平}	dy ^{陽平}
LD-a	te'io ^{陰平}	teivŋ ^{陰平文} ~ tɲ ^{陰平} 白	tin ^{陰平}	ts'ui ^{陰平文} ~ te'y ^{陰平白}	dzy ^{陽平}
LD-b	t'o ^{陰平}	taŋ ^{陰平}	ten ^{陰平}	t'y ^{陰平}	t'y ^{陽平}
LY	t'o ^{陰平}	taŋ ^{陰平}	ten ^{陰平}	k'ui ^{陰平文} ~ t'y ^{陰平白}	kui ^{陽平文} ~ ty ^{陽平白}
AH	t'ə ^{陰平文} ~ t'a ^{陰平白}	tən ^{陰平}	tən ^{陰平}	t'ei ^{陰平}	tei ^{陽平}
HT-a	t'e ^{陰平文} ~ t'a ^{陰平白}	toŋ ^{陰平}	tən ^{陰平}	te'y ^{陰平}	tey ^{陽平}
MC	假開三平麻昌	通開三平東知	臻開三平眞章	止合三平支昌	止合三平支澄
CNR			O	O	O
QYS	tshja ^平	tjung ^平	tshjen ^平	tshjwe ^平	djwi ^平
CDC	*chia ¹	*ciung ¹	*cin ¹	*chui ¹	*jui ²
CCX	*tɕ'io ^{陰平}	*tɕioŋ ^{陰平白} (~ *tɕiuŋ ^{陰平文})	*tɕin ^{陰平}	*tɕ'y ^{陰平白} ~ *tɕ'yi ^{陰平文}	*dzy ^{陽平白} ~ dzyi ^{陽平文}

Table 60. Examples of characters that do not show hardening in Ānhuà.

Dialect	知 zhī	值 zhí	豬 zhū	除 chú	柱 zhù	主 zhǔ
XX	tɕl ^{陰平}	tɕ'ɿ ^{次陰去}	ty ^{陰平}	dy ^{陽平}	dy ^{陽去}	ty ^上
SF	tɕl ^{陰平}	tɕ'ɿ ^{陰去}	ty ^{陰平}	dy ^{陽平}	dy ^{陽去}	ty ^上
LD-a	tei ^{陰平}	te'i ^{陰去}	tey ^{陰平}	dzy ^{陽平}	dzy ^{陽去}	tey ^上
LD-b	tei ^{陰平}	te'i ^{陰去}	ty ^{陰平}	t'y ^{陽平}	t'y ^{陽去}	ty ^上
LY	tei ^{陰平}	te'i ^{陰去}	ty ^{陰平}	ty ^{陽平}	ty ^{陽去}	ty ^上
AH	tsɿ ^{陰平}	ts'ɿ ^{次陰去}	tey ^{陰平}	tey ^{陽平}	tey ^{陽去}	tey ^上
HT-a	te ^{陰平}	t'e ^{陰去}	tey ^{陰平}	tey ^{陽平}	tey ^{陽去}	tey ^上
MC	止開三平支知	止開三去志澄	遇開三平魚知	遇開三平魚澄	遇合三上麌澄	遇合三上麌章
CNR	O					
QYS	tje ^平	ɕi ^去	tjwo ^平	djwo ^平	dju ^上	tɕju ^上
CDC	*ci ¹	*jik ⁸	*cie ¹ (~ *ciu ¹)	*jie ² (~ *jiu ²)	*jiu ⁴	*ciu ³
CCX	*tɕi ^{陰平}	*tɕ'ɿ ^{陰去}	*tɕy ^{陰平}	*dzy ^{陽平}	*dzy ^{陽上白} ~ *dzy ^{陽去文}	*tɕy ^上

The 止 zhǐ shè kāikōu characters or characters that have a high apical vowel also do not show hardening. The initials are all dental affricates [ts] or [ts^h]¹⁹. The two cases of 止 zhǐ shè hékōu characters show hardening are 吹 chuī [t'ei^{陰平}] and 錘 chuī [tei^{陽平}]. The character 尺 chǐ 'ruler,

¹⁹ There are no cases of palatalized initials found in the 止 zhǐ shè characters in Ānhuà.

unit of length' [ts'ɿ^{次陰去文} ~ t'a^{次陰去白}] has the affricate reading labeled as literary, and the stop as vernacular. The following table gives some examples of characters with the CCX final *-i.

Table 61. Examples of 止 zhǐ shè characters in Ānhuà.

Dialect	知 <i>zhī</i>	遲 <i>chí</i>	直 <i>zhí</i>	尺 <i>chǐ</i>
XX	tʂɿ ^{陰平}	tʂɿ ^{陽平}	tʂ'ɿ ^{次陰去}	tʂ'ɿ ^{陽平文} ~ t'o ^{陽平白}
SF	tʂɿ ^{陰平}	dʒɿ ^{陽平}	tʂ'ɿ ^{陰去}	tʂ'ɿ ^{陽平文} ~ t'o ^{陽平白}
LD-a	tei ^{陰平}	dzi ^{陽平}	te'i ^{陰去}	te'i ^{陽平文} ~ te'io ^{陽平白}
LD-b	tei ^{陰平}	te'i ^{陽平}	te'i ^{陰去}	t'o ^{陽平白}
LY	tei ^{陰平}	sɿ ^{陽平}	te'i ^{陰去}	te'i ^{入文} ~ t'o ^{入白}
AH	tsɿ ^{陰平}	tsɿ ^{陽平}	ts'ɿ ^{次陰去}	ts'ɿ ^{次陰去文} ~ t'a ^{次陰去白}
HT-a	te ^{陰平}	te ^{陽平}	t'e ^{陰去}	t'e ^上
MC	止開三平支知	止開三平脂澄	曾開三入職澄	梗開三入昔昌
CNR	O	O		
QYS	tje ^平	ɖi ^平	dʒək ^入	tʂhjak ^入
CDC	*ci ¹	*ji ²	*jik ⁸	*chiak ⁷
CCX	*tʂi ^{陰平}	*dʒi ^{陽平}	*tʂ'i ^{陰去}	*tʂ'io ^{入白} ~ tʂ'i ^{陽平文}

As for the issue of the 船 *chuán* initial and 禪 *shàn* initial characters, the one case of 船 *chuán* initial character has palatalized: 船 *chuán* 'boat, ship' [t'e'yē^{陽平}]. The 禪 *shàn* initial characters have hardened: 臣 *chén* 'vassal' [tən^{陽平}], 承 *chéng* 'to bear' [tən^{陽平}], 成 *chéng* 'to accomplish' [tən^{陽平}], and 城 *chéng* 'city' [tən^{陽平}]. The regular reflex of 船 *chuán* initial and 禪 *shàn* initial initials is a lateral approximant [l], or the dental fricatives [s] or [z] when combined with 止 *zhǐ* shè finals. The character 船 *chuán* here has aspiration, different to the hardened 澄 *chéng* initial, which do not have aspiration. On the other hand, the four 禪 *shàn* initial characters here are parallel to the 澄 *chéng* initial characters in that they also do not have aspiration.

Table 62. Character readings of the five 船 *chuán* and 禪 *shàn* initial characters 船 *chuán*, 臣 *chén*, 承 *chéng*, 成 *chéng*, and 城 *chéng* in Ānhuà and other Xiāng dialects.

Dialect	船 <i>chuán</i>	臣 <i>chén</i>	承 <i>chéng</i>	成 <i>chéng</i>	城 <i>chéng</i>
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XX	d yī ^{陽平}	d Λn ^{陽平}	d Λn ^{陽平}	d Λn ^{陽平}	d Λn ^{陽平}
SF	d uī ^{陽平}	d iɛn ^{陽平}	d iɛn ^{陽平}	d iɛn ^{陽平文} ~ yioŋ ^{陽平白}	d iɛn ^{陽平}
LD-a	d uī ^{陽平}	d in ^{陽平}	d in ^{陽平}	d in ^{陽平}	d in ^{陽平}
LD-b	t 'ui ^{陽平}	t 'ɛn ^{陽平}	t 'ɛn ^{陽平}	t 'ɛn ^{陽平文} ~ ɛio ^{陽平白}	t 'ɛn ^{陽平}
LY	k ui ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}
AH	te'yē ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}
HT-a	teyen ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}
MC	山合三平仙船	臻開三平真禪	曾開三平蒸禪	梗開三平清禪	梗開三平清禪
CN rhyme	O	O			
QYS	dźjwǎn ^平	źjen ^平	źjəŋ ^平	źjäŋ ^平	źjäŋ ^平
CDC	*jion ²	*jin ²	*zhiŋ ² ~ *jiŋ ²	*zhiang ² ~ *jiang ²	*zhiang ² ~ *jiang ²
CCX	*dzyen ^{陽平} ~ *syen ^{陽平} (?)	*dźin ^{陽平}	*dźin ^{陽平}	*dźin ^{陽平文} ~ *zjioŋ ^{陽平白}	*dźin ^{陽平}

Two other characters that are interesting are 車 *chē* [t'ə^{陰平文} ~ t'a^{陰平白}] and 丈 *zhàng* [taŋ^{陰去文} ~ taŋ^{陽去白}], where both the literary and vernacular readings show hardening.

Table 63. Character readings of 車 *chē* and 丈 *zhàng* in Ānhuà and other Xiāng dialects.

Dialect	車 <i>chē</i>	丈 <i>zhàng</i>
XX	tʂ'ɿ ^{陰平文} ~ t'o ^{陰平白}	d aŋ ^{陽去}
SF	t 'o ^{陰平}	d oŋ ^{陽去}
LD-a	te'io ^{陰平}	dzəŋ ^{陽去}
LD-b	t 'o ^{陰平}	t 'oŋ ^{陽去}
LY	t 'o ^{陰平}	t oŋ ^{陽去}
AH	t 'ə ^{陰平文} ~ t'a ^{陰平白}	t aŋ ^{陰去文} ~ t aŋ ^{陽去白}
HT-a	t 'e ^{陰平文} ~ t'a ^{陰平白}	t aŋ ^{陽去}
MC	假開三平麻昌	宕開三上養澄
CN rhyme		
QYS	tʂhja ^平	dʒaŋ ^上
CDC	*chia ¹	*jiong ⁴
CCX	*tʂ'io ^{陰平}	*dźiaŋ ^{陽上白} ~ *dźiaŋ ^{陽去文}

Huìtóng Línchéng (Huìtóng-a) is also a dialect that has a two-way distinction of voiceless aspirated and non-aspirated in the affricates and stops. Hardening in Huìtóng Línchéng shows regular correspondence of Middle Chinese 知 *zhī* group division III and 章 *zhāng* group as unaspirated or

aspirated voiceless dental stops [t] or [t^h]. Middle Chinese 知 *zhī* group division III and 章 *zhāng* group regularly correspond to voiceless unaspirated [t], division III 徹 *chè* initial and 昌 *chāng* initial to voiceless aspirated [t^h], and division III 澄 *chéng* initial to voiceless unaspirated [t]. There are two exceptions with 澄 *chéng* initials but have aspiration in the initials, 值 *zhí* ‘value, worth’ [t’e^{陰去}] and 直 *zhí* ‘straight’ [t’e^{陰去}]. The condition in Huìtóng Línchéng looks to be a CCX medial or main vowel *-i, including the CCX final *-i. Different to the other Central Xiāng dialects, CCX finals *-y, *-yn, and *-yen appear to never induce hardening. The initials in front of these finals are read as alveolo-palatal affricates instead. There are no cases of CCX final *-yi characters in the data. The following two tables show examples of characters that have hardening in Huìtóng Línchéng and examples that do not.

Table 64. Examples of characters that show hardening in Huìtóng Línchéng.

Dialect	車 <i>chē</i>	中 <i>zhōng</i>	真 <i>zhēn</i>	知 <i>zhī</i>	值 <i>zhí</i>
XX	tʂʰ ^{陰平} ~ tʰ ^{陰平}	tʂ ^{陰平}	tʂ ^{陰平}	tʂ ^{陰平}	tʂʰ ^{次陰去}
SF	tʰ ^{陰平}	tan ^{陰平}	tiɛn ^{陰平}	tʂ ^{陰平}	tʂʰ ^{陰去}
LD-a	teʰ ^{陰平}	teivɨŋ ^{陰平} ~ tɨŋ ^{陰平}	tin ^{陰平}	tei ^{陰平}	teʰ ^{陰去}
LD-b	tʰ ^{陰平}	tʂ ^{陰平}	tɛn ^{陰平}	tei ^{陰平}	teʰ ^{陰去}
LY	tʰ ^{陰平}	tʂ ^{陰平}	tɛn ^{陰平}	tei ^{陰平}	teʰ ^{陰去}
AH	tʰ ^{陰平} ~ tʰ ^{陰平}	tən ^{陰平}	tən ^{陰平}	tsɿ ^{陰平}	tsʰ ^{次陰去}
HT-a	tʰ ^{陰平} ~ tʰ ^{陰平}	toŋ ^{陰平}	tən ^{陰平}	te ^{陰平}	tʰ ^{陰去}
MC	假開三平麻昌	通開三平東知	臻開三平真章	止開三平支知	止開三去志澄
CNR			O	O	
QYS	tʂhja ^平	tʂung ^平	tʂjen ^平	tʂe ^平	ɬi ^去
CDC	*chia ¹	*ciung ¹	*cin ¹	*ci ¹	*jik ⁸
CCX	*tʂʰ ^{陰平}	*tʂioŋ ^{陰平} (~ *tʂiuŋ ^{陰平})	*tʂin ^{陰平}	*tʂi ^{陰平}	*tʂʰ ^{陰去}

Table 65. Examples of characters that do not show hardening in Huìtóng Línchéng.

Dialect	吹 <i>chuī</i>	錘 <i>chuí</i>	豬 <i>zhū</i>	主 <i>zhǔ</i>	准 <i>zhǔn</i>	專 <i>zhuān</i>
XX	tʰ ^{陰平}	dy ^{陽平}	ty ^{陰平}	ty ^上	tu ^上	ty ^{陰平}

SF	t'y ^{陰平}	dy ^{陽平}	ty ^{陰平}	ty ^上	tuan ^上	tuī ^{陰平}
LD-a	ts'ui ^{陰平文} ~ te'y ^{陰平白}	dzy ^{陽平}	tey ^{陰平}	tey ^上	tun ^上	tuī ^{陰平}
LD-b	t'y ^{陰平}	t'y ^{陽平}	ty ^{陰平}	ty ^上	--	tui ^{陰平}
LY	k'ui ^{陰平文} ~ t'y ^{陰平白}	kui ^{陽平文} ~ ty ^{陽平白}	ty ^{陰平}	ty ^上	kuən ^上	kui ^{陰平}
AH	t'ei ^{陰平}	tei ^{陽平}	tey ^{陰平}	tey ^上	teyn ^上	teyē ^{陰平}
HT-a	te'y ^{陰平}	tey ^{陽平}	tey ^{陰平}	tey ^上	teyn ^上	teyen ^{陰平}
MC	止合三平支昌	止合三平支澄	遇開三平魚知	遇合三上麌章	臻合三上準章	山合三平仙章
CNR	O	O			O	O
QYS	tshjwe ^平	djwi ^平	tjwo ^平	tšju ^上	tšjwěn ^上	tšjwän ^平
CDC	*chui ¹	*jui ²	*cie ¹ (~ *ciu ¹)	*ciu ³	*ciun ³	*cion ¹
CCX	*tɕ'y ^{陰平白} ~ *tɕ'yi ^{陰平文}	*dzy ^{陽平白} ~ dzyi ^{陽平文}	*tɕy ^{陰平}	*tɕy ^上	*tɕyn ^上	*tɕyen ^{陰平}

Unlike the other Xiāng dialects that have hardening, Huìtóng Línchéng shows hardening in the 止 *zhǐ shè kāikǒu* characters as well. However, the 止 *zhǐ shè hékǒu* ones seem to have all palatalized instead of hardened. Coblin has a whole section discussing about the issue of 止 *zhǐ shè* hardening in Huìtóng Línchéng (2011: 244-245). In short, the phenomenon of hardening in Huìtóng Línchéng seems to be a different case to the other Xiāng dialects that have hardening in many ways. First, according to Hú (2008), there are many different subtypes of Huìtóng dialect, some with hardening and some without, and hardening is spreading from the core, the county seat of Huìtóng Línchéng where the dialect subtype is considered prestigious, outwards to other dialect subtypes that originally do not have hardening. Though older people tend to retain affricate readings for the Middle Chinese 知 *zhī* group division III and 章 *zhāng* group initials, in many places the younger generation substitute the affricates for dental stops. Second, Coblin states that the hardening phenomenon is lexically more restricted than in the other Xiāng dialects that have hardening.

Table 66. Character readings of 值 *zhí*, 直 *zhí*, 吹 *chuī*, and 錘 *chuí* in Huìtóng Línchéng and other Xiāng dialects.

Dialect	值 <i>zhí</i>	直 <i>zhí</i>	吹 <i>chuī</i>	錘 <i>chuí</i>
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XX	tɕ'ɿ̄ 次陰去	tɕ'ɿ̄ 次陰去	t'y 陰平	dy 陽平
SF	tɕ'ɿ̄ 陰去	tɕ'ɿ̄ 陰去	t'y 陰平	dy 陽平
LD-a	te'i 陰去	te'i 陰去	ts'ui 陰平文 ~ te'y 陰平白	dzy 陽平
LD-b	te'i 陰去	te'i 陰去	t'y 陰平	t'y 陽平
LY	te'i 陰去	te'i 陰去	k'ui 陰平文 ~ t'y 陰平白	kui 陽平文 ~ ty 陽平白
AH	ts'ɿ̄ 次陰去	ts'ɿ̄ 次陰去	t'ei 陰平	tei 陽平
HT-a	t'e 陰去	t'e 陰去	te'y 陰平	tey 陽平
MC	止開三去志澄	曾開三入職澄	止合三平支昌	止合三平支澄
CN rhyme			O	O
QYS	ɬi 去	djək 入	tshjwe 平	djwi 平
CDC	*jik ⁸	*jik ⁸	*chui1	*jui2
CCX	*tɕ'ɿ̄ 陰去	*tɕ'ɿ̄ 陰去	*tɕ'y 陰平白 ~ *tɕ'yi 陰平文	*dzy 陽平白 ~ dzyi 陽平文

Table 67. Character readings of 知 *zhī*, 支 *zhī*, 齒 *chǐ*, and 遲 *chí* in Huìtóng Línchéng and other Xiāng dialects.

Dialect	知 <i>zhī</i>	支 <i>zhī</i>	齒 <i>chǐ</i>	遲 <i>chí</i>
XX	tɕɿ̄ 陰平	tɕɿ̄ 陰平	tɕ'ɿ̄ 上	tɕɿ̄ 陽平
SF	tɕɿ̄ 陰平	tɕɿ̄ 陰平	tɕ'ɿ̄ 上	dzɿ̄ 陽平
LD-a	tei 陰平	tei 陰平	ts'ɿ̄ 上	dzi 陽平
LD-b	tei 陰平	tsɿ̄ 陰平	ts'ɿ̄ 上	te'i 陽平
LY	tei 陰平	tsɿ̄ 陰平	ts'ɿ̄ 上	sɿ̄ 陽平
AH	tsɿ̄ 陰平	tsɿ̄ 陰平	ts'ɿ̄ 上	tsɿ̄ 陽平
HT-a	te 陰平	te 陰平	t'e 上	te 陽平
MC	止開三平支知	止開三平支章	止開三上止昌	止開三平脂澄
CN rhyme	O	O		O
QYS	tje 平	tɕje 平	tshī 上	ɬi 平
CDC	*ci ¹	*ci ¹	*chi ³	*ji ²
CCX	*tɕɿ̄ 陰平	*tɕɿ̄ 陰平	*tɕ'ɿ̄ 上	*dzɿ̄ 陽平

The five 船 *chuán* and 禪 *shàn* initial characters that show hardening in the other Xiāng dialects also appear to show hardening in Huìtóng Línchéng, except the character 船 *chuán*, which palatalizes to an alveolo-palatal affricate initial.

Table 68. Character readings of the five 船 *chuán* and 禪 *shàn* initial characters 船 *chuán*, 臣 *chén*, 承 *chéng*, 成 *chéng*, and 城 *chéng* in Huìtóng Línchéng and other Xiāng dialects.

Dialect	船 <i>chuán</i>	臣 <i>chén</i>	承 <i>chéng</i>	成 <i>chéng</i>	城 <i>chéng</i>
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XX	d yī ^{陽平}	d Λn ^{陽平}	d Λn ^{陽平}	d Λn ^{陽平}	d Λn ^{陽平}
SF	d uī ^{陽平}	d iɛn ^{陽平}	d iɛn ^{陽平}	d iɛn ^{陽平文 ~ yioŋ^{陽平白}}	d iɛn ^{陽平}
LD-a	d uī ^{陽平}	d in ^{陽平}	d in ^{陽平}	d in ^{陽平}	d in ^{陽平}
LD-b	t 'ui ^{陽平}	t 'ɛn ^{陽平}	t 'ɛn ^{陽平}	t 'ɛn ^{陽平文 ~ ɛio^{陽平白}}	t 'ɛn ^{陽平}
LY	k ui ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}
AH	te'yē ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}
HT-a	teyen ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}
MC	山合三平仙船	臻開三平真禪	曾開三平蒸禪	梗開三平清禪	梗開三平清禪
CN rhyme	O	O			
QYS	dźjwǎn ^平	źjen ^平	źjəŋ ^平	źjäŋ ^平	źjäŋ ^平
CDC	*jion ²	*jin ²	*zhiŋ ² ~ *jing ²	*zhiang ² ~ *jiang ²	*zhiang ² ~ *jiang ²
CCX	*dzyen ^{陽平} ~ *šyen ^{陽平} (?)	*dzin ^{陽平}	*dzin ^{陽平}	*dzin ^{陽平文 ~ zioŋ^{陽平白}}	*dzin ^{陽平}

In sum, a few generalizations can be made for the Type I hardening conditions in the Central Xiāng dialects:

(1) The CCX finals that generally induce Type I hardening are:

- a. *-iɔ, *-iəu, *-iau, *-in, *-ien, *-iɔŋ, *-iaŋ, and *-ioŋ
- b. *-y, *-yi, *-yn, and *-yen

(2) Exceptions:

- a. CCX final *-i never cause Type I hardening in any Central Xiāng dialect except Huitóng Línchéng.
- b. CCX final *-iɔ does not cause hardening in Lóudǐ Lǎojiē.
- c. CCX final *-iəu does not cause hardening at all in Lóudǐ Lǎojiē, and partially in Shuāngfēng (hardening found in the characters 竹 *zhú*, 粥 *zhōu*, and 祝 *zhù*, but not 逐 *zhú*, 州 *zhōu*, 抽 *chōu*, 臭 *chòu*, 畜 *chù*, and 綢 *chóu*) and Lóudǐ Jiāolóngcūn (hardening found in the characters 竹 *zhú*, 粥 *zhōu*, 逐 *zhú*, 祝 *zhù*, 畜 *chù*, but not 州 *zhōu*, 抽 *chōu*, 臭 *chòu*, and 綢 *chóu*).

- d. CCX final *-ien does not cause hardening at all in Xiāngxiāng, Lóudǐ Lǎojiē, and Lóudǐ Jiāolóngcūn. The finals turn into an apical vowel in Xiāngxiāng, and a nasalized -ĩ in the other two.
- e. CCX final *-iaŋ does not cause hardening in Lóudǐ Lǎojiē for the two characters 杖 *zhàng* and 丈 *zhàng*.
- f. CCX final *-ioŋ does not show hardening in Lóudǐ Lǎojiē for the character 眾 *zhòng*.
- g. CCX final *-y does not show hardening at all in Lóudǐ Lǎojiē and Huìtóng Línchéng, and partially in Ānhuà (hardening in 吹 *chuī* and 錘 *chuí*, but not 豬 *zhū*, 煮 *zhǔ*, 主 *zhǔ*, 除 *chú*, 柱 *zhù*, and 出 *chū*).
- h. CCX final *-yi does not cause hardening in Lóudǐ Lǎojiē and Lóudǐ Jiāolóngcūn. Liányuán also does not show hardening with this final, but show velarization. There are, however, only two characters with this final in the Central Xiāng dialects, 追 *zhuī* and 錐 *zhuī*. Ānhuà and Huìtóng Línchéng do not have data for this CCX final.
- i. CCX final *-yn does not cause hardening in Ānhuà and Huìtóng Línchéng. It also does not cause hardening in Liányuán but show velarization.
- j. CCX final *-yen does not cause hardening in Ānhuà and Huìtóng Línchéng. It also does not cause hardening in Liányuán but show velarization.
- k. The character 者 *zhě* with the CCX final *-ə show hardening in Lóudǐ Lǎojiē, Lóudǐ Jiāolóngcūn, and Liányuán. No data is given for the other dialects.

If summarized by the condition in each dialect:

- (1) Huìtóng Línchéng is definitely the most distinctive to the others in that it shows hardening with the CCX final *-i, but not the CCX finals *-y, *-yn, and *-yen at all.
- (2) Ānhuà is the next interesting one in line. It shows no hardening with the CCX final *-i, just as the other Central Xiāng dialects, but it almost does not have hardening at all in the CCX finals *-y, *-yn, and *-yen, except in two characters 吹 *chuī* and 錘 *chuí* that have the CCX final *-y.
- (3) Liányuán also does not show hardening in the CCX finals *-y, *-yn, and *-yen, but they regularly show velarization.
- (4) Unlike other Central Xiāng dialects that may not show hardening in some or all of the characters with the CCX finals *-iəu and *-ien, in addition, Lóudǐ Lǎojiē also has some characters found with the CCX finals *-iə, *-iəŋ, and *-iaŋ without hardening.

The table below summarizes Type I hardening pattern in the Central Xiāng dialects. If a CCX final shows hardening in some characters but not in others in a given dialect, the characters in each case are listed out. CCX final *-ə (者 *zhě*) is listed with the character written out as a reminder that 者 *zhě* is the only character with this final that shows hardening. The next table summarizes the general conditions and exceptions of Type I hardening in each dialect.

Table 69. Type I hardening pattern in the Central Xiāng dialects. The second column shows the respective division III 知 *zhī* group and 章 *zhāng* group hardened initials read in each dialect. The third column shows CCX finals that cause hardening in each dialect. The fourth column shows CCX finals that do not cause hardening in each dialect. The fifth column shows the readings of the division III 知 *zhī* group and 章 *zhāng* group that have not hardened.

	Hardening results	CCX finals that show hardening	CCX finals that do not show hardening	Initials that do not harden
XX	Dental stops t, t ^h , d	*-iə, *-iəu, *-iau, *-in, *-iəŋ, *-iaŋ, *-iəŋ *-y, *-yi, *-yn, *-yen	*-i, *-ien	Retroflex affricates (tʂ, tʂ ^h , dz)

SF	Dental stops t, t ^h , d	*-iə, *-iəu (竹 zhú, 粥 zhōu, 祝 zhù), *-iau, *-in, *-ien, *-ioŋ, *-iaŋ, *-iəŋ *-y, *-yi, *-yn, *-yen	*-i, *-iəu (逐 zhú, 州 zhōu, 抽 chōu, 臭 chòu, 畜 chù, 綢 chóu)	Retroflex affricates (tʂ, tʂ ^h , dz)
LD-a	Dental stops t, t ^h , d	*-ioŋ, *-in, *-iau, *-iaŋ, *-iəŋ *-yn, *-yen *-ə (者 zhě)	*-i, *-iəu, *-ioŋ (眾 zhòng), *-ien, *-iə, *-iaŋ (杖 zhàng, 丈 zhàng) *-y, *-yi	Dental affricates (ts, ts ^h , dz), or alveolo-palatals (tɕ, tɕ ^h , dz) before high front vowels
LD-b	Retroflex stops t, t ^h	*-ioŋ, *-iəu (竹 zhú, 粥 zhōu, 逐 zhú, 祝 zhù, 畜 chù), *-in, *-iau, *-iə, *-iaŋ, *-iəŋ *-y, *-yn, *-yen *-ə (者 zhě)	*-i, *-iəu (州 zhōu, 抽 chōu, 臭 chòu, 綢 chóu), *-ien *-yi	Dental affricates (ts, ts ^h), or alveolo-palatal (tɕ, tɕ ^h) before high front vowels
LY	Retroflex stops t, t ^h	*-ioŋ, *-iəu, *-in, *-iau, *-iə, *-iaŋ, *-iəŋ *-y *-ə (者 zhě)	*-i, *-ien (velarization) *-yi, *-yn, *-yen (velarization for these three finals)	Dental affricates (ts, ts ^h), or alveolo-palatal (tɕ, tɕ ^h) before high front vowels
AH	Dental stops ts, ts ^h	*-ioŋ, *-iəu, *-in, *-ien, *-iau, *-iə, *-iaŋ, *-iəŋ *-y (吹 chuī, 錘 chuī)	*-i *-y (豬 zhū, 煮 zhǔ, 主 zhǔ, 除 chú, 柱 zhù, 出 chū), *-yn, *-yen	Dental affricates (ts, ts ^h), or alveolo-palatal (tɕ, tɕ ^h) before high front vowels
HT-a	Dental stops ts, ts ^h	*-i, *-ioŋ, *-iəu, *-in, *-ien, *-iau, *-iaŋ, *-iə, *-iəŋ	*-y, *-yn, *-yen	Dental affricates (ts, ts ^h), or alveolo-palatal (tɕ, tɕ ^h) before high front vowels

Table 70. Generalized conditions and exceptions in each dialect for Type I hardening.

	Condition	Hardening exceptions
XX	CCX medial or main vowel *-i and *-y	1. CCX final *-i 2. CCX final *-ien
SF	CCX medial or main vowel *-i and *-y	1. CCX final *-i 2. CCX final *-iəu (except 粥 zhōu and 竹 zhú, which are the only two characters that show hardening with this final) 3. CCX final *-yi (錘 chuī and 追 zhuī)
LD-a	CCX medial or main vowel *-i and *-y	1. CCX final *-i 2. CCX final *-iəu 3. CCX final *-ien: 展 zhǎn、戰 zhàn、沾 zhān 4. CCX final *-iə 5. The two characters 杖 zhàng and 丈 zhàng (with the CCX final *-iaŋ; the only Central Xiang dialect that does not show hardening with these two characters) 6. CCX final *-yi: 錘 chuī、追 zhuī 7. CCX final *-y
LD-b	CCX medial or main vowel *-i and *-y	1. CCX final *-i 2. CCX final *-iəu (except 竹 zhú, 粥 zhōu, 祝 zhù, 畜 chù) 3. CCX final *-yi (錘 chuī and 追 zhuī)
LY	CCX medial or main vowel *-i and *-y	1. CCX final *-i 2. 錘 chuī (CCX final *-yi; 追 zhuī with the same CCX final show velarization)
AH	CCX medial or main vowel *-i	1. CCX final *-i

HT-a	CCX medial or main vowel *-i	--
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3.2 TYPE II: HARDENING OF PALATALS FROM MC VELARS

Another type of hardening mentioned in Coblin's 2011 work is hardening of palatals from Middle Chinese velar stops (見 *jiàn*, 溪 *xī*, and 群 *qún* initials), which he calls hardening of secondary palatal affricates derived from Common Central Xiāng velar stops (2011: 47, 212). For the convenience of discussion, this type will be called Type II hardening afterwards. In this section, I will focus on the division III 見 *jiàn* group initial characters in the Central Xiāng dialects. Divisions I, II, and IV 見 *jiàn* group initial characters generally do not show hardening.

In Xiāngxiāng, the condition for hardening of secondary palatal affricates appears to be a CCX medial or main vowel *-y. Under this condition, the 見 *jiàn*, 溪 *xī*, and 群 *qún* initials correspond to t-, t^h-, and d- in Xiāngxiāng. CCX medial or main vowel *-i generally do not show hardening. The 見 *jiàn* group characters that do not harden stay as velar stops k, k^h, g. None of them show palatalization. The following table gives division III 見 *jiàn* group initial example characters that show hardening and those that do not.

Table 71. Examples of division III 見 *jiàn* group initial characters that show hardening and those that do not in Xiāngxiāng.

	Hardening			No hardening		
Dialect	句 <i>jù</i>	去 <i>qù</i>	裙 <i>qún</i>	供 <i>gōng</i>	氣 <i>qì</i>	緊 <i>jǐn</i>
XX	ty ^{陰去}	t'y ^{次陰去文} ~ k'i ^{次陰去白}	duan ^{陽平}	kɿn ^{陰去}	k'i ^{次陰去}	kin ^上
SF	ty ^{陰去}	t'y ^{陰去文} ~ te'i ^{陰去白} ~ k'i ^{陰去}	duan ^{陽平}	kan ^{陰去} ~ kan ^{陰平}	te'i ^{陰去}	teien ^上
LD-a	ty ^{陰去}	te'y ^{陰去文} ~ te'i ^{陰去白}	dun ^{陽平}	kɿŋ ^{陰去}	te'i ^{陰去}	tin ^上

LD-b	t ^y _{陰去}	t ^y _{陰去文} ~ te'i _{陰去白}	t ^{uən} _{陽平}	taŋ _{陰去}	te'i _{陰去}	ten _上
LY	t ^y _{陰去}	t ^y _{陰去文} ~ te'i _{陰去白}	kuən _{陽平}	kaŋ _{陰平}	te'i _{陰去}	ten _上
AH	tey _{陰去}	te'y _{次陰去文} ~ te'i _{次陰去白}	teyn _{陽平}	kən _{陰平}	te'i _{次陰去}	tein _上
HT-a	tey _{陰去}	k'y _{陰去}	teyn _{陽平}	koŋ _{陰平}	te'i _{陰去}	tein _上
	遇開三去遇見	遇開三上語溪	臻合三平文群	通開三平鍾見	止開三去未溪	臻開三上軫 A 見
CNR						
MC	kju _去	khjwo _上	gjuən _平	kjwong _平	khjei _去	kjien _上
CDC	*kiu ⁵	*khie ⁵ (~ *khiu)	*giun ²	*kiung ¹	*khi ⁵	*kin ³
CCX	*ky _{陰去}	*k'i _{陰去白} ~ *k'y _{陰去文}	*gyn _{陽平}	*koŋ _{陰平} ~ *koŋ _{陰去}	*k'i _{陰去}	*kin _上

A character that is not in division III rhymes but still show hardening is 決 *jué*, which is a division IV character. Note that the CCX final is still reconstructed with a *-y medial. The only two characters with a CCX medial *-i that show hardening are 茄 *qié* CCX *giō^{陽平}, modern [t'ō^{陽平}], and 卻 *què* CCX *k'io^入 ~ *k'io^{陰去}, modern [t'ō^{陽平}]. A possible condition for these two characters is a Common Central Xiang high front medial *-i- plus a following back rounded vowel, but this would lead to three other characters meeting this condition yet having no hardening: 窮 *qióng*, 喫 *chī*, and 輕 *qīng*. The readings of these characters are listed below. The initial reading of the character 茄 *qié* is also strange in that the regular hardening correspondence for 群 *qún* initial would be d-, regardless of tone, instead of the voiceless aspirated t^h-. Two other characters that are interesting are 櫃 *guì* and 鋸 *jù*. Where 櫃 *guì* has the literary reading a velar and vernacular a dental stop in Xiāngxiāng, 鋸 *jù* is the opposite. The following two tables give the characters mentioned above.

Table 72. Character readings of 決 *jué*, 茄 *qié*, 卻 *què*, 窮 *qióng*, and 喫 *chī* in Xiāngxiāng and other Xiāng dialects.

Dialect	決 <i>jué</i>	茄 <i>qié</i>	卻 <i>què</i>	窮 <i>qióng</i>	喫 <i>chī</i>
XX	tua ^{次陽平}	t'o ^{陽平}	t'uo ^{陽平}	gin ^{陽平}	k'i ^{陽平文} ~ k'io ^{陽平白}
SF	tue ^{陽平文} ~ tua ^{陽平白}	do ^{陽平}	t'uo ^{陽平}	dziɛn ^{陽平}	te'i ^{陽平文} ~ te'io ^{陽平白}
LD-a	tue ^{陽平}	dzio ^{陽平}	te'io ^{陽平}	dziɛŋ ^{陽平}	te'i ^{陽平}
LD-b	tue ^{陽平}	t'o ^{陽平}	t'uo ^{陽平}	t'aŋ ^{陽平}	t'o ^{陽平}
LY	--	t'o ^{陰平文} ~ t'o ^{陽平}	t'uo ^{陰去}	t'aŋ ^{陽平}	te'i ^{入文} ~ t'o ^{入白}
AH	teye ^{陰去}	--	te'io ^{次陰去}	tein ^{陽平}	te'i ^{次陰去文} ~ te'ia ^{陰去白}
HT-a	teye ^上	--	te'io ^上	te'ioŋ ^{陽平}	te'i ^上
MC	山合四入屑見	果開三平戈羣	宕開三入藥見	通開三平東羣	臻開三入迄見
CN rhyme					
QYS	kiwet ^入	gja ^平	khjak ^入	gjung ^平	(khjət ^入), khiek ^入
CDC	*kiot ⁷	*gio ²	*khiok ⁷	*giung ²	*khiak ⁷
CCX	*kya ^{入白} ~ *kye ^{入文}	*gin ^{陽平}	*k'io ^入 ~ *k'io ^{陰去}	*gion ^{陽平} (~ *giuŋ ^{陽平})	*k'in ^{入白} ~ *k'i ^{入文}

Table 73. Character readings of 櫃 *guì*, 鋸 *jù*, and 輕 *qīng* in Xiāngxiāng and other Xiāng dialects.

Dialect	櫃 <i>guì</i>	鋸 <i>jù</i>	輕 <i>qīng</i>
XX	gui ^{陽去文} ~ dy ^{陽去白}	ty ^{陰去文} ~ ka ^{陰去白}	k'in ^{陰平文} ~ k'io ^{陰平白}
SF	gui ^{陽去文} ~ dy ^{陽去白}	ty ^{陰去文} ~ ka ^{陰去白}	te'ien ^{陰平文} ~ te'ioŋ ^{陰平白}
LD-a	yui ^{陽去}	tey ^{陰去文} ~ ke ^{陰去白}	t'in ^{陰平}
LD-b	yui ^{陽去}	ty ^{陰去文} ~ ke ^{陰去白} “a saw; to saw” ~ ka ^{陰去} “saw(dust)”	t'en ^{陰平文} ~ t'o ^{陰平白}
LY	kui ^{陽去}	ty ^{陰去} ~ ki ^{陰去白} “a saw” ~ ka ^{陰去白} “to saw”	t'en ^{陰平文} ~ t'o ^{陰平白}
AH	kui ^{陽去}	kə ^{陰去文} ~ kai ^{陰去白}	te'in ^{陰平文} ~ te'iaŋ ^{陰平白}
HT-a	kuai ^{陽去}	ky ^{陰去}	te'in ^{陰平}
MC	止合三去至 B 羣	遇開三去御見	梗開三平清 A 溪
CN rhyme	O		
QYS	gjwi ^去	kjwo ^去	khjäŋ ^平
CDC	*gui ⁵	*kie ⁵ (~ *kiu ⁵)	*khiang ¹
CCX	*gy ^{陽去白} ~ yui ^{陽去} ~ gui ^{陽去文}	*ky ^{陰去文} ~ *kə ^{陰去白} ~ *kai ^{陰去白} ~ *ka ^{陰去白}	*k'ioŋ ^{陰平白} ~ k'in ^{陰平文}

In Shuāngfēng, the condition appears to be the same to Xiāngxiāng, a CCX medial or main vowel *-y in the division III rhymes. Under this condition, the 見 *jiàn*, 溪 *xī*, and 群 *qún* initials

correspond to t-, t^h-, and d-, respectively. CCX medial or main vowel *-i generally do not show hardening. The 見 *jiàn* group characters that do not harden stay as velar stops k, k^h, g, or alveolo-palatal affricates tɕ, tɕ^h, dz. The following table gives division III 見 *jiàn* group initial example characters that show hardening and those that do not.

Table 74. Examples of division III 見 *jiàn* group initial characters that show hardening and those that do not in Shuāngfēng.

	Hardening			No hardening		
Dialect	句 <i>jù</i>	去 <i>qù</i>	裙 <i>qún</i>	供 <i>gōng</i>	氣 <i>qì</i>	緊 <i>jǐn</i>
XX	t ^h y 陰去	t ^h y 次陰去文 ~ k'i 次陰去白	duan 陽平	kan 陰去	k'i 次陰去	kin 上
SF	t ^h y 陰去	t ^h y 陰去文 ~ te'i 陰去白 ~ k'i 陰去	duan 陽平	kan 陰去 ~ kan 陰平	te'i 陰去	teien 上
LD-a	t ^h y 陰去	te'y 陰去文 ~ te'i 陰去白	dun 陽平	kɿŋ 陰去	te'i 陰去	tin 上
LD-b	t ^h y 陰去	t ^h y 陰去文 ~ te'i 陰去白	t ^h uan 陽平	taŋ 陰去	te'i 陰去	ten 上
LY	t ^h y 陰去	t ^h y 陰去文 ~ te'i 陰去白	kuən 陽平	kaŋ 陰平	te'i 陰去	ten 上
AH	tey 陰去	te'y 次陰去文 ~ te'i 次陰去白	teyn 陽平	kən 陰平	te'i 次陰去	tein 上
HT-a	tey 陰去	k'y 陰去	teyn 陽平	koŋ 陰平	te'i 陰去	tein 上
	遇開三去遇見	遇開三上語溪	臻合三平文群	通開三平鍾見	止開三去未溪	臻開三上軫 A 見
CNR						
MC	kju 去	khjwo 上	gjuən 平	kjwong 平	khjei 去	kjien 上
CDC	*kiu ⁵	*khie ⁵ (~ *khiu)	*giun ²	*kiung ¹	*khi ⁵	*kin ³
CCX	*ky 陰去	*k'i 陰去白 ~ *k'y 陰去文	*gyn 陽平	*koŋ 陰平 ~ *koŋ 陰去	*k'i 陰去	*kin 上

The only non-division III character that show hardening is 決 *jué*, a division IV character. The character has both the literary and vernacular readings as dental stops in Shuāngfēng. Again, the two characters that do not meet the general condition but still hardened are 茄 *qié* and 卻 *què*. In the cases of 窮 *qióng*, 喫 *chī*, and 輕 *qīng*, which have the same CCX finals to 茄 *qié* and 卻 *què*,

they show palatalization in Shuāngfēng. For the other division III characters that do not show hardening, they are read as palatal affricates before a high front unrounded medial or vowel, except for one character 建 *jiàn* [kī^{陰去}] that remains the velar stop reading. The two characters 櫃 *guì* and 鋸 *jù* also have the same situation as in Xiāngxiāng, where 櫃 *guì* has the literary reading a velar and vernacular a dental stop, and 鋸 *jù* the opposite. The two tables below give the readings of these mentioned characters.

Table 75. Character readings of 決 *jué*, 茄 *qié*, 卻 *què*, 窮 *qióng*, and 喫 *chī* in Shuāngfēng and other Xiāng dialects.

Dialect	決 <i>jué</i>	茄 <i>qié</i>	卻 <i>què</i>	窮 <i>qióng</i>	喫 <i>chī</i>
XX	tua ^{次陽平}	t'o ^{陽平}	t'o ^{陽平}	gin ^{陽平}	k'i ^{陽平文} ~ k'io ^{陽平白}
SF	tue ^{陽平文} ~ tua ^{陽平白}	do ^{陽平}	t'o ^{陽平}	dziɛn ^{陽平}	te'i ^{陽平文} ~ te'io ^{陽平白}
LD-a	tue ^{陽平}	dzio ^{陽平}	te'io ^{陽平}	dziɛŋ ^{陽平}	te'i ^{陽平}
LD-b	tue ^{陽平}	t'o ^{陽平}	t'o ^{陽平}	t'aŋ ^{陽平}	t'o ^{陽平}
LY	--	tɔ ^{陰平文} ~ tɔ ^{陽平}	t'o ^{陰去}	t'aŋ ^{陽平}	te'i ^{入文} ~ t'o ^{入白}
AH	teye ^{陰去}	--	te'io ^{次陰去}	tein ^{陽平}	te'i ^{次陰去文} ~ te'ia ^{陰去白}
HT-a	teye ^上	--	te'io ^上	te'ioŋ ^{陽平}	te'i ^上
MC	山合四入屑見	果開三平戈羣	宕開三入藥見	通開三平東羣	臻開三入迄見
CN rhyme					
QYS	kiwet ^入	gja ^平	khjak ^入	gjung ^平	(khjət ^入), khiek ^入
CDC	*kiot ⁷	*gio ²	*khiok ⁷	*giung ²	*khiak ⁷
CCX	*kya ^{入白} ~ *kye ^{入文}	*gin ^{陽平}	*k'io ^入 ~ *k'io ^{陰去}	*gion ^{陽平} (~ *giuŋ ^{陽平})	*k'io ^{入白} ~ *k'i ^{入文}

Table 76. Character readings of 櫃 *guì*, 鋸 *jù*, 輕 *qīng*, and 建 *jiàn* in Shuāngfēng and other Xiāng dialects.

Dialect	櫃 <i>guì</i>	鋸 <i>jù</i>	輕 <i>qīng</i>	建 <i>jiàn</i>
XX	gui ^{陽去文} ~ dy ^{陽去白}	ty ^{陰去文} ~ ka ^{陰去白}	k'in ^{陰平文} ~ k'io ^{陰平白}	kī ^{陰去}
SF	gui ^{陽去文} ~ dy ^{陽去白}	ty ^{陰去文} ~ ka ^{陰去白}	te'ien ^{陰平文} ~ te'ioŋ ^{陰平白}	kī ^{陰去}
LD-a	yui ^{陽去}	tey ^{陰去文} ~ ke ^{陰去白}	t'in ^{陰平}	tei ^{陰去}
LD-b	yui ^{陽去}	ty ^{陰去文} ~ ke ^{陰去白} “a saw; to saw” ~ ka ^{陰去} “saw(dust)”	t'en ^{陰平文} ~ t'o ^{陰平白}	tei ^{陰去}
LY	kui ^{陽去}	ty ^{陰去} ~ ki ^{陰去白} “a saw” ~ ka ^{陰去白} “to saw”	t'en ^{陰平文} ~ t'o ^{陰平白}	ki ^{陰去}
AH	kui ^{陽去}	kə ^{陰去文} ~ kai ^{陰去白}	te'in ^{陰平文} ~ te'iaŋ ^{陰平白}	teiĕ ^{陰去}
HT-a	kuei ^{陽去}	ky ^{陰去}	te'in ^{陰平}	teien ^{陰去}

MC	止合三去至 B 羣	遇開三去御見	梗開三平清 A 溪	臻開三去願見
CN rhyme	O			
QYS	g <i>ji</i> ^去	k <i>jo</i> ^去	kh <i>jä</i> ŋ ^平	k <i>je</i> ^去
CDC	* <i>gui</i> ⁵	* <i>kie</i> ⁵ (~ * <i>kiu</i> ⁵)	* <i>khia</i> ŋ ¹	* <i>kian</i> ⁵
CCX	* <i>gy</i> ^{陽去白} ~ <i>yui</i> ^{陽去} ~ <i>gui</i> ^{陽去文}	* <i>ky</i> ^{陰去文} ~ * <i>kə</i> ^{陰去白} ~ * <i>kai</i> ^{陰去白} ~ * <i>ka</i> ^{陰去白}	* <i>k'io</i> ŋ ^{陰平白} ~ <i>k'in</i> ^{陰平文}	* <i>kien</i> ^{陰去}

The condition in *Lóudǐ Lǎojiē* is a little different to *Xiāngxiāng* and *Shuāngfēng*. In addition to division III rhymes with CCX *-y medial or main vowel, the CCX finals *-in and *-ioŋ appear to also induce hardening. Under this condition, the 見 *jiàn*, 溪 *xī*, and 群 *qún* initials correspond to dental stops t-, t^h-, d-. CCX medial or main vowel *-i generally do not show hardening, except the two previously mentioned CCX final *-in and *-ioŋ. The 見 *jiàn* group characters that do not harden stay as velar stops k-, k^h-, g-, or alveolo-palatal affricates tɕ-, tɕ^h-, dʒ-. The following table gives division III 見 *jiàn* group initial example characters that show hardening and those that do not.

Table 77. Examples of division III 見 *jiàn* group initial characters that show hardening and those that do not in *Lóudǐ Lǎojiē*.

	Hardening			No hardening		
Dialect	句 <i>jù</i>	緊 <i>jǐn</i>	裙 <i>qún</i>	供 <i>gōng</i>	氣 <i>qì</i>	去 <i>qù</i>
XX	t <i>y</i> ^{陰去}	kin ^上	d uən ^{陽平}	kən ^{陰去}	k'i ^{次陰去}	t'y ^{次陰去文} ~ k'i ^{次陰去白}
SF	t <i>y</i> ^{陰去}	teien ^上	d uan ^{陽平}	kan ^{陰去} ~ kan ^{陰平}	te'i ^{陰去}	t'y ^{陰去文} ~ te'i ^{陰去白} ~ k'i ^{陰去}
LD-a	t <i>y</i> ^{陰去}	t in ^上	d un ^{陽平}	kɿŋ ^{陰去}	te'i ^{陰去}	te'y ^{陰去文} ~ te'i ^{陰去白}
LD-b	t <i>y</i> ^{陰去}	t en ^上	t'u ən ^{陽平}	t aŋ ^{陰去}	te'i ^{陰去}	t'y ^{陰去文} ~ te'i ^{陰去白}
LY	t <i>y</i> ^{陰去}	t en ^上	kuən ^{陽平}	kaŋ ^{陰平}	te'i ^{陰去}	t'y ^{陰去文} ~ te'i ^{陰去白}
AH	tey ^{陰去}	tein ^上	teyn ^{陽平}	kən ^{陰平}	te'i ^{次陰去}	te'y ^{次陰去文} ~ te'i ^{次陰去白}
HT-a	tey ^{陰去}	tein ^上	teyn ^{陽平}	koŋ ^{陰平}	te'i ^{陰去}	k'ɿ ^{陰去}
	遇合三去遇見	臻開三上軫 A 見	臻合三平文群	通開三平鍾見	止開三去未溪	遇開三上語溪
CNR						
MC	k <i>ju</i> ^去	k <i>je</i> ^上	g <i>ju</i> ən ^平	k <i>jo</i> ŋ ^平	kh <i>je</i> ^去	kh <i>jo</i> ^上

CDC	*kiu ⁵	*kin ³	*giun ²	*kiung ¹	*khi ⁵	*khie ⁵ (~ *khiu)
CCX	*ky _{陰去}	*kin _上	*gyn _{陽平}	*koŋ _{陰平} ~ *koŋ _{陰去}	*k'i _{陰去}	*k'i _{陰去白} ~ *k'y _{陰去文}

Just as Xiāngxiāng and Shuāngfēng, the only exception of showing hardening but not in a division III rhyme is the character 決 *jué*, a division IV character. Characters with CCX *-y main vowel appear to have the tendency of not hardening but instead palatalize: 鋸 *jù*, 據 *jù*, 去 *qù*, 懼 *jù*, and 屈 *qū*. Only two characters with CCX *-y main vowel show hardening to dental stops: 居 *jū* and 句 *jù*. Behavior difference for CCX medial *-y- versus CCX main vowel *-y is not exceptionally strange, since glides and vowels work differently, and it is not uncommon for glides to induce palatalization but not vowels in the same language, such as the so-called “jotation” process from Early to Late Common Slavic (Padgett 2008). The more interesting thing here is why the two characters 居 *jū* and 句 *jù* show hardening to dental stops while the other characters with the same CCX final do not. The table below gives the characters mentioned above.

Table 78. Character readings of 居 *jū*, 句 *jù*, 鋸 *jù*, 據 *jù*, and 去 *qù* in Lóudǐ Lǎojiē and other Xiāng dialects.

	Hardening		No hardening		
Dialect	居 <i>jū</i>	句 <i>jù</i>	鋸 <i>jù</i>	據 <i>jù</i>	去 <i>qù</i>
XX	ty _{陰平}	ty _{陰去}	ty _{陰去文} ~ ka _{陰去白}	ty _{陰去}	t'y _{次陰去文} ~ k'i _{次陰去白}
SF	ty _{陰平}	ty _{陰去}	ty _{陰去文} ~ ka _{陰去白}	ty _{陰去}	t'y _{陰去文} ~ te'i _{陰去白} ~ k'i _{陰去}
LD-a	ty _{陰平}	ty _{陰去}	tey _{陰去文} ~ ke _{陰去白}	tey _{陰去}	te'y _{陰去文} ~ te'i _{陰去白}
LD-b	ty _{陰平}	ty _{陰去}	ty _{陰去文} ~ ke _{陰去白} “a saw; to saw” ~ ka _{陰去} “saw(dust)”	ty _{陰去}	t'y _{陰去文} ~ te'i _{陰去白}
LY	ty _{陰平}	ty _{陰去}	ty _{陰去} ~ ki _{陰去白} “a saw” ~ ka _{陰去} “to saw”	ty _{陰去}	t'y _{陰去文} ~ te'i _{陰去白}
AH	--	tey _{陰去}	kə _{陰去文} ~ kai _{陰去白}	--	te'y _{次陰去文} ~ te'i _{次陰去白}
HT-a	--	tey _{陰去}	kɤ _{陰去}	--	k'y _{陰去}
MC	遇開三平魚見	遇合三去遇見	遇開三去御見	遇開三去魚見	遇開三去語溪
CNR					
QYS	kjwo _平	kju _去	kjwo _去	kjwo _去	khjwo _去

CDC	*kie ¹ (~ *kiu ¹)	*kiu ⁵	*kie ⁵ (~ *kiu ⁵)	*kie (~ *kiu)	*khie ⁵ (~ *khiu)
CCX	*ky ^{陰平}	*ky ^{陰去}	*ky ^{陰去文} ~ *kə ^{陰去白} ~ *kai ^{陰去白} ~ *ka ^{陰去白}	*ky ^{陰去}	*k'i ^{陰去白} ~ *k'y ^{陰去文}

The reading of 櫃 *guì* ‘closet, cupboard’ is especially interesting here, where it has a voiced velar fricative. Another exception is 輕 *qīng* ‘light, soft’, where Coblin reconstructs a *-iəŋ final for the vernacular form, but the hardening could also have come from the literary reading. The character 決 *jué*, being a division IV character, also hardened. The two characters 茄 *qié* ‘a kind of plant’ and 卻 *què* ‘step back, decline’ have palatalized in Lóudǐ Lǎojiē, showing no hardening. The characters 窮 *qióng* ‘poverty’ and 喫 *chī* ‘to eat’, which have the same CCX finals to 茄 *qié* and 卻 *què*, have also palatalized. For the division III characters that do not harden, they remain as velar stops or palatalize before high front medial or vowel. The two tables below show the characters discussed here.

Table 79. Character readings of 懼 *jù*, 屈 *qū*, 櫃 *guì*, and 輕 *qīng* in Lóudǐ Lǎojiē and other Xiāng dialects.

Dialect	懼 <i>jù</i>	屈 <i>qū</i>	櫃 <i>guì</i>	輕 <i>qīng</i>
XX	--	t'y ^{陽平}	gui ^{陽去文} ~ dy ^{陽去白}	k'in ^{陰平文} ~ k'io ^{陰平白}
SF	dy ^{陽去}	t'y ^{陽平}	gui ^{陽去文} ~ dy ^{陽去白}	te'ien ^{陰平文} ~ te'ioŋ ^{陰平白}
LD-a	dzy ^{陽去}	te'y ^{陽平}	yui ^{陽去}	t'in ^{陰平}
LD-b	--	t'y ^{陰平}	yui ^{陽去}	t'en ^{陰平文} ~ t'o ^{陰平白}
LY	ty ^{陽去}	t'y ^{陰平}	kui ^{陽去}	t'en ^{陰平文} ~ t'o ^{陰平白}
AH	--	--	kui ^{陽去}	te'in ^{陰平文} ~ te'iaŋ ^{陰平白}
HT-a	--	--	kuei ^{陽去}	te'in ^{陰平}
MC	遇合三去遇羣	臻合三入物溪	止合三去至 B 羣	梗開三平清 A 溪
CNR			O	
QYS	gju ^去	khjuət ^入	gjwi ^去	khjäŋ ^平
CDC	*giu ⁶	*khiut ⁷	*gui ⁵	*khiang ¹
CCX	*gy ^{陽去}	*k'y ^入	*gy ^{陽去白} ~ yui ^{陽去} ~ gui ^{陽去文}	*k'ioŋ ^{陰平白} ~ k'in ^{陰平文}

Table 80. Character readings of 決 *jué*, 茄 *qié*, 卻 *què*, 窮 *qióng*, and 喫 *chī* in Lóudǐ Lǎojiē and other Xiāng dialects.

Dialect	決 <i>jué</i>	茄 <i>qié</i>	卻 <i>què</i>	窮 <i>qióng</i>	喫 <i>chī</i>
XX	tua <small>次陽平</small>	t'o <small>陽平</small>	t'o <small>陽平</small>	gin <small>陽平</small>	k'i <small>陽平文</small> ~ k'io <small>陽平白</small>
SF	tue <small>陽平文</small> ~ tua <small>陽平白</small>	do <small>陽平</small>	t'o <small>陽平</small>	dzien <small>陽平</small>	te'i <small>陽平文</small> ~ te'io <small>陽平白</small>
LD-a	tue <small>陽平</small>	dzio <small>陽平</small>	te'io <small>陽平</small>	dzivŋ <small>陽平</small>	te'i <small>陽平</small>
LD-b	tue <small>陽平</small>	t'o <small>陽平</small>	t'o <small>陽平</small>	t'aŋ <small>陽平</small>	t'o <small>陽平</small>
LY	--	t'o <small>陰平文</small> ~ t'o <small>陽平</small>	t'o <small>陰去</small>	t'aŋ <small>陽平</small>	te'i <small>入文</small> ~ t'o <small>入白</small>
AH	teye <small>陰去</small>	--	te'io <small>次陰去</small>	tein <small>陽平</small>	te'i <small>次陰去文</small> ~ te'ia <small>陰去白</small>
HT-a	teye <small>上</small>	--	te'io <small>上</small>	te'ioŋ <small>陽平</small>	te'i <small>上</small>
MC	山合四入屬見	果開三平戈羣	宕開三入藥見	通開三平東羣	臻開三入迄見
CN rhyme					
QYS	kiwet <small>入</small>	gja <small>平</small>	khjak <small>入</small>	gjung <small>平</small>	(khjət [^]), khiek <small>入</small>
CDC	*kiot ⁷	*gio ²	*khiok ⁷	*giung ²	*khiak ⁷
CCX	*kya <small>入白</small> ~ *kye <small>入文</small>	*gin <small>陽平</small>	*k'io <small>入</small> ~ *k'io <small>陰去</small>	*gion <small>陽平</small> (~ *giuŋ <small>陽平</small>)	*k'io <small>入白</small> ~ *k'i <small>入文</small>

Lóudǐ Jiāolóngcūn also shows Type II hardening in some division III where division III 見 *jiàn* group initial characters. The condition appears to be CCX *-y medial or main vowel, and some characters with CCX finals with medial or main vowel *-i, namely *-io, *-in, *-ioŋ, and *-iaŋ. The 見 *jiàn*, 溪 *xī*, and 群 *qún* initials correspond to retroflex stops ʈ-, ʈ^h- and ʈ^h- in these cases. The division III characters without a CCX *-i or *-y medial generally do not harden. The CCX finals *-i, *-ien, and *-iəu also do not show hardening. The initials that do not show hardening are read as velar stops k- and k^h-, or alveolo-palatal affricates tɕ- and tɕ^h- before high front vowels. The table below gives examples of division III 見 *jiàn* group initial characters that show hardening and those that do not.

Table 81. Examples of division III 見 *jiàn* group initial characters that show hardening and those that do not in Lóudǐ Jiāolóngcūn.

	Hardening			No hardening		
Dialect	句 <i>jù</i>	曲 <i>qǔ</i>	裙 <i>qún</i>	九 <i>jiǔ</i>	氣 <i>qì</i>	恐 <i>kǒng</i>
XX	ty <small>陰去</small>	k'iei <small>陽平</small>	du _{AN} <small>陽平</small>	kiei <small>上</small>	k'i <small>次陰去</small>	k'ʌn <small>上</small>

SF	ty ^{陰去}	te'io ^{陽平}	duan ^{陽平}	teio ^上	te'i ^{陰去}	k'an ^上
LD-a	ty ^{陰去}	te'io ^{陽平}	ɖun ^{陽平}	teio ^上	te'i ^{陰去}	k'ɲŋ ^上
LD-b	ty ^{陰去}	t'io ^{陽平}	t'uən ^{陽平}	teio ^上	te'i ^{陰去}	k'aŋ ^上
LY	ty ^{陰去}	t'au ^入	kuən ^{陽平}	tɕau ^上	te'i ^{陰去}	k'aŋ ^上
AH	tey ^{陰去}	te'iau ^{次陰去}	teyn ^{陽平}	teiau ^上	te'i ^{次陰去}	k'ən ^上
HT-a	tey ^{陰去}	te'iau ^上	teyn ^{陽平}	teiau ^上	te'i ^{陰去}	k'oŋ ^上
	遇合三去遇見	通開三入燭溪	臻合三平文群	流開三上有見	止開三去未溪	通開三上腫溪
CNR						
MC	kju ^去	khjwok ^入	gjuən ^平	kjəu ^上	khjei ^去	khjwong ^上
CDC	*kiu ⁵	*khiuk ⁷	*giun ²	*kieu ³	*khi ⁵	*khung ³
CCX	*ky ^{陰去}	*k'iau ^入	*gyn ^{陽平}	*kia ^上	*k'i ^{陰去}	*k'oŋ ^上

Again, 決 *jué* is the only character that show hardening without being in a division III rhyme. The characters with *-y final that do not harden but palatalize instead in Lóudǐ Lǎojiē, namely 鋸 *jù*, 據 *jù*, 去 *qù*, 俱 *jù*, 矩 *jǔ*, and 屈 *qū*, show hardening in Lóudǐ Jiāolóngcūn. One exception is 傾 *qīng*, where it has a CCX *-yn final but does not show hardening. It remains a velar stop instead. The reading of the 櫃 *guì* is a voiced velar fricative, the same as in Lóudǐ Lǎojiē. The following table gives examples of some of the characters with the CCX final *-y, and the characters 傾 *qīng* and 櫃 *guì*.

Table 82. Examples of CCX *-y final characters 居 *jū*, 鋸 *jù*, and 據 *jù*, and the characters 傾 *qīng* and 櫃 *guì* in Lóudǐ Jiāolóngcūn and other Xiāng dialects.

Dialect	居 <i>jū</i>	鋸 <i>jù</i>	據 <i>jù</i>	傾 <i>qīng</i>	櫃 <i>guì</i>
XX	ty ^{陰平}	ty ^{陰去文} ~ ka ^{陰去白}	ty ^{陰去}	t'uən ^{陰去}	gui ^{陽去文} ~ dy ^{陽去白}
SF	ty ^{陰平}	ty ^{陰去文} ~ ka ^{陰去白}	ty ^{陰去}	t'uan ^{陰去}	gui ^{陽去文} ~ dy ^{陽去白}
LD-a	ty ^{陰平}	tey ^{陰去文} ~ ke ^{陰去白}	tey ^{陰去}	t'un ^{陰去}	yui ^{陽去}
LD-b	ty ^{陰平}	ty ^{陰去文} ~ ke ^{陰去白} “a saw; to saw” ~ ka ^{陰去} “saw(dust)”	ty ^{陰去}	k'uen ^{陰平文} ~ k'o ^{陰平白}	yui ^{陽去}
LY	ty ^{陰平}	ty ^{陰去} ~ ki ^{陰去白} “a saw” ~ ka ^{陰去白} “to saw”	ty ^{陰去}	k'uən ^{陰平}	kui ^{陽去}
AH	--	kə ^{陰去文} ~ kai ^{陰去白}	--	te'yn ^{陰平}	kui ^{陽去}

HT-a	--	ky ^{陰去}	--	te'in ^上	kuai ^{陽去}
MC	遇開三平魚見	遇開三去御見	遇開三去魚見	梗合三平清 A 溪	止合三去至 B 羣
CNR					O
QYS	kjwo ^平	kjwo ^去	kjwo ^去	khjwäng ^平 , khjäng ^平	gjwi ^去
CDC	*kie ¹ (~ *kiu ¹)	*kie ⁵ (~ *kiu ⁵)	*kie (~ *kiu)	*khing ¹ ~ khiung ¹	*gui ⁵
CCX	*ky ^{陰平}	*ky ^{陰去文} ~ *kə ^{陰去白} ~ *kai ^{陰去白} ~ *ka ^{陰去白}	*ky ^{陰去}	*k'yn ^{陰平} (~ k'in ?)	*gy ^{陽去白} ~ yui ^{陽去} ~ gui ^{陽去文}

As previously mentioned, CCX final *-iəu generally does not cause hardening. The characters with this final show palatalized alveolo-palatal affricates instead of retroflex stops or the original velar stops. For instance, 九 *jiǔ* and 求 *qiú*. There is, however, one exception 曲 *qǔ*. Note that 曲 *qǔ* is a 通 *tōng shè* character, while the other characters with a CCX final *-iəu are all 流 *liú shè* characters. The following table gives the readings of these characters with CCX final *-iəu.

Table 83. Comparison of CCX final *-iəu character readings in Lóudǐ Jiāolóngcūn.

Dialect	曲 <i>qū</i>	久 <i>jiǔ</i>	九 <i>jiǔ</i>	救 <i>jiù</i>	求 <i>qiú</i>
XX	k'iei ^{陽平}	kiei ^上	kiei ^上	kiei ^{陰去}	giei ^{陽平}
SF	te'io ^{陽平}	teio ^上	teio ^上	teio ^{陰去}	dzio ^{陽平}
LD-a	te'io ^{陽平}	teio ^上	teio ^上	teio ^{陰去}	dzio ^{陽平}
LD-b	t'ɔ ^{陽平}	teio ^上	teio ^上	teio ^{陰去}	te'io ^{陽平}
LY	t'au ^入	t'au ^上	t'au ^上	t'au ^{陰去}	t'au ^{陽平}
AH	te'iəu ^{次陰去}	teio ^上	teio ^上	teio ^{陰去}	teio ^{陽平}
HT-a	te'iəu ^上	teio ^上	teio ^上	teio ^{陰去}	teio ^{陽平}
MC	通開三入燭溪	流開三上有見	流開三上有見	流開三去有見	流開三平尤羣
CNR				O	
QYS	khjwok ^入	kjəu ^上	kjəu ^上	kjəu ^去	gjəu ^平
CDC	*khiuk ⁷	*kieu ³	*kieu ³	*kieu ⁵	*gieu ²
CCX	*k'iəu ^入	*kieu ^上	*kieu ^上	*kieu ^{陰去}	*gieu ^{陽平}

Another interesting final is CCX *-oŋ. There are only two characters with this final, 供 *gōng* and 恐 *kǒng*. Both characters are division III characters, but readings in all Xiāng dialects lack a high

front medial, and Coblin has reconstructed the two characters with just a back vowel without a high front medial. 供 *gōng* shows Type II hardening to a retroflex stop, while 恐 *kǒng* does not and remains a velar stop. The reason for this is unclear. Further studies such as more data on other characters with the same final will be needed to see a clearer pattern and make a better explanation. The table below gives the comparison of the two characters.

Table 84. Comparison of the two characters 供 *gōng* and 恐 *kǒng* with the CCX final *-oŋ in Lóudǐ Jiāolóngcūn.

Dialect	供 <i>gōng</i>	恐 <i>kǒng</i>
XX	kʌn ^{陰去}	k'ʌn ^上
SF	kan ^{陰去} ~ kan ^{陰平}	k'an ^上
LD-a	kʌŋ ^{陰去}	k'ʌŋ ^上
LD-b	ʔaŋ ^{陰去}	k'aŋ ^上
LY	kʌŋ ^{陰平}	k'aŋ ^上
AH	kən ^{陰平}	k'ən ^上
HT-a	koŋ ^{陰平}	k'oŋ ^上
MC	通開三平鍾見	通開三上腫溪
CNR		
QYS	kjwong ^平	khjwong ^上
CDC	*kiung ¹	*khung ³
CCX	*koŋ ^{陰平} ~ *koŋ ^{陰去}	*k'oŋ ^上

A few other characters that are worth mentioning are 茄 *qié*, 喫 *chī*, 窮 *qióng*, 卻 *què*, 強 *qiáng*, and 輕 *qīng*. These characters all show hardening. They have the CCX finals *-io, *-io, *-ioŋ, *-io, *-iaŋ, and *-ioŋ respectively. A possible condition that can be drawn from these characters is a CCX medial *-i plus a mid or low back or rounded vowel. This generalization is problematic, however, because of the CCX final *-in, which also cause hardening but does not have a following mid or low back or rounded element after CCX *-i. In the case of 輕 *qīng*, it could also be the CCX final *-in of the literary reading causing the hardening, although in the case of Lóudǐ

Jiāolóngcūn here both the literary and vernacular readings show hardening. The mentioned characters are given in the table below, with a character with CCX final *-in, 緊 *jǐn*, for comparison.

Table 85. Character readings of 茄 *qié*, 喫 *chī*, 窮 *qióng*, 卻 *què*, and 強 *qiáng* in Lóudǐ Jiāolóngcūn. 輕 *qīng* is given as a comparison.

Dialect	茄 <i>qié</i>	喫 <i>chī</i>	窮 <i>qióng</i>	卻 <i>què</i>	強 <i>qiáng</i>	輕 <i>qīng</i>	緊 <i>jǐn</i>
XX	t'o ^{陽平}	k'i ^{陽平文} ~ k'io ^{陽平白}	gin ^{陽平}	t'o ^{陽平}	giaŋ ^{陽平}	k'in ^{陰平文} ~ k'io ^{陰平白}	kin ^上
SF	do ^{陽平}	te'i ^{陽平文} ~ te'io ^{陽平白}	dziɛŋ ^{陽平}	t'o ^{陽平}	dziŋŋ ^{陽平}	te'ien ^{陰平文} ~ te'ioŋ ^{陰平白}	teien ^上
LD-a	dzio ^{陽平}	te'i ^{陽平}	dziŋŋ ^{陽平}	te'io ^{陽平}	dzɔŋ ^{陽平}	t'in ^{陰平}	tin ^上
LD-b	t'o ^{陽平}	t'o ^{陽平}	t'aŋ ^{陽平}	t'o ^{陽平}	t'oŋ ^{陽平}	t'en ^{陰平文} ~ t'o ^{陰平白}	ten ^上
LY	t'o ^{陰平文} ~ t'o ^{陽平}	te'i ^{入文} ~ t'o ^{入白}	t'aŋ ^{陽平}	t'o ^{陰去}	toŋ ^{陽平}	t'en ^{陰平文} ~ t'o ^{陰平白}	ten ^上
AH	--	te'i ^{次陰去文} ~ te'ia ^{陰去白}	tein ^{陽平}	te'io ^{次陰去}	teiaŋ ^{陽平}	te'in ^{陰平文} ~ te'iaŋ ^{陰平白}	tein ^上
HT-a	--	te'i ^上	te'ioŋ ^{陽平}	te'io ^上	teiaŋ ^{陽平}	te'in ^{陰平}	tein ^上
MC	果開三平戈羣	臻開三入迄見	通開三平東群	宕開三入藥見	宕開三平陽群	梗開三平清 A 溪	臻開三上軫 A 見
CNR							
QYS	gja ^平	(khjət ^入), khiek ^入	gjuŋ ^平	khjak ^入	gjaŋ ^平	khjäŋ ^平	kjien ^上
CDC	*gio ²	*khiak ⁷	*giuŋ ²	*khiok ⁷	*giong ²	*khiang ¹	*kin ³
CCX	*gio ^{陽平}	*k'io ^{入白} ~ *k'i ^{入文}	*gioŋ ^{陽平} (~ *giuŋ ^{陽平})	*k'io ^入 ~ *k'io ^{陰去}	*giaŋ ^{陽平}	*k'ioŋ ^{陰平白} ~ k'in ^{陰平文}	*kin ^上

Liányuán has similar conditions of hardening to Lóudǐ Lǎojiē and Lóudǐ Jiāolóngcūn. The division III rhymes with CCX *-y medial or main vowel show Type II hardening, except the final *-yn. The 見 *jiàn*, 溪 *xī*, and 群 *qún* initials correspond to retroflex stops t-, t^h-, and t- in these cases. Similar to Lóudǐ Jiāolóngcūn, some of the CCX finals with medial or main vowel *-i also show hardening. The CCX finals that never show hardening are *-oŋ, *-ui, *-uaŋ, *-i, *-ien, and *-yn. The characters that do not show hardening are read as velar stop initials k-, k^h-, or palatalize to alveolo-palatal affricates tɕ-, tɕ^h- before high front vowels. The table below gives some examples of characters that show hardening and those that do not in Liányuán.

Table 86. Examples of division III 見 *jiàn* group initial characters that show hardening and those that do not in Liányuán.

	Hardening			No hardening		
Dialect	句 <i>jù</i>	曲 <i>qǔ</i>	緊 <i>jǐn</i>	裙 <i>qún</i>	氣 <i>qì</i>	恐 <i>kǒng</i>
XX	ty ^{陰去}	k'iei ^{陽平}	kin ^上	ɖu Λn ^{陽平}	k'i ^{次陰去}	k'Λn ^上
SF	ty ^{陰去}	te'io ^{陽平}	teieŋ ^上	ɖuan ^{陽平}	te'i ^{陰去}	k'an ^上
LD-a	ty ^{陰去}	te'io ^{陽平}	tin ^上	ɖun ^{陽平}	te'i ^{陰去}	k'ɤŋ ^上
LD-b	ty ^{陰去}	t'io ^{陽平}	ten ^上	t'uən ^{陽平}	te'i ^{陰去}	k'aŋ ^上
LY	ty ^{陰去}	t'au ^入	ten ^上	kuən ^{陽平}	te'i ^{陰去}	k'aŋ ^上
AH	tey ^{陰去}	te'io ^{次陰去}	tein ^上	teyn ^{陽平}	te'i ^{次陰去}	k'ən ^上
HT-a	tey ^{陰去}	te'io ^上	tein ^上	teyn ^{陽平}	te'i ^{陰去}	k'oŋ ^上
	遇合三去遇見	通開三入燭溪	臻開三上軫 A 見	臻合三平文群	止開三去未溪	通開三上腫溪
CNR						
MC	kju ^去	khjwok ^入	kjien ^上	gjuən ^平	khjei ^去	khjwong ^上
CDC	*kiu ⁵	*khiuk ⁷	*kin ³	*giun ²	*khi ⁵	*khung ³
CCX	*ky ^{陰去}	*k'io ^入	*kin ^上	*gyn ^{陽平}	*k'i ^{陰去}	*k'oŋ ^上

Again, the character 決 *jué* shows hardening without being in the division III rhyme group.

Another character that show hardening but is not a division III character is 𠵹 *kōu*. This character is a division I character, with the CCX final *-eu. The literary reading shows a velar stop initial, while the vernacular has a retroflex stop. The readings of the two characters are given in Table 87.

Same as in Lóudí Jiāolóngcūn, the characters with CCX final *-y all show hardening, in addition to the characters with *-y- medial, such as the character 居 *jū*. Liányuán is, however, different to the previously discussed dialects in that the characters with a CCX *-yn final do not show hardening. Rather, they remain as velar stops. For instance, the character 君 *jūn*. The previously discussed character 傾 *qīng* also fits the pattern of having a *-yn final and also does not show hardening in Liányuán. A comparison of the character readings of these CCX finals are given in the table below.

Table 87. Character readings of 決 *jué* and 口 *kǒu*, and 居 *jū*, 君 *jūn*, and 傾 *qīng* in Liányuán.

Dialect	決 <i>jué</i>	口 <i>kǒu</i>	居 <i>jū</i>	君 <i>jūn</i>	傾 <i>qīng</i>
XX	tua ^{次陽平}	k'ai ^上	ty ^{陰平}	tuΛn ^{陰平}	t'uΛn ^{陰去}
SF	tue ^{陽平文} ~ tua ^{陽平白}	k'e ^{上文} ~ te'ie ^{上白}	ty ^{陰平}	tuan ^{陰平}	t'uan ^{陰平}
LD-a	tue ^{陽平}	k'ɿ ^上	ty ^{陰平}	tun ^{陰平}	t'un ^{陰平}
LD-b	tue ^{陽平}	k'ɿ ^上	ty ^{陰平}	tuen ^{陰平}	k'uen ^{陰平文} ~ k'o ^{陰平白}
LY	--	k'ə ^{上文} ~ t'ə ^{上白}	ty ^{陰平}	kuən ^{陰平}	k'uən ^{陰平}
AH	teye ^{陰去}	k'əu ^{上文} ~ te'io ^{上白}	--	teyn ^{陰平}	te'yn ^{陰平}
HT-a	teye ^上	te'iau ^{上文} ~ k'iau ^{上白}	--	teyn ^{陰平}	te'in ^上
MC	山合四入屑見	流開一上厚溪	遇開三平魚見	臻合三平文見	梗合三平清A溪
CN rhyme					
QYS	kiwet ^入	khəu ^上	kjwo ^平	kjuən ^平	khjwäng ^平 , khjäng ^平
CDC	*kiot ⁷	*kheu ³	*kie ¹ (~ *kiu ¹)	*kiun ¹	*khing ¹ ~ khiung ¹
CCX	*kya ^{入白} ~ *kye ^{入文}	*k'eu ^{上白} ~ *k'əu ^{上文}	*ky ^{陰平}	*kyn ^{陰平}	*k'yn ^{陰平} (~ k'in [?])

In the cases of the characters that have an *-i- medial plus some other elements, the CCX finals *-iəu (e.g. 九 *jiǔ*), *-iəŋ (e.g. 窮 *qióng*), *-in (e.g. 緊 *jǐn*), *-iə (e.g. 茄 *qié*), *-io (e.g. 卻 *què*), *-ian (e.g. 強 *qiáng*), and *-iəŋ (e.g. 輕 *qīng*) show hardening. A condition same as Lóudǐ Jiāolóngcūn can be generalized here, which is a CCX *-i plus some mid or low back element. Here the exceptions would be the finals *-iəu and *-in. The previously mentioned division I character that shows hardening, 口 *kǒu*, is a 流 *liú shè* character with the CCX final *-eu. The division III 流 *liú shè* characters, with the CCX final *-iəu, all show hardening. 口 *kǒu* showing hardening might be related to the other 流 *liú shè* characters. Readings of the characters mentioned above are given in the following table.

Table 88. Character readings of 九 *jiǔ*, 口 *kǒu*, 窮 *qióng*, 緊 *jǐn*, 茄 *qié*, 卻 *què*, 強 *qiáng*, and 輕 *qīng* in Liányuán and other Xiāng dialects.

Dialect	九 <i>jiǔ</i>	口 <i>kǒu</i>	窮 <i>qióng</i>	緊 <i>jǐn</i>	茄 <i>qié</i>	卻 <i>què</i>	強 <i>qiáng</i>	輕 <i>qīng</i>
XX	kiei ^上	k'ai ^上	gin ^{陽平}	kin ^上	t'o ^{陽平}	t'o ^{陽平}	gian ^{陽平}	k'in ^{陰平文} ~ k'io ^{陰平白}

SF	teio ^上	k'e ^{上文} ~ te'ie ^{上白}	dziɛn ^{陽平}	teien ^上	do ^{陽平}	t'o ^{陽平}	dziŋɣ ^{陽平}	te'ien ^{陰平文} ~ te'ioŋ ^{陰平白}
LD-a	teio ^上	k'ɣ ^上	dziŋɣ ^{陽平}	tin ^上	dzio ^{陽平}	te'io ^{陽平}	dzoŋ ^{陽平}	t'in ^{陰平}
LD-b	teio ^上	k'ɣ ^上	t'aŋ ^{陽平}	ten ^上	t'o ^{陽平}	t'ɔ ^{陽平}	t'oŋ ^{陽平}	t'en ^{陰平文} ~ t'o ^{陰平白}
LY	t'au ^上	k'ə ^{上文} ~ t'ə ^{上白}	t'aŋ ^{陽平}	ten ^上	t'o ^{陰平文} ~ t'o ^{陽平}	t'o ^{陰去}	toŋ ^{陽平}	t'en ^{陰平文} ~ t'o ^{陰平白}
AH	teiou ^上	k'əu ^{上文} ~ te'io ^{上白}	tein ^{陽平}	tein ^上	--	te'io ^{次陰去}	teiaŋ ^{陽平}	te'in ^{陰平文} ~ te'iaŋ ^{陰平白}
HT-a	teiou ^上	te'iau ^{上文} ~ k'iau ^{上白}	te'ioŋ ^{陽平}	tein ^上	--	te'io ^上	teiaŋ ^{陽平}	te'in ^{陰平}
MC	流開三上 有見	流開一上厚 溪	通開三平 東群	臻開三上 軫 A 見	果開三平 戈羣	宕開三入 藥見	宕開三平 陽群	梗開三平清 A 溪
CNR				O				
QYS	kjəu ^上	khəu ^上	gjuŋ ^平	kjien ^上	gja ^平	khjak ^入	gjaŋ ^平	khjäŋ ^平
CDC	*kieu ³	*kheu ³	*giuŋ ²	*kin ³	*gio ²	*khiok ⁷	*giong ²	*khiang ¹
CCX	*kiəu ^上	*k'əu ^{上白} ~ *k'əu ^{上文}	*giəŋ ^{陽平} (~ *giuŋ ^{陽平})	*kin ^上	*giə ^{陽平}	*k'io ^入 ~ *k'io ^{陰去}	*giaŋ ^{陽平}	*k'ioŋ ^{陰平白} ~ k'in ^{陰平文}

It is worth mentioning that the situation in Liányuán might be a bit more complicated than the other dialects. Since it has velarization, we cannot rule out the possibility that some of the velar stops we see in 見 *jiàn* group characters might actually have become something else first and then gone through the velarization route to come back to a velar stop again, rather than staying a velar stop as before. At present it is rather difficult to tell the two possibilities apart.

Ānhuà and Huìtóng Línchéng do not show Type II hardening at all. The 見 *jiàn* group characters in these two dialects are read as k-, k^h-, or alveolo-palatal affricates tɕ-, tɕ^h- before high front vowels. The following table shows some examples of 見 *jiàn* group characters in these two dialects.

Table 89. Examples of division III 見 *jiàn* group initial character readings in Ānhuà and Huìtóng Línchéng.

Dialect	句 <i>jù</i>	鋸 <i>jù</i>	緊 <i>jǐn</i>	裙 <i>qún</i>	氣 <i>qì</i>	恐 <i>kǒng</i>
XX	tɣ ^{陰去}	tɣ ^{陰去文} ~ ka ^{陰去白}	kin ^上	duan ^{陽平}	k'i ^{次陰去}	k'an ^上
SF	tɣ ^{陰去}	tɣ ^{陰去文} ~ ka ^{陰去白}	teien ^上	duan ^{陽平}	te'i ^{陰去}	k'an ^上
LD-a	tɣ ^{陰去}	tey ^{陰去文} ~ ke ^{陰去白}	tin ^上	dun ^{陽平}	te'i ^{陰去}	k'ɣŋ ^上

LD-b	tʰ ^{陰去}	tʰ ^{陰去文} ~ ke ^{陰去白} “a saw; to saw” ~ ka ^{陰去} “saw(dust)”	tʰ ^上 en	tʰ ^{陽平} uən	te ^{陰去} ’i	k’ ^上 aj
LY	tʰ ^{陰去}	tʰ ^{陰去} ~ ki ^{陰去白} “a saw” ~ ka ^{陰去白} “to saw”	tʰ ^上 en	kuən ^{陽平}	te ^{陰去} ’i	k’ ^上 aj
AH	tey ^{陰去}	kə ^{陰去文} ~ kai ^{陰去白}	te ^上 in	teyn ^{陽平}	te ^{次陰去} ’i	k’ ^上 ən
HT-a	tey ^{陰去}	kʰ ^{陰去}	te ^上 in	teyn ^{陽平}	te ^{陰去} ’i	k’ ^上 oŋ
MC	遇合三去遇見	遇開三去御見	臻開三上軫 A 見	臻合三平文群	止開三去未溪	通開三上腫溪
CNR						
QYS	kju ^去	kjwo ^去	kjien ^上	gjuən ^平	khjei ^去	khjwong ^上
CDC	*kiu ⁵	*kie ⁵ (~ *kiu ⁵)	*kin ³	*giun ²	*khi ⁵	*khung ³
CCX	*ky ^{陰去}	*ky ^{陰去文} ~ *kə ^{陰去白} ~ *kai ^{陰去白} ~ *ka ^{陰去白}	*kin ^上	*gyn ^{陽平}	*k’ ^{陰去} i	*k’ ^上 oŋ

In sum, Type II hardening is a phenomenon that occurs in the Xiāng dialects Xiāngxiāng, Shuāngfēng, Lóudǐ Lǎojiē, Lóudǐ Jiāolóngcūn, and Liányuán. Type II hardening is not found in the dialects Ānhuà and Huìtóng, which have Type I hardening. Type II hardening affects the Middle Chinese 見 *jiàn*, 溪 *xī*, and 群 *qún* initials in the division III rhymes of these dialects, giving the results of dental or retroflex stops. One exception is 決 *jué* ‘to break, to determine’, which despite being a division IV character, shows hardening in all these dialects, except in Liányuán due to lack of data. A few generalizations can be made for the Type II hardening conditions in the Central Xiāng dialects:

- (1) The CCX finals that generally induce Type II hardening are: *-y, *-yn, *-yen, and *-ya (the division IV character 決 *jué*).
- (2) CCX finals that show hardening in some Central Xiāng dialects but not others:
 - a. *-io: shows hardening in Xiāngxiāng, Shuāngfēng, Lóudǐ Jiāolóngcūn, and Liányuán.

- b. *-io: shows hardening in Lóudǐ Jiāolóngcūn and Liányuán. The character 茄 *qié* with this CCX final also show hardening in Xiāngxiāng and Shuāngfēng, but not the character 喫 *chī*.
- c. *-in: shows hardening in Lóudǐ Lǎojiē, Lóudǐ Jiāolóngcūn, and Liányuán.
- d. *-ioŋ: shows hardening in Lóudǐ Lǎojiē, Lóudǐ Jiāolóngcūn, and Liányuán.
- e. *-iaŋ: shows hardening in Lóudǐ Lǎojiē and Liányuán.
- f. *-iəu: shows hardening in Liányuán, and also in Lóudǐ Jiāolóngcūn for the character 曲 *qǔ*, but not the other characters with the same final.

(3) Exceptions:

- a. CCX final *-yn does not show hardening in Liányuán. A character 傾 *qīng* with the same CCX final also does not show hardening in Lóudǐ Jiāolóngcūn, although the other characters with the same final do.
- b. CCX final *-y
- c. One character with the CCX final *-yen, 勸 *quàn*, does not show hardening in Liányuán.

From point (2) above, we can further generalize that a possible condition in addition to CCX medial or main vowel *-y is CCX *-i followed by some mid low mid back element, except the final *-in. This generalization is problematic in several aspects. First, it does not apply to all the Central Xiāng dialects that have Type II hardening. Second, some CCX finals may have characters that show hardening and the ones that do not in the same dialect. For example, 茄 *qié* with the CCX final *-io has hardening in Xiāngxiāng and Shuāngfēng, but in the same two dialects the

character 喫 *chī* that has the same CCX final do not show hardening. Not to mention the CCX final *-in does not fit into the picture of followed by a mid low mid back vowel.

The CCX final *-i that is reconstructed for the 止 *zhǐ shè* characters never show Type II hardening in the Central Xiāng dialects. But since CCX medial or main vowel *-i does not appear to be a general condition for all the Central Xiāng dialects, it is not viewed as an exception here.

The following table summarizes Type II hardening results, the CCX finals that show hardening and the ones that do not, and the initial readings that are not influenced by hardening in each Central Xiāng dialect. If a CCX final shows hardening in some characters but not in others in a given dialect, the characters in each case are listed out. CCX final *-ya (決 *jué*) is listed with the character written out as a reminder that 決 *jué* is the only character with this final that shows hardening. CCX final *-eu with the character 口 *kǒu* is also listed out for the same reason. The next table summarizes the general conditions and exceptions of Type II hardening in each dialect. Since the condition of CCX medial *-i plus something mid low mid back is problematic, I do not put it in the summary chart but only focus on the CCX medial or main vowel *-y.

Table 90. Type II hardening pattern in the Central Xiāng dialects. The second column to the left shows the respective division III 知 *zhī* group and 章 *zhāng* group hardened initials read in each dialect. The next column to the right shows CCX finals that cause hardening in each dialect. The second column to the right shows CCX finals that do not cause hardening in each dialect. The column to the right shows the readings of the division III 知 *zhī* group and 章 *zhāng* group that have not hardened.

	Hardening results	CCX finals that show hardening	CCX finals that do not show hardening	Initials that do not harden
XX	Dental stops t, t ^h , d	*-io, *-io̯ (茄 <i>qié</i>) *-y, *-yn, *-yen, *-ya (決 <i>jué</i> , Div. IV)	*-oŋ, *-ui, *-uaŋ *-io̯u, *-io̯ŋ, *-i, *-in, *-ien, *-io̯ (喫 <i>chī</i>), *-ie, *-iaŋ, *-io̯ŋ *-yɒ	Velar stops (k, k ^h , g)

SF	Dental stops t, t ^h , d	*-io, *-io̯ (茄 <i>qié</i>) *-y, *-yn, *-yen, *-ya (決 <i>jué</i> , Div. IV)	*-oŋ, *-ui, *-uaŋ *-iəu, *-ioŋ, *-i, *-in, *-ien, *-io̯ (喫 <i>chī</i>), *-ie, *-iaŋ, *-io̯ŋ	Velar stops (k, k ^h , g), or alveolo-palatals (tɛ, tɛ ^h , dz) before high front vowels
LD-a	Dental stops t, t ^h , d	*-in, *-io̯ŋ *-y (居 <i>jū</i> , 句 <i>jù</i>), *-yn, *-yen, *-ya (決 <i>jué</i> , Div. IV)	*-oŋ, *-ui, *-uaŋ *-iəu, *-ioŋ, *-i, *-in, *-ien, *-io̯, *-ie, *-iaŋ *-y (據 <i>jù</i> , 鉅 <i>jù</i> , 去 <i>qù</i> , 懼 <i>jù</i> , 屈 <i>qū</i> , all palatalized)	Dental affricates (ts, ts ^h , dz), or alveolo-palatals (tɛ, tɛ ^h , dz) before high front vowels
LD-b	Retroflex stops ʈ, ʈ ^h	*-oŋ (供 <i>gōng</i>) *-iəu (曲 <i>qū</i>), *-in, *- io̯, *-io̯ŋ, *-iaŋ *-y, *-yn (君 <i>jūn</i> , 裙 <i>qún</i> , 郡 <i>jùn</i>), *-yen, *- ya (決 <i>jué</i> , Div. IV), *- yɒ	*-oŋ (恐 <i>kǒng</i>), *-ui, *-uaŋ *-i, *-ien, *-iəu (久 <i>jiǔ</i> , 九 <i>jiǔ</i> , 救 <i>jiù</i> , 求 <i>qiú</i> , all palatalized) *-yn (傾 <i>qīng</i>)	Dental affricates (ts, ts ^h), or alveolo-palatal (tɛ, tɛ ^h) before high front vowels
LY	Retroflex stops ʈ, ʈ ^h	*-iəu, *-ioŋ, *-in, *-io̯, *-io, *-iaŋ, *-io̯ŋ *-y, *-yen (倦 <i>juàn</i> , 捲 <i>juǎn</i>), *-ya (決 <i>jué</i> , Div. IV), *-yɒ *-eu (口 <i>kǒu</i> , Div. I)	*-oŋ, *-ui, *-uaŋ *-i, *-ien *-yn, *-yen (勸 <i>quàn</i>)	Dental affricates (ts, ts ^h), or alveolo-palatal (tɛ, tɛ ^h) before high front vowels
AH	No hardening	--	--	Dental affricates (ts, ts ^h), or alveolo-palatal (tɛ, tɛ ^h) before high front vowels
HT-a	No hardening	--	--	Dental affricates (ts, ts ^h), or alveolo-palatal (tɛ, tɛ ^h) before high front vowels

Table 91. Generalized conditions and exceptions in each dialect for Type II hardening.

	Condition	Hardening exceptions
XX	CCX medial or main vowel *-y	--
SF	CCX medial or main vowel *-y	--
LD-a	CCX medial or main vowel *-y	1. Some CCX final *-y characters 據 <i>jù</i> , 鉅 <i>jù</i> , 去 <i>qù</i> , 懼 <i>jù</i> , 屈 <i>qū</i> , which all palatalized)
LD-b	CCX medial or main vowel *-y	--
LY	CCX medial or main vowel *-y	1. CCX final *-yn
AH	--	--
HT-a	--	--

3.3 VELARIZATION IN THE XIANG DIALECTS

In addition to the hardening to a dental stop found in the other Xiāng dialects, Liányuán shows a change of what Coblin calls velarization (Coblin 2011: 51-52, 212-213). Velarization occurs as a subtype of Type I hardening, i.e. also on the 知 *zhī* group division III and 章 *zhāng* group initials.

Most of these characters with these initials in the other Central Xiāng dialects show hardening, except for some special cases. For Liányuán, however, there are two possible turnouts for these initials. In addition to retroflex stops, in some characters Liányuán has velar stops instead. A possible condition found for Liányuán velarization is that the velarized characters all have their finals in *chóngniǔ* rhymes. To be more exact, *chóngniǔ* rhymes in 咸 *xián shè kāikǒu*, 山 *shān shè kāikǒu* and 蟹 *xiè shè kāikǒu*, 臻 *zhēn shè hékǒu*, and 止 *zhǐ shè hékǒu* have the initials turn into voiceless velar stops, either aspirated or unaspirated. On the other hand, *chóngniǔ* rhymes in 深 *shēn shè kāikǒu*, 效 *xiào shè kāikǒu*, and 臻 *zhēn shè kāikǒu* characters regularly do not have velarization but show hardening to a voiceless retroflex stop. The 止 *zhǐ shè kāikǒu* and 蟹 *xiè shè kāikǒu* characters that have some kind of high apical vowel never show either hardening or velarization, but turn out as aspirated or unaspirated voiceless dental affricate ts-, ts^h-, or palatalize to tɕ- before high front vowels²⁰. Two characters that are more interesting are 吹 *chuī* [k'ui^{陰平文} ~ t'y^{陰平白}] and 鍾 *chuí* [kui^{陽平文} ~ tɕ^{陽平白}], where the retroflex stop is marked as the vernacular form and the velar stop marked as literary instead. The following table shows some examples of characters that have velarization in Liányuán. The next table below summarizes the CCX finals that lead to different initial readings in Liányuán.

Table 92. Example characters that show velarization in Liányuán.

Dialect	沾 <i>zhān</i>	展 <i>zhǎn</i>	穿 <i>chuān</i>	眷, 蠢 <i>chún</i>	吹 <i>chuī</i>	鍾 <i>chuí</i>
XX	tʂ _l ^{陰平}	tʂ _l ^上	t'yī ^{陰平}	t'uən ^上	t'y ^{陰平}	dy ^{陽平}
SF	tī ^{陰平}	kī ^上	t'uī ^{陰平}	t'uan ^上	t'y ^{陰平}	dy ^{陽平}
LD-a	teī ^{陰平}	teī ^上	t'uī ^{陰平}	t'un ^上	ts'ui ^{陰平文} 平白 ~ tɕ'y ^陰	dzy ^{陽平}
LD-b	tei ^{陰平}	tei ^上	t'ui ^{陰平}	t'uen ^上	t'y ^{陰平}	t'y ^{陽平}
LY	ki ^{陰平}	ki ^上	k'ui ^{陰平}	k'uən ^上	k'ui ^{陰平文} 白 ~ t'y ^{陰平}	kui ^{陽平文} 平白 ~ tɕ ^陽

²⁰ Only one case of palatalization in 知 *zhī*. Not sure if there is aspirated alveopalatal.

AH	t̚ ^{陰平}	t̚ ^上	te'yē ^{陰平}	te'yn ^上	t'ei ^{陰平}	tei ^{陽平}
HT-a	tsan ^{陰平文} ~ ten ^{陰平白}	tan ^上	te'yen ^{陰平}	te'yn ^上	te'y ^{陰平}	tey ^{陽平}
MC	咸開三平鹽知	山開三上獮知	山合三平仙昌	臻合三上準昌	止合三平支昌	止合三平支澄
CNR	O	O	O	O	O	O
QYS	tjäm ^平	tjän ^上	tshjwän ^平	tshjuen ^上	tshjwe ^平	djwi ^平
CDC	*ciam ¹	*cian ³	*chion ¹	*chiun ³	*chui ¹	*jui ²
CCX	*t̚sien ^{陰平}	*t̚sien ^上	*t̚s'yen ^{陰平}	*t̚s'yn ^上	*t̚s'y ^{陰平白} ~ *t̚s'yi ^{陰平文}	*dzy ^{陽平白} ~ dzyi ^{陽平文}

Table 93. CCX finals that show Type I hardening, velarization, or neither in Liányuán when paired with 知 zhī group division III and 章 zhāng group initials.

CCX finals that show Type I hardening	CCX finals that show velarization	CCX finals that do not show Type I hardening or velarization
*-ioŋ, *-iəu, *-in, *-iau, *-iɒ, *-iaŋ, *-iɒŋ *-y *-ə (者 zhě)	*-ien *-yn, *-yen, *-yi	*-i (止 zhǐ shè)

In the Central Xiāng dialects Xiāngxiāng, Shuāngfēng, Lóudǐ Lǎojiē, Lóudǐ Jiāolóngcūn and Liányuán, some of the fricatives of 章 zhāng group initials turn out as velar fricatives [x] and/or [ɣ] under different conditions. I will call this phenomenon velarization of the fricatives for now, to make a distinction to velarization to velar stops in Liányuán.

In Xiāngxiāng, the initials of 船 chuán and 禪 shàn turn out as the voiced velar fricative [ɣ], except for the ones with a CCX final *-i, i.e. in 止 zhǐ shè or other rhymes in other shè, that have a modern following apical vowel. These are read with dz- or dz_ɿ- initials. The condition for reading as which one is uncertain. For the CCX finals that became apical vowels and with a QYS rù tone, these are pronounced with a retroflex fricative ʂ-. Under the condition of a high front medial or main vowel, the initials are palatalized to ɕ-. The character 善 shàn has a CCX final *-ien, but just as with MC division III 知 zhī group and 章 zhāng group affricate initials, the CCX final *-ien becomes an apical vowel, hence the initial follows the route of such and turn into a dz_ɿ-. The table below shows

some examples of characters that have velarization of fricatives in Xiāngxiāng. The next table below gives examples of characters that do not have velarization of fricatives.

Table 94. Example characters of velarization of fricatives in Xiāngxiāng.

Dialect	神 <i>shén</i>	順 <i>shùn</i>	純 <i>chún</i>	樹 <i>shù</i>	蛇 <i>shé</i>	壽 <i>shòu</i>
XX	ɿiʌn ^{陽平}	ɿyʌn ^{陽去}	ɿyʌn ^{陽平}	ɿy ^{陽去}	ɿio ^{陽平}	ɿiei ^{陽去}
SF	ɿiɛn ^{陽平}	ɿyɛn ^{陽去}	ɿyɛn ^{陽平}	ɿy ^{陽去}	ɿio ^{陽平}	ɿio ^{陽去}
LD-a	zin ^{陽平}	yun ^{陽去}	yun ^{陽平}	zy ^{陽去}	zio ^{陽平}	zio ^{陽去}
LD-b	eien ^{陽平}	yuen ^{陽去}	yuen ^{陽平}	ey ^{陽去}	eiō ^{陽平}	eiō ^{陽去}
LY	ʂen ^{陽平}	xuən ^{陽去}	--	ey ^{陽去}	ʂo ^{陽平}	ʂau ^{陽去}
AH	lən ^{陽平}	eyn ^{陰去文 ~ yn^{陽去白}}	yn ^{陽平}	y ^{陽去}	la ^{陽平}	səu ^{陰去文 ~ ləu^{陽去白}}
HT-a	sen ^{陽平}	eyn ^{陽去}	eyn ^{陽平}	ey ^{陽去}	sa ^{陽平}	səu ^{陽去}
MC	臻開三平眞船	臻合三去稫船	臻合三平諄常	遇合三上慶常	假開三平麻船	流開三去宥常
CNR	O	O	O			
QYS	dźjen ^平	dźjuen ^去	źjuen ^平	źju ^上 “tree”	dźja ^平	źjəu ^上 , źjəu ^去
CDC	*zhin ²	*zhiun ⁶	*zhiun ² ~ *jiun ²	*zhiu ⁶	*zhia ²	*zhiəu ⁶
CCX	*ɿin ^{陽平}	*ɿyn ^{陽去}	*ɿyn ^{陽平}	*ɿy ^{陽去}	*ɿio ^{陽平}	*ɿiəu ^{陽去}

Table 95. Examples of characters that do not show velarization of fricatives in Xiāngxiāng. 是 *shì* and 時 *shí* represent initial readings of CCX *-i final characters with a modern apical vowel reading, one has a dz- initial and the other one dẓ-. 十 *shí* is also a character with a CCX *-i final that turn into a modern apical vowel, but it has a QYS *rù* tone and therefore the initial is a ʂ-. 善 *shàn* has a CCX final *-ien, but the modern reading is an apical vowel final, hence the initial is the same as those with CCX final *-i. 熟 *shóu* and 睡 *shuì* represent initials with high front medial or main vowels that show palatalization to ɛ-.

Dialect	是 <i>shì</i>	時 <i>shí</i>	十 <i>shí</i>	善 <i>shàn</i>	熟 <i>shóu</i>	睡 <i>shuì</i>
XX	dzɿ ^{陽去}	dzɿ ^{陽平}	ʂɿ ^{陰去}	dzɿ ^{陽去}	ɛiei ^{陰去}	ɛyi ^{陰去}
SF	dzɿ ^{陽去}	dzɿ ^{陽平}	ʂɿ ^{陰去}	ɿi ^{陽去}	ɛio ^{陰去}	ɛy ^{陰去}
LD-a	dzɿ ^{陽去}	dzɿ ^{陽平}	ɛi ^{陰去}	ɿi ^{陽去}	ɛio ^{陰去}	ɛy ^{陰去}
LD-b	ts'ɿ ^{陽去}	ts'ɿ ^{陽平}	ɛi ^{陰去}	ɛi ^上	ɛio ^{陰去}	ɛy ^{陰去}
LY	sɿ ^{陽去}	sɿ ^{陽平}	ɛi ^{陰去}	xi ^{陽去}	ʂau ^{陰去}	xui ^{陰去}
AH	zɿ ^{陽去}	zɿ ^{陽平}	sɿ ^{陰去}	sə̃ ^{陽去}	səu ^{陰去}	sei ^{陰去}
HT-a	se ^{陽去}	se ^{陽平}	se ^{陰去}	sen ^{陽去}	səu ^上	sei ^{陰去}
MC	止開三上紙禪	止開三平之禪	深開三入緝禪	山開三上獮禪	通開三入屋禪	止合三去寘禪
CNR	O		O	O		O
QYS	źje ^上	źi ^平	źjəp ^入	źjǎn ^上 , źjǎn ^去	źjuk ^入	źjwe ^去
CDC	*shi ⁴	*zhi ²	*zhip ⁸	*zhian ⁶	*zhiuk ⁸	*zhu ⁶
CCX	*ɿi ^{陽上} ~ *ɿi ^{陽去}	*ɿi ^{陽平}	*ɿi ^{陰去}	*ɿien ^{陽去}	*ɿiəu ^{陰去}	*ɿy ^{陰去} ~ *ɿyi ^{陰去}

The 書 *shū* initial characters do not get velarized but stay as either the voiceless retroflex fricative [ʂ] or the voiceless alveolopalatal fricative [ç]. The following table gives examples of 書 *shū* initial characters.

Table 96. Examples of 書 *shū* initial readings in Xiāngxiāng.

Dialect	施 <i>shī</i>	室 <i>shì</i>	水 <i>shuǐ</i>	收 <i>shōu</i>
XX	ʂ _{陰平}	ʂ _{次陽平}	ey ^上	eiɛi _{陰平}
SF	ʂ _{陰平} ~ sɿ _{陰去}	ʂ _{陽平}	ey ^上	eiɔ _{陰平}
LD-a	sɿ _{陰平}	ei _{陰去}	ey ^上	eiɔ _{陰平}
LD-b	sɿ _{陰平}	ei _{陰去}	ey ^上	eiɔ _{陰平}
LY	sɿ _{陰平}	ei _{陰去}	ey ^上	ʂau _{陰平}
AH	--	sɿ _{陰去}	sei ^上	səu _{陰平}
HT-a	--	se ^上	ey ^上	səu _{陰平}
MC	止開三平支書	臻開三入質書	止合三上旨書	流開三平尤書
CNR	O	O	O	
QYS	ʂje ^平	ʂjet ^入	ʂwi ^上	ʂjəu ^平
CDC	*shi ¹	*shit ⁷	*shui ³	*shieu ¹
CCX	*ʂi _{陰平}	*ʂi ^入 ~ *ʂi _{陰去}	*ʂy ^{上白} ~ *ʂyi ^{上文}	*ʂiəu _{陰平}

Shuāngfēng also has the general trend of the MC voiced initials 船 *chuán* and 禪 *shàn* turn into a voiced velar fricative [ɣ]. There are, however, no characters with voiced velar fricatives found with 止 *zhǐ shè* rhymes. There is one interesting character 舌 *shé* [xe_{陰去文} ~ eiə_{陰去白}], which has a voiceless x- initial instead of a voiced ɣ- as the other MC 船 *chuán* and 禪 *shàn* initials. Another interesting thing to note here is that the reading with an x- initial is marked as the literary form, indicating that it may be a later loan word coming from an outside source. The table below gives examples of characters that show velarization of fricatives in Shuāngfēng.

Table 97. Example characters of velarization of fricatives in Shuāngfēng.

Dialect	神 <i>shén</i>	順 <i>shùn</i>	樹 <i>shù</i>	蛇 <i>shé</i>	壽 <i>shòu</i>	舌 <i>shé</i>
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XX	y ¹ i ¹ ɿ ¹ 陽平	yy ¹ ɿ ¹ 陽去	y ¹ y ¹ 陽去	y ¹ io 陽平	y ¹ iei 陽去	eia 陰去
SF	y ¹ i ¹ ɿ ¹ 陽平	yy ¹ ɿ ¹ 陽去	y ¹ y ¹ 陽去	y ¹ io 陽平	y ¹ i ¹ o 陽去	x ¹ e 陰去文 ~ eia 陰去白
LD-a	zin 陽平	yun 陽去	zy 陽去	zio 陽平	zi ¹ o 陽去	ei ¹ e 陰去
LD-b	eien 陽平	yuen 陽去	ey 陽去	ei ¹ o 陽平	ei ¹ o 陽去	se 陰去
LY	ʂen 陽平	xuən 陽去	ey 陽去	ʂo 陽平	ʂau 陽去	xi 陰去
AH	lən 陽平	eyn 陰去文 ~ yn 陽去白	y 陽去	la 陽平	səu 陰去文 ~ ləu 陽去白	sə 陰去
HT-a	sen 陽平	eyn 陽去	ey 陽去	sa 陽平	səu 陽去	se 陰去
MC	臻開三平眞船	臻合三去稗船	遇合三上禩禪	假開三平麻船	流開三去宥禪	山開三人薛船
CNR	O	O				O
QYS	dʒjen 平	dʒjuen 去	ʒju 上 “tree”	dʒja 平	ʒjəu 上, ʒjəu 去	dʒjət 入
CDC	*zhin ²	*zhiun ⁶	*zhiu ⁶	*zhia ²	*zhieu ⁶	*zhiat ⁸
CCX	*ʒin 陽平	*ʒyn 陽去	*ʒy 陽去	*ʒi ¹ o 陽平	*ʒi ¹ əu 陽去	*ʂie 陰去 ~ *ʂə 陰去

Under the condition of CCX final *-i, i.e. MC 止 *zhǐ shè* rhymes or other rhymes that have the same ending as 止 *zhǐ shè* rhymes, the initials turn out as a voiced dental affricate dz-, as in 是 *shì* [dz¹ 陽去], 示 *shì* [dz¹ 陽去], 視 *shì* [dz¹ 陽去], and 時 *shí* [dz¹ 陽平]. The 船 *chuán* and 禪 *shàn* initials with CCX final *-i and MC *rù* tone become ʂ-. Note that it is true that none of the Central Xiāng dialects preserve a *rù* tone consonant ending, although a few dialects may have *rù* tones preserved in certain characters. Coblin (2011: 2) has established the regular change of 陽入 *yáng rù* > 陰去 *yīn qù* for the MC voiced initials as a common innovation for the Central Xiāng dialects following Norman (2007). For the MC voiceless initials, Coblin reconstructs a *rù* tone category, which would correspond to MC 陰入 *yīn rù* tone, but without a consonant ending (2011: 192-206). In the case here as well as in some of the other Central Xiāng dialects that will be discussed later, it is quite clear that MC *rù* tone is the conditioning factor for the split in 船 *chuán* and 禪 *shàn* initial characters with CCX *-i finals. MC *rù* tone can also be the conditioning factor in 書 *shū* initial characters. The *rù* tone problem in the Central Xiāng dialects clearly is an interesting topic that deserves more attention, but since it is not directly related to hardening, for the sake of convenience

I use MC *rù* tone as a conditioning factor without going into what exactly does MC *rù* tone become in CCX for now. The following table gives examples of characters with CCX final *-i.

Table 98. Examples of characters that do not show velarization of fricatives in Shuāngfēng. 示 *shì* and 時 *shí* represent initial readings of CCX *-i final characters with a modern apical vowel reading, both have dz- initials. 十 *shí* is also a character with a CCX *-i final that turn into a modern apical vowel, but it has an MC *rù* tone and therefore the initial is a ʃ-.

Dialect	示 <i>shì</i>	時 <i>shí</i>	十 <i>shí</i>
XX	--	dz _ɿ ^{陽平}	ʃ _ɿ ^{陰去}
SF	dzɿ ^{陽去}	dzɿ ^{陽平}	ʃ _ɿ ^{陰去}
LD-a	dzɿ ^{陽去}	dzɿ ^{陽平}	ɕi ^{陰去}
LD-b	ts'ɿ ^{陽去}	ts'ɿ ^{陽平}	ɕi ^{陰去}
LY	sɿ ^{陽去}	sɿ ^{陽平}	ɕi ^{陰去}
AH	--	zɿ ^{陽平}	sɿ ^{陰去}
HT-a	--	se ^{陽平}	se ^{陰去}
MC	止開三去至船	止開三平之禪	深開三人緝禪
CNR	O		O
QYS	dʒi ^去	ʒi ^平	ʒjəp ^入
CDC	*zhi ⁶	*zhi ²	*zhip ⁸
CCX	*zɿ ^{陽去} ~ *zɿ ^{陰去}	*zɿ ^{陽平}	*ʃi ^{陰去}

Most of the other finals that combine with 船 *chuán* and 禪 *shàn* initials, the MC division III rhymes, start with a high front medial or have a high front main vowel. The 船 *chuán* and 禪 *shàn* initials therefore all palatalize to ɕ- in front of these finals. There are only three such cases in Shuāngfēng: 逝 *shì* [ɕy^{陰去}], 睡 *shuì* [ɕy^{陰去}], and 熟 *shóu* [ɕi^{陰去}]. There are also two cases that start with a voiceless dental fricative s- initial, 上 *shàng* [san^{陰去文} ~ san^{陽去白}] and 尚 *shàng* [san^{陰去文} ~ san^{陽去白}]. Interestingly, both the literary and casual forms of these two characters have [s] initials. Coblin states that “It would seem that this different development is conditioned by tone, with the failure of velarization occurring under oblique tones.” (2011: 63). Since these are the only two characters with MC 船 *chuán* and 禪 *shàn* initials that are read with s- initials, it is hard to tell

what is going on. There are, however, problems to this statement. First of all, we do not see other MC 船 *chuán* and 禪 *shàn* initial characters with oblique tones fail to show velarization. Second, if the statement were true, why do the initials not turn into ξ -, as the initials with CCX final *-i and MC *rù* tone, but to s- that is not seen anywhere else with MC 船 *chuán* and 禪 *shàn* initials? More data and study will be needed to better determine the status of these two characters. The table below gives the readings of the characters discussed above.

Table 99. MC 船 *chuán* and 禪 *shàn* initial characters that show palatalization and the two characters with s- initials in Shuāngfēng. 熟 *shóu* and 睡 *shuì* represent initials with high front medial or main vowels that show palatalization to ϵ -. 上 *shàng* and 尚 *shàng* are the only two MC 船 *chuán* and 禪 *shàn* characters that are read with s- initials.

Dialect	述 <i>shù</i>	熟 <i>shóu</i>	睡 <i>shuì</i>	上 <i>shàng</i>	尚 <i>shàng</i>
XX	--	eiei ^{陰去}	eyi ^{陰去}	ɣiaŋ ^{陽去}	ɣiaŋ ^{陽去}
SF	ey ^{陰去}	eio ^{陰去}	ey ^{陰去}	san ^{陰去文} ~ san ^{陽去白}	san ^{陰去文} ~ san ^{陽去白}
LD-a	ey ^{陰去}	eio ^{陰去}	ey ^{陰去}	zioŋ ^{陽去}	zioŋ ^{陽去}
LD-b	ey ^{陰去}	eio ^{陰去}	ey ^{陰去}	εioŋ ^{陽去}	εioŋ ^{陽去}
LY	ey ^{陰去}	ɣau ^{陰去}	xui ^{陰去}	ɣoŋ ^{陽去}	ɣoŋ ^{陽去}
AH	--	səu ^{陰去}	sei ^{陰去}	laŋ ^{陽去}	laŋ ^{陰去文} ~ laŋ ^{陽去白}
HT-a	ey ^{陽去}	səu ^上	sei ^{陰去}	saŋ ^{陽去}	saŋ ^{陽去}
MC	臻合三入術船	通開三入屋禪	止合三去寘禪	宕開三上養禪	宕開三去漾禪
CNR	O		O		
QYS	dźjuet ^入	źjuk ^入	źjwe ^去	źjang ^上 , źjang ^去	źjang ^去
CDC	*zhiut ⁸	*zhiuk ⁸	*zhui ⁶	*zhiong ⁴ ~ *zhiong ⁶	*zhiong ⁶
CCX	*ɣy ^{陰去} ~ *ɣy ^{陽去}	*ɣiəu ^{陰去}	*ɣy ^{陰去} ~ *ɣyi ^{陰去}	*ɣiaŋ ^{陽上白} (~ *ɣiaŋ ^{陽去文})	*ɣiaŋ ^{陽上白} (~ *ɣiaŋ ^{陽去文}) ~ *ɣiaŋ ^{陰去文}

For the 書 *shū* initial characters in Shuāngfēng, similar to Xiāngxiāng, these initials remain [ɣ] or get palatalized to [ɕ] before high front medials or main vowels. There are, however, two cases that have the voiceless velar fricative initial [x], 閃 *shǎn* [xī^上] and 善 *shàn* [xī^{陰去}]. The two characters both have the CCX final *-ien. The character 舌 *shé* that is a 船 *chuán* initial character but is read

with an x- instead of the normal ɣ- as the other 禪 *shàn* and 船 *chuán* initial characters, as discussed before, also has the CCX final *-ien. However, the character 善 *shàn* with the same CCX final does not show a change to x-, but to the normal ɣ- for 禪 *shàn* and 船 *chuán* initial characters. The reason for this is not clear. The table below gives examples of some 書 *shū* initial character readings in Shuāngfēng, and the characters with CCX *-ien finals as discussed.

Table 100. Examples of 書 *shū* initial character readings in Shuāngfēng, and the characters with CCX *-ien finals. The characters 舌 *shé* and 善 *shàn* are given for comparison.

Dialect	施 <i>shī</i>	水 <i>shuǐ</i>	身 <i>shēn</i>	閃 <i>shǎn</i>	扇 <i>shàn</i>	舌 <i>shé</i>	善 <i>shàn</i>
XX	ʃl _{陰平}	ey _上	eiɿɿ _{陰平}	ei _上	ʃl _{陰去}	eia _{陰去}	dzɿ _{陽去}
SF	ʃl _{陰平} ~ sɿ _{陰去}	ey _上	eiɿɿ _{陰平}	xī _上	xī _{陰去}	xɛ _{陰去文} ~ eia _{陰去白}	yī _{陽去}
LD-a	sɿ _{陰平}	ey _上	ein _{陰平}	eī _上	eī _{陰去}	eiɛ _{陰去}	yī _{陽去}
LD-b	sɿ _{陰平}	ey _上	eiɿɿ _{陰平}	ei _上	ei _{陰去}	se _{陰去}	ei _上
LY	sɿ _{陰平}	ey _上	ʃɿɿ _{陰平}	xī _上	xī _{陰去}	xī _{陰去}	xī _{陽去}
AH	--	sei _上	sən _{陰平}	sə̃ _上	sə _{陰去}	sə _{陰去}	sə̃ _{陽去}
HT-a	--	ey _上	sən _{陰平}	san _上	sen _{陰去}	se _{陰去}	sen _{陽去}
MC	止開三平支書	止合三上旨書	臻開三平眞書	咸開三上琰書	山開三去線書	山開三入薛船	山開三上獮禪
CNR	O	O	O	O	O	O	O
QYS	ʃje _平	ʃwi _上	ʃjen _平	ʃjäm _上	ʃjän _去	dʒjät _入	ʒjän _上 , ʒjän _去
CDC	*shi ¹	*shui ³	*shin ¹	*shiam ³	*shian ⁵	*zhiat ⁸	*zhian ⁶
CCX	*ʃi _{陰平}	*ʃy _{上白} ~ *ʃyi _{上文}	*ʃin _{陰平}	*ʃien _上	*ʃien _{陰去}	*ʃie _{陰去} ~ *ʃə _{陰去}	*ʒien _{陽去}

In Lóudǐ Lǎojiē, there are only three cases of velar fricatives, 善 *shàn* [yī_{陽去}], 順 *shùn* [yün_{陽去}], and 純 *chún* [yün_{陽平}]. For the 船 *chuán* and 禪 *shàn* initials, the general turnout for CCX final *-i is a voiced dental affricate dz-, as in 時 *shí* [dzɿ_{陽平}], or a voiceless alveolopalatal fricative [ç] if the MC tone is *rù* tone²¹, merging with the MC voiceless 書 *shū* initial, as in 十 *shí* [çɿ_{陰去}]. Most

²¹ Middle Chinese *rù* tone turns into 陰去 regularly in all the Xiāng dialects (Coblin 2011: 2).

of the other finals that combine with 船 *chuán* and 禪 *shàn* initials, the MC division III rhymes, start with a high front medial or have a high front main vowel, and under this condition, the 船 *chuán* and 禪 *shàn* initials palatalize to a voiced alveolopalatal fricative *z-*, as in 樹 *shù*. One exception is the character 睡 *shuì*. Although it is a 禪 *shàn* initial character, it is read with a *ɛ-* initial, rather than the *z-* initial like other 船 *chuán* and 禪 *shàn* initial characters. The following table gives the characters discussed here.

Table 101. 船 *chuán* and 禪 *shàn* initial character examples in Lóudǐ Lǎojiē. 善 *shàn*, 順 *shùn*, and 純 *chún* are the only three 船 *chuán* and 禪 *shàn* initial characters that show velarization of fricatives. 時 *shí* represents the initial readings for CCX *-i non-MC *rù* tone finals, and 十 *shí* for CCX *-i MC *rù* tone finals. 樹 *shù* represents the normal initial reading for finals with high front medials or main vowels, and 睡 *shuì* is an exception under this condition.

Dialect	善 <i>shàn</i>	順 <i>shùn</i>	純 <i>chún</i>	時 <i>shí</i>	十 <i>shí</i>	樹 <i>shù</i>	睡 <i>shuì</i>
XX	dʒ _ɿ 陽去	ʎyan 陽去	ʎyan 陽平	dʒ _ɿ 陽平	ʃɿ 陰去	ʎy 陽去	eyi 陰去
SF	ʎi 陽去	ʎyen 陽去	ʎyen 陽平	dʒɿ 陽平	ʃɿ 陰去	ʎy 陽去	ey 陰去
LD-a	ʎi 陽去	ʎun 陽去	ʎun 陽平	dʒɿ 陽平	ei 陰去	zy 陽去	ey 陰去
LD-b	ei 上	ʎuen 陽去	ʎuen 陽平	ts'ɿ 陽平	ei 陰去	ey 陽去	ey 陰去
LY	xi 陽去	xuən 陽去	--	sɿ 陽平	ei 陰去	ey 陽去	xui 陰去
AH	sə̌ 陽去	eyn 陰去文 ~ yn 陽去白	yn 陽平	zɿ 陽平	sɿ 陰去	y 陽去	sei 陰去
HT-a	sen 陽去	eyn 陽去	eyn 陽平	se 陽平	se 陰去	ey 陽去	sei 陰去
MC	山開三上獮禪	臻合三去稭船	臻合三平諄禪	止開三平之禪	深開三入緝禪	遇合三去遇禪	止合三去真禪
CNR	O	O	O		O		O
QYS	ʒjän 上, ʒjän 去	dʒjuen 去	ʒjuen 平	ʒi 平	ʒjəp 入	ʒju 去 “tree”	ʒjwe 去
CDC	*zhian ⁶	*zhiun ⁶	*zhiun ² ~ *jiun ²	*zhi ²	*zhip ⁸	*zhiu ⁶	*zhui ⁶
CCX	*ʒien 陽去	*ʒyn 陽去	*ʒyn 陽平	*ʒi 陽平	*ʒi 陰去	*ʒy 陽去	*ʒy 陰去 ~ *ʒyi 陰去

As for 書 *shū* initial characters in Lóudǐ Lǎojiē, the general turnout is *s-* before CCX final *-i, for instance 施 *shī* [sɿ^{陰平}], or *ɛ-* if followed by a high front medial or vowel, such as 水 *shuǐ* [ey^上] and

身 *shēn* [ɛin^{陰平}]. The 書 *shū* initial characters also show the split in the CCX final *-i, where the non-MC *rù* tone initials stay as s- and have a following apical vowel, such as 施 *shī* [sɿ^{陰平}], while the MC *rù* tone initials become ɛ-, in turn followed by the final -i, for instance 適 *shì* [ɛi^{陽平}]. The table below gives the readings of these characters.

Table 102. 書 *shū* initial character examples in Lóudǐ Lǎojiē. 水 *shuǐ* and 身 *shēn* represent initial readings before finals with high front medials or main vowels. 施 *shī* represents the initial readings for CCX *-i non-MC *rù* tone finals, and 適 *shì* for CCX *-i MC *rù* tone finals.

Dialect	水 <i>shuǐ</i>	身 <i>shēn</i>	施 <i>shī</i>	適 <i>shì</i>
XX	ɛy ^上	ɛiɒn ^{陰平}	ʃɿ ^{陰平}	ʃɿ ^{次陽平}
SF	ɛy ^上	ɛiɛn ^{陰平}	ʃɿ ^{陰平} ~ sɿ ^{陰去}	ʃɿ ^{陽平}
LD-a	ɛy ^上	ɛin ^{陰平}	sɿ ^{陰平}	ɛi ^{陽平}
LD-b	ɛy ^上	ɛien ^{陰平}	sɿ ^{陰平}	ɛi ^{陽平}
LY	ɛy ^上	ʃɛn ^{陰平}	sɿ ^{陰平}	ɛi ^{陰去}
AH	sei ^上	səɒn ^{陰平}	--	sɿ ^{陰去}
HT-a	ɛy ^上	səɒn ^{陰平}	--	se ^{陰去}
MC	止合三上旨書	臻開三平眞書	止開三平支書	梗開三入昔書
CNR	O	O	O	
QYS	ʃwi ^上	ʃjen ^平	ʃje ^平	ʃjak ^入
CDC	*shui ³	*shin ¹	*shi ¹	*shiak ⁵
CCX	*ɛy ^{上白} ~ *ɛyi ^{上文}	*ɕin ^{陰平}	*ɕi ^{陰平}	*ɕi ^入 ~ *ɕi ^{陰去}

In Lóudǐ Jiāolóngcūn, there are only two cases of velar fricatives, 順 *shùn* [yuen^{陽去}] and 純 *chún* [yuen^{陽平}]. The 船 *chuán* and 禪 *shàn* initial characters are read as ts^h- before CCX *-i finals, with the split that the initials before CCX *-i final with MC *rù* tone become ɛ-, and the following final a -i. For example, 時 *shí* [ts'ɿ^{陽平}] while 十 *shí* [ɛi^{陰去}]. Just as in the previously discussed dialects, most of the other finals that combine with 船 *chuán* and 禪 *shàn* initials, the MC division III rhymes, start with a high front medial or have a high front main vowel. The 船 *chuán* and 禪 *shàn* initials therefore all palatalize to ɛ- in front of these finals. For instance, 樹 *shù* [ɛy^{陽去}] and 神 *shén*

[eien^{陽平}]. One exception is 殊 *shū* [t'y^{陽平}], which despite being a 禪 *shàn* character has a retroflex stop initial. The table below shows the readings of the characters mentioned above.

Table 103. 船 *chuán* and 禪 *shàn* initial character examples in Lóudǐ Jiāolóngcūn. 順 *shùn* and 純 *chún* are the only two characters that have velarization in fricatives in Lóudǐ Jiāolóngcūn. 時 *shí* represents the initial readings for CCX *-i non-MC *rù* tone finals, and 十 *shí* for CCX *-i MC *rù* tone finals. 樹 *shù* and 神 *shén* represents the normal initial reading for finals with high front medials or main vowels. 殊 *shū* is a strange character here, since it is a 禪 *shàn* initial character but the modern pronunciation has a hardened t^h-.

Dialect	順 <i>shùn</i>	純 <i>chún</i>	時 <i>shí</i>	十 <i>shí</i>	樹 <i>shù</i>	神 <i>shén</i>	殊 <i>shū</i>
XX	yɿan ^{陽去}	yɿan ^{陽平}	dzɿ ^{陽平}	ʂɿ ^{陰去}	yɿ ^{陽去}	yɿan ^{陽平}	--
SF	yɿen ^{陽去}	yɿen ^{陽平}	dzɿ ^{陽平}	ʂɿ ^{陰去}	yɿ ^{陽去}	yɿen ^{陽平}	yɿ ^{陽平}
LD-a	yun ^{陽去}	yun ^{陽平}	dzɿ ^{陽平}	ei ^{陰去}	zy ^{陽去}	zin ^{陽平}	zy ^{陽平}
LD-b	yuen ^{陽去}	yuen ^{陽平}	ts'ɿ ^{陽平}	ei ^{陰去}	ey ^{陽去}	eien ^{陽平}	t'y ^{陽平}
LY	xuən ^{陽去}	--	sɿ ^{陽平}	ei ^{陰去}	ey ^{陽去}	ʂen ^{陽平}	t'y ^{陽平}
AH	eyn ^{陰去文} ~ yn ^{陽去白}	yn ^{陽平}	zɿ ^{陽平}	sɿ ^{陰去}	y ^{陽去}	lən ^{陽平}	--
HT-a	eyn ^{陽去}	eyn ^{陽平}	se ^{陽平}	se ^{陰去}	ey ^{陽去}	sen ^{陽平}	--
MC	臻合三去禱船	臻合三平諄禪	止開三平之禪	深開三入緝禪	遇合三去遇禪	臻開三平眞船	遇合三平虞禪
CNR	O	O		O		O	
QYS	dźjuen ^去	źjuen ^平	źi ^平	źjəp ^入	źju ^去 “tree”	dźjen ^平	źju ^平
CDC	*zhiun ⁶	*zhiun ² ~ *jiun ²	*zhi ²	*zhip ⁸	*zhiu ⁶	*zhin ²	*zhiu ²
CCX	*zyn ^{陽去}	*zyn ^{陽平}	*zi ^{陽平}	*ʂi ^{陰去}	*zy ^{陽去}	*zin ^{陽平}	*zy ^{陽去} (~*dzy ^{陽平} ?)

Just as the 船 *chuán* and 禪 *shàn* initial characters, 書 *shū* initial characters also have the split of reading as s- before CCX *-i non-MC *rù* tone finals, or ɛ- before CCX *-i MC *rù* tone finals. Other than that, 書 *shū* initial characters are read as ɛ- before finals with high front medials or main vowels, which is the major turnout for division III rhymes in Lóudǐ Jiāolóngcūn. The following table gives examples of these cases.

Table 104. 書 *shū* initial character examples in Lóudǐ Jiāolóngcūn. 施 *shī* represents the initial readings for CCX *-i non-MC *rù* tone finals, and 適 *shì* for

CCX *-i MC *rù* tone finals. 水 *shuǐ* and 身 *shēn* represent initial readings before finals with high front medials or main vowels.

Dialect	施 <i>shī</i>	適 <i>shì</i>	水 <i>shuǐ</i>	身 <i>shēn</i>
XX	ɿ _{陰平}	ɿ _{次陽平}	ey _上	eiɿ _{陰平}
SF	ɿ _{陰平} ~ sɿ _{陰去}	ɿ _{陽平}	ey _上	eiɿ _{陰平}
LD-a	sɿ _{陰平}	ei _{陽平}	ey _上	ein _{陰平}
LD-b	sɿ _{陰平}	ei _{陽平}	ey _上	eiɿ _{陰平}
LY	sɿ _{陰平}	ei _{陰去}	ey _上	ɿɿ _{陰平}
AH	--	sɿ _{陰去}	sei _上	səɿ _{陰平}
HT-a	--	se _{陰去}	ey _上	səɿ _{陰平}
MC	止開三平支書	梗開三入昔書	止合三上旨書	臻開三平眞書
CNR	O		O	O
QYS	ʃje _平	ʃjək _入	ʃwi _上	ʃjen _平
CDC	*shi ¹	*shiak ⁵	*shui ³	*shin ¹
CCX	*ɿ _{陰平}	*ɿ _入 ~ *ɿ _{陰去}	*ɿy _{上白} ~ *ɿyi _{上文}	*ɿin _{陰平}

Liányuán also has velarization of fricatives in addition to velarization of stops. Interestingly, of the fricatives that have velarization in Liányuán, the condition is the same as the velarization of stops. Rather than a split between the Middle Chinese voiced 船 *chuán* and 禪 *shàn* initials versus the voiceless 書 *shū* initial, as in Xiāngxiāng and Shuāngfēng, Liányuán has a voiceless velar fricative x- in all these groups of initials when they are followed by *chóngniǔ* rhymes. Furthermore, just as in the stops, *chóngniǔ* rhymes in 咸 *xián shè kāikǒu*, 山 *shān shè kāikǒu* and 咸 *hékǒu*, 臻 *zhēn shè hékǒu*, and 止 *zhǐ shè hékǒu* show velarization, but the ones in 深 *shēn shè kāikǒu*, 效 *xiào shè kāikǒu*, and 臻 *zhēn shè kāikǒu* do not. The following table shows the characters that have velarization of fricative in Liányuán.

Table 105. Characters that have velarization of fricatives in Liányuán.

Dialect	善 <i>shàn</i>	舌 <i>shé</i>	順 <i>shùn</i>	睡 <i>shuì</i>	扇 <i>shàn</i>	說 <i>shuō</i>	閃 <i>shǎn</i>
XX	dzɿ _{陽去}	eiɿ _{陰去}	yɿɿ _{陽去}	eyi _{陰去}	ɿ _{陰去}	eya _{次陽平}	eĩ _上
SF	yĩ _{陽去}	xe _{陰去文} ~ eiɿ _{陰去白}	yɿɿ _{陽去}	ey _{陰去}	xĩ _{陰去}	eye _{陽平文} ~ eya _{陽平白}	xĩ _上
LD-a	yĩ _{陽去}	eiɿ _{陰去}	yun _{陽去}	ey _{陰去}	eĩ _{陰去}	sue _{陽平}	eĩ _上

LD-b	ei ^上	se ^{陰去}	yuen ^{陽去}	ey ^{陰去}	ei ^{陰去}	eye ^{陽平}	ei ^上
LY	xi ^{陽去}	xi ^{陰去}	xuən ^{陽去}	xui ^{陰去}	xi ^{陰去}	xui ^{陰去}	xi ^上
AH	sǎ ^{陽去}	sə ^{陰去}	eyn ^{陰去文} ~ yn ^{陽去白}	sei ^{陰去}	sə ^{陰去}	eye ^{陰去}	sǎ ^上
HT-a	sen ^{陽去}	se ^{陰去}	eyn ^{陽去}	sei ^{陰去}	sen ^{陰去}	so ^上	san ^上
MC	山開三上彌禪	山開三入薛船	臻合三去稗船	止合三去寘禪	山開三去線書	山合三入薛書	咸開三上琰書
CNR	O	O	O	O	O	O	O
QYS	zjǎn ^上 , zjǎn ^去	dzjät ^入	dzjuen ^去	zjwe ^去	sjǎn ^去	sjwät ^入	sjäm ^{上, 去}
CDC	*zhian ⁶	*zhiat ⁸	*zhiun ⁶	*zhuī ⁶	*shian ⁵	*shiot ⁶	*shiam ³
CCX	*zjen ^{陽去}	*ɕie ^{陰去} ~ *ɕə ^{陰去}	*zyn ^{陽去}	*ɕy ^{陰去} ~ *ɕyi ^{陰去}	*ɕien ^{陰去}	*ɕya ^{入白} ~ *ɕye ^{入文} ~ *so ^{入文}	*ɕien ^上

船 *chuán*, 禪 *shàn*, and 書 *shū* initial characters that do not show velarization of fricatives are read with ξ -, or palatalize to ϵ - before high front medials or main vowels. For example, 壽 *shòu* and 燒 *shāo* are read with the initial ξ -, while 樹 *shù* and 水 *shuǐ* have ϵ - initials before the final -y. Liányuán also has the split with 船 *chuán*, 禪 *shàn*, and 書 *shū* initials when combined with CCX final *-i. The non-MC *rù* tone ones are read with s-, and the MC *rù* tone characters have ϵ -. For instance, the non-MC *rù* tone character 時 *shí* and 世 *shì* have s- initials, while the MC *rù* tone character 食 *shí* and 室 *shì* is read with a ϵ - initial. 殊 *shū* is an interesting case here since it has a 禪 *shàn* initial but shows hardening instead. The following table shows examples of such cases with 船 *chuán* and 禪 *shàn* initial characters, and the next table gives examples of 書 *shū* initial characters.

Table 106. Examples of 船 *chuán* and 禪 *shàn* initial characters that do not have velarization of fricatives in Liányuán. 壽 *shòu* and 神 *shén* represent characters that have a final starting with a non-high front medial or main vowel, and 樹 *shù* represents the initial readings for characters that have a final starting with a non-high front medial or main vowel. 時 *shí* represents characters with CCX *-i plus non-MC *rù* tone finals, and 食 *shí* the ones with CCX *-i plus MC *rù* tone. 殊 *shū* is a strange case here that show hardening with a 禪 *shàn* initial.

Dialect	壽 <i>shòu</i>	神 <i>shén</i>	樹 <i>shù</i>	時 <i>shí</i>	食 <i>shí</i>	殊 <i>shū</i>
XX	ɿiei 陽去	ɿian 陽平	ɿy 陽去	dzɿ 陽平	ʃɿ 陰去	--
SF	ɿiü 陽去	ɿien 陽平	ɿy 陽去	dzɿ 陽平	ʃɿ 陰去	ɿy 陽平
LD-a	ziü 陽去	zin 陽平	zy 陽去	dzɿ 陽平	ei 陰去	zy 陽平
LD-b	eiü 陽去	eien 陽平	ey 陽去	ts'ɿ 陽平	ei 陰去	t'y 陽平
LY	ʃau 陽去	ʃen 陽平	ey 陽去	sɿ 陽平	ei 陰去	t'y 陽平
AH	səu 陰去文 ~ löu 陽去白	lən 陽平	y 陽去	zɿ 陽平	sɿ 陰去	--
HT-a	səu 陽去	sen 陽平	ey 陽去	se 陽平	se 陰去	--
MC	流開三去宥禪	臻開三平眞船	遇合三去遇禪	止開三平之禪	曾開三入職船	遇合三平虞禪
CNR		O				
QYS	ʒjəu 上, ʒjəu 去	dʒjen 平	ʒju 去 “tree”	ʒi 平	dʒjək 入	ʒju 平
CDC	*zhieu ⁶	*zhin ²	*zhiu ⁶	*zhi ²	*zhik ⁸	*zhiu ²
CCX	*ʒjəu 陽去	*ʒin 陽平	*zy 陽去	*ʒi 陽平	*ʃi 陰去白 ~ ʃi 入文	*zy 陽去 (~*dzy 陽平?)

Table 107. Examples of 書 *shū* initial characters that do not have velarization of fricatives in Liányuán. 燒 *shāo* and 身 *shēn* represent characters that have a final starting with a non-high front medial or main vowel, and 水 *shuǐ* represents the initial readings for characters that have a final starting with a non-high front medial or main vowel. 世 *shì* represents characters with CCX *-i plus non-MC *rù* tone finals, and 室 *shì* the ones with CCX *-i plus MC *rù* tone.

Dialect	燒 <i>shāo</i>	身 <i>shēn</i>	水 <i>shuǐ</i>	世 <i>shì</i>	室 <i>shì</i>
XX	eiəu 陰平	eiən 陰平	ey 上	ʃɿ 陰去	ʃɿ 次陽平
SF	eiv 陰平	eien 陰平	ey 上	ʃɿ 陰去	ʃɿ 陽平
LD-a	eiv 陰平	ein 陰平	ey 上	sɿ 陰去	ei 陰去
LD-b	eiv 陰平	eien 陰平	ey 上	sɿ 陰去	ei 陰去
LY	ʃə 陰平	ʃen 陰平	ey 上	sɿ 陰去	ei 陰去
AH	sə 陰平	sən 陰平	sei 上	sɿ 陰去	sɿ 陰去
HT-a	sau 陰平	sən 陰平	ey 上	se 陰去	se 上
MC	效開三平宵書	臻開三平眞書	止合三上旨書	蟹開三去祭書	臻開三入質書
CNR	O	O	O	O	O
QYS	ʃjəu 平	ʃjen 平	ʃwi 上	ʃjəi 去	ʃjet 入
CDC	*shiau ¹	*shin ¹	*shui ³	*shiai ⁵	*shit ⁷
CCX	*ʃiau 陰平	*ʃin 陰平	*ʃy 上白 ~ *ʃyi 上文	*ʃi 陰去	*ʃi 入 ~ *ʃi 陰去

In Liányuán we can kind of see a trend different to the previously discussed dialects. Instead of having a palatalized initial and show a high front medial or main vowel in the final, Liányuán has non-high front medial or main vowel in most of the division III rhymes that combine with 船 *chuán*,

禪 *shàn*, and 書 *shū* initials. In fact, the ones that remain a palatalized *ɕ*- are now only with 止 *zhǐ* *shè hékǒu* or other finals that also become CCX *-y, and the previously mentioned CCX *-i, which are 止 *zhǐ shè kāikǒu* or other finals that have the same CCX final *-i.

ĀnhuàHuìtóng Línchéng does not have velarization of fricatives. But in Ānhuà, there is an interesting reading of a lateral approximant *l*- in some 船 *chuán* and 禪 *shàn* initial characters. The condition seems to be the CCX finals *-in and *-iaŋ. However, there is one other character with the CCX final *-in that do not show the change into an *l*-. The character 盛 *shèng*, with two different readings in different tones, has the CCX final *-in but is read with the initial *s*-, which is the most common reading for 船 *chuán* and 禪 *shàn* initial characters. The reason for this is unclear. Two other character that show an *l*- initial reading are 受 *shòu* and 壽 *shòu*. These characters are also confusing because the other character with the same CCX final *-iəu, 熟 *shóu*, does not have the change but is read instead with an *s*- initial. The following tables give the characters with the CCX finals *-iaŋ and *-in, and *-iəu respectively.

Table 108. 船 *chuán* and 禪 *shàn* initial characters in Ānhuà that show *l*- initials. 盛 *shèng* is a character with the CCX final *-in that does not show the initial changing to an *l*-.

Dialect	上 <i>shàng</i>	尚 <i>shàng</i>	嘗 <i>cháng</i>	常 <i>cháng</i>	神 <i>shén</i>	繩 <i>shéng</i>	盛 <i>shèng</i>
XX	ɣiaŋ ^{陽去}	ɣiaŋ ^{陽去}	ɣioŋ ^{陽平}	ɣioŋ ^{陽平}	ɣiɒŋ ^{陽平}	ɣiɒŋ ^{陽平}	ɣiɒŋ ^{陽去}
SF	san ^{陰去文} ~ san ^{陽去白}	san ^{陰去文} ~ san ^{陽去白}	ɣioŋ ^{陽平}	ɣioŋ ^{陽平} ~ dɒŋ ^{陽平口}	ɣien ^{陽平}	ɣien ^{陽平}	ɣien ^{陽去}
LD-a	ziɔŋ ^{陽去}	ziɔŋ ^{陽去}	ziɔŋ ^{陽平}	ziɔŋ ^{陽平}	zin ^{陽平}	zin ^{陽平}	zin ^{陽去}
LD-b	eiɔŋ ^{陽去}	eiɔŋ ^{陽去}	eiɔŋ ^{陽平}	eiɔŋ ^{陽平}	eien ^{陽平}	eien ^{陽平}	eien ^{陽去}
LY	ʂɔŋ ^{陽去}	ʂɔŋ ^{陽去}	ʂɔŋ ^{陽平}	ʂɔŋ ^{陽平}	ʂɛŋ ^{陽平}	ʂɛŋ ^{陽平}	ʂɛŋ ^{陽去}
AH	laŋ ^{陽去}	laŋ ^{陰去文} ~ laŋ ^{陽去白}	laŋ ^{陽平}	laŋ ^{陽平}	lən ^{陽平}	lən ^{陽平}	sən ^{陰去}
HT-a	saŋ ^{陽去}	saŋ ^{陽去}	saŋ ^{陽平}	taŋ ^{陽平}	sen ^{陽平}	sən ^{陽平}	sən ^{陽去}
MC	宕開三上養禪	宕開三去漾禪	宕開三平陽禪	宕開三平陽禪	臻開三平眞船	曾開三平蒸船	梗開三去勁禪
CNR					O		

QYS	ʒjang ^上 , ʒjang ^去	ʒjang ^去	ʒjang ^平	ʒjang ^平	dʒjen ^平	dʒjəŋ ^平	ʒjäng ^去
CDC	*zhiŋg ⁴ ~ *zhiŋg ⁶	*zhiŋg ⁶	*zhiŋg ²	*jiong ² ~ zhiŋg ²	*zhin ²	*zhiŋg ²	*zhiang ⁶
CCX	*zjaŋ ^{陽上白} (~ *zjaŋ ^{陽去文})	*zjaŋ ^{陽上白} (~ *zjaŋ ^{陽去文} ~ *ɣjaŋ ^{陰去文})	*zjaŋ ^{陽平}	*zjaŋ ^{陽平} ~ *dzjaŋ ^{陽平口}	*zjin ^{陽平}	*zjin ^{陽平}	*zjin ^{陽去}

Table 109. 船 chuán and 禪 shàn initial characters in Ānhuà with CCX final *-iəu. 受 shòu and 壽 shòu have l- initials, while 熟 shóu has an s- initial.

Dialect	受 shòu	壽 shòu	熟 shóu
XX	ɣiei ^{陽去}	ɣiei ^{陽去}	ɛiei ^{陰去}
SF	ɣiəu ^{陽去}	ɣiəu ^{陽去}	ɛiəu ^{陰去}
LD-a	ziəu ^{陽去}	ziəu ^{陽去}	ɛiəu ^{陰去}
LD-b	ɛiəu ^{陽去}	ɛiəu ^{陽去}	ɛiəu ^{陰去}
LY	ɣəu ^{陽去}	ɣəu ^{陽去}	ɣəu ^{陰去}
AH	səu ^{陰去文} ~ ləu ^{陽去白}	səu ^{陰去文} ~ ləu ^{陽去白}	səu ^{陰去}
HT-a	--	səu ^{陽去}	səu ^上
MC	流開三上有禪	流開三去宥禪	通開三入屋禪
CNR			
QYS	ʒjəu ^上 , ʒjəu ^去	ʒjəu ^上 , ʒjəu ^去	ʒjuk ^入
CDC	*zhiəu ⁴	*zhiəu ⁶	*zhiuk ⁸
CCX	*zjəu ^{陽去}	*zjəu ^{陽去}	*ɣjəu ^{陰去}

When combined with CCX final *-i, Ānhuà also have the split of 船 chuán and 禪 shàn initials reading as z- before MC rù tone or s- before non-MC rù tone. For example, 時 shí [zɿ^{陽平}] without the MC rù tone is read with z- initial, and 食 shí [sɿ^{陰去}] from MC rù tone is read with s- initial. Outside of the condition of in front of the CCX final *-i, the 船 chuán and 禪 shàn initial characters are mainly read with s- initials, with the CCX final lacking any high front medial or main vowel element. For instance, the character 善 shàn [sə̃^{陽去}]. In front of a -y main vowel, the initial becomes a zero initial. There three characters 樹 shù [y^{陽去}], 純 chún [yn^{陽平}], and the vernacular reading of 順 shùn [yn^{陽去白}] are the ones with such zero initials. The following table gives the readings of the characters mentioned here.

Table 110. Examples of 船 *chuán* and 禪 *shàn* initial character readings in Ānhuà. 時 *shí* represents characters with CCX *-i plus non-MC *rù* tone finals, and 食 *shí* the ones with CCX *-i plus MC *rù* tone. 善 *shàn* the most common initial reading for characters that have finals other than CCX *-i. 樹 *shù*, 純 *chún*, and 順 *shùn* are the three characters with zero initials.

Dialect	時 <i>shí</i>	食 <i>shí</i>	善 <i>shàn</i>	樹 <i>shù</i>	純 <i>chún</i>	順 <i>shùn</i>
XX	dʒɿ ^{陽平}	ʃɿ ^{陰去}	dʒɿ ^{陽去}	yɿ ^{陽去}	yɿʌn ^{陽平}	yɿʌn ^{陽去}
SF	dʒɿ ^{陽平}	ʃɿ ^{陰去}	yĩ ^{陽去}	yɿ ^{陽去}	yɿɛn ^{陽平}	yɿɛn ^{陽去}
LD-a	dʒɿ ^{陽平}	ɛɿ ^{陰去}	yĩ ^{陽去}	zy ^{陽去}	yun ^{陽平}	yun ^{陽去}
LD-b	ts'ɿ ^{陽平}	ɛɿ ^{陰去}	ɛɿ ^上	ey ^{陽去}	yuen ^{陽平}	yuen ^{陽去}
LY	sɿ ^{陽平}	ɛɿ ^{陰去}	xi ^{陽去}	ey ^{陽去}	--	xuən ^{陽去}
AH	zɿ ^{陽平}	sɿ ^{陰去}	sǝ ^{陽去}	y ^{陽去}	yn ^{陽平}	eyn ^{陰去文} ~ yn ^{陽去白}
HT-a	se ^{陽平}	se ^{陰去}	sen ^{陽去}	ey ^{陽去}	eyn ^{陽平}	eyn ^{陽去}
MC	止開三平之禪	曾開三入職船	山開三上獮禪	遇合三去遇禪	臻合三平諄禪	臻合三去稕船
CNR			O		O	O
QYS	ʒi ^平	dʒjək ^入	ʒjǎn ^上 , ʒjǎn ^去	ʒju ^去 “tree”	ʒjuen ^平	dʒjuen ^去
CDC	*ʒhi ²	*ʒhik ⁸	*ʒhian ⁶	*ʒhiu ⁶	*ʒhiun ² ~ *ʒjiun ²	*ʒhiun ⁶
CCX	*ʒi ^{陽平}	*ʃi ^{陰去白} ~ ʃi ^{入文}	*ʒien ^{陽去}	*zy ^{陽去}	*zy ^{陽平}	*zy ^{陽去}

The 書 *shū* initial characters in Ānhuà are mainly read as s- initials. Same as the 船 *chuán* and 禪 *shàn* initial characters, palatalization to ɛ- and with the final having a high front medial or main vowel element are not so common in Ānhuà. For instance, the characters 身 *shēn* [sən^{陰平}] and 少 *shǎo* [so^上]. This is different to Xiāngxiāng, Shuāngfēng, and the two Lóudǐ dialects, where ɛ- is the most common reading for 船 *chuán*, 禪 *shàn*, and 書 *shū* initial characters. Palatalization to ɛ- in Ānhuà is only found in the three characters 書 *shū*, 鼠 *shǔ*, and 說 *shuō*. Palatalization seems to occur with CCX finals that have a *-y element, but there are also other characters with CCX *-y medial or main vowel that do not show palatalization. For example, the character 水 *shuǐ*, which shows palatalization in all the other Central Xiāng dialects, does not show palatalization in Ānhuà and is read with an s- initial. The characters mentioned here are shown in the following table.

Table 111. Examples of 書 *shū* initial character readings in Ānhuà. 身 *shēn* and 少 *shǎo* represent characters that are read with an s- initial, which is the most common reading for 書 *shū* initial characters. 書 *shū*, 鼠 *shǔ*, and 說 *shuō* are the only three characters found with palatalized initial ɛ-. 水 *shuǐ* is an example with a CCX final similar to 書 *shū*, 鼠 *shǔ*, and 說 *shuō*, but the initial does not show palatalization and is read with an s- instead.

Dialect	身 <i>shēn</i>	少 <i>shǎo</i>	書 <i>shū</i>	鼠 <i>shǔ</i>	說 <i>shuō</i>	水 <i>shuǐ</i>
XX	ɛiɒn ^{陰平}	ɛiau ^上	ɛy ^{陰平}	ɛy ^上	ɛya ^{次陽平}	ɛy ^上
SF	ɛien ^{陰平}	ɛiv ^上	ɛy ^{陰平}	ɛy ^{上文} ~ ɛio ^{陰去} 白	ɛye ^{陽平文} ~ ɛya ^{陽平白}	ɛy ^上
LD-a	ɛin ^{陰平}	ɛiv ^上	ɛy ^{陰平}	ɛy ^上	sue ^{陽平}	ɛy ^上
LD-b	ɛien ^{陰平}	ɛiv ^上	ɛy ^{陰平}	ɛy ^上	ɛye ^{陽平}	ɛy ^上
LY	ɣen ^{陰平}	ɣə ^上	ɛy ^{陰平}	ɛy ^上	xui ^{陰去}	ɛy ^上
AH	sən ^{陰平}	sə ^上	ɛy ^{陰平}	ɛy ^上	ɛye ^{陰去}	sei ^上
HT-a	sən ^{陰平}	sau ^上	ɛiau ^{陰去}	ɛy ^上	so ^上	ɛy ^上
MC	臻開三平眞書	效開三上小書	遇開三平魚書	遇開三上語書	山合三入薛書	止合三上旨書
CNR	O	O			O	O
QYS	ʃjen ^平	ʃjäu ^上	ʃjwo ^平	ʃjwo ^上	ʃjwät ^入	ʃwi ^上
CDC	*shin ¹	*shiau ³	*shie ¹ (~ *shiu ¹)	*shie ³ (~ *shiu ³)	*shiot ⁶	*shui ³
CCX	*ɣin ^{陰平}	*ɣiau ^上	*ɣy ^{陰平}	*ɣy ^上	*ɣya ^{入白} ~ *ɣye ^{入文} 入文 ~ *so ^{入文}	*ɣy ^{上白} ~ *ɣyi ^上 文

In front of the CCX final *-i, unlike the other Central Xiāng dialects where the split conditioned by MC *rù* tone occurs in both 船 *chuán* and 禪 *shàn* initial characters and 書 *shū* initial characters, in Ānhuà the split is only found with 船 *chuán* and 禪 *shàn* initial characters. The 書 *shū* initial characters are all read as s- with the CCX final *-i. The following table shows some example characters with CCX final *-i in Ānhuà.

Table 112. Example readings of characters with 書 *shū* initial and CCX final *-i in Ānhuà.

Dialect	屎 <i>shǐ</i>	世 <i>shì</i>	室 <i>shì</i>	釋 <i>shì</i>	適 <i>shì</i>
XX	ʃl ^上	ʃl ^{陰去}	ʃl ^{次陽平}	ʃl ^{次陽平}	ʃl ^{次陽平}
SF	--	ʃl ^{陰去}	ʃl ^{陽平}	ʃl ^{陽平}	ʃl ^{陽平}
LD-a	--	sɿ ^{陰去}	ɛi ^{陰去}	ɛi ^{陽平}	ɛi ^{陽平}
LD-b	sɿ ^上	sɿ ^{陰去}	ɛi ^{陰去}	ɛi ^{陽平}	ɛi ^{陽平}

LY	sɿ ^上	sɿ ^{陰去}	ei ^{陰去}	ei ^{陰去}	ei ^{陰去}
AH	sɿ ^上	sɿ ^{陰去}	sɿ ^{陰去}	sɿ ^{陰去}	sɿ ^{陰去}
HT-a	se ^上	se ^{陰去}	se ^上	se ^{陰去}	se ^{陰去}
MC	止開三上旨書	蟹開三去祭書	臻開三入質書	梗開三入昔書	梗開三入昔書
CNR	O	O	O		
QYS	śi ^上	śjǎi ^去	śjet ^入	śjǎk ^入	śjǎk ^入
CDC	*shi ³	*shiai ⁵	*shit ⁷	*shiak ⁷	*shiak ⁵
CCX	*ɕi ^上	*ɕi ^{陰去}	*ɕi ^入 ~ *ɕi ^{陰去}	*ɕi ^入 ~ *ɕi ^{陰去}	*ɕi ^入 ~ *ɕi ^{陰去}

Huìtóng Líchéng also does not show velarization of fricatives. The most common reading for 船 *chuán*, 禪 *shàn*, and 書 *shū* initial characters are s-, with the final lacking any high front medial or main vowel element. For example, 上 *shàng* [saŋ^{陽去}] and 繩 *shéng* [sən^{陽平}]. Palatalization to ɕ- appears to only occur before finals with CCX *-y main vowels, for instance 樹 *shù* [ɕy^{陽去}] and 順 *shùn* [ɕyn^{陽去}]. The character 書 *shū* [ɕiau^{陰去}] is interesting because the modern reading lacks a -y main vowel, but the CCX does have one. In addition, Huìtóng Líchéng does not have the split with CCX final *-i conditioned by MC *rù* tone. For example, 時 *shí* [se^{陽平}] and 實 *shí* [se^{陰去}] are both read with s- initials, even though 實 *shí* is an MC *rù* tone character and 時 *shí* is not. Other than that, we also see the reflex of CCX *-i to final -e in Huìtóng Líchéng, which is parallel to the change in Type I hardening with CCX *-i in Huìtóng Líchéng. The following table shows examples of 船 *chuán* and 禪 *shàn* initial characters, and the next table gives examples of 書 *shū* initial characters.

Table 113. Example characters of 船 *chuán* and 禪 *shàn* initials in Huìtóng Líchéng. 上 *shàng* and 繩 *shéng* represent the most common initial reading s-. 樹 *shù* and 順 *shùn* represent characters that show palatalization with the CCX main vowel *-y. 時 *shí* and 實 *shí* represent characters with CCX final *-i, one a non-MC *rù* tone and one an MC *rù* tone.

Dialect	上 <i>shàng</i>	繩 <i>shéng</i>	樹 <i>shù</i>	順 <i>shùn</i>	時 <i>shí</i>	實 <i>shí</i>
XX	yiaŋ ^{陽去}	yiɛn ^{陽平}	yy ^{陽去}	yyɛn ^{陽去}	dʒɿ ^{陽平}	ʂɿ ^{陰去}

SF	san ^{陰去文} ~ san ^{陽去白}	ɣiɛn ^{陽平}	ɣy ^{陽去}	ɣyɛn ^{陽去}	dzɿ ^{陽平}	ʂɿ ^{陰去}
LD-a	ziɔŋ ^{陽去}	zin ^{陽平}	zy ^{陽去}	yun ^{陽去}	dzɿ ^{陽平}	ɛi ^{陰去}
LD-b	ɛiɔŋ ^{陽去}	ɛien ^{陽平}	ey ^{陽去}	yuen ^{陽去}	ts'ɿ ^{陽平}	ɛi ^{陰去}
LY	ʂɔŋ ^{陽去}	ʂɛn ^{陽平}	ey ^{陽去}	xuɛn ^{陽去}	sɿ ^{陽平}	ɛi ^{陰去}
AH	laŋ ^{陽去}	lən ^{陽平}	y ^{陽去}	ɛyn ^{陰去文} ~ yn ^{陽去白}	zɿ ^{陽平}	sɿ ^{陰去}
HT-a	saj ^{陽去}	sən ^{陽平}	ey ^{陽去}	ɛyn ^{陽去}	se ^{陽平}	se ^{陰去}
MC	宕開三上養禪	曾開三平蒸船	遇合三上麌禪	臻合三去稇船	止開三平之禪	臻開三入質船
CNR				O		O
QYS	ʒjɑŋ ^上 , ʒjɑŋ ^去	dʒjəŋ ^平	ʒju ^上 “tree”	dʒjuen ^去	ʒi ^平	dʒjet ^入
CDC	*zhiong ⁴ ~ *zhiong ⁶	*zhing ²	*zhiu ⁶	*zhiun ⁶	*zhi ²	*zhit ⁸
CCX	*zjaŋ ^{陽上白} (~ *zjaŋ ^{陽去文})	*zɿn ^{陽平}	*zy ^{陽去}	*zyn ^{陽去}	*zɿ ^{陽平}	*ʂi ^{陰去白} ~ ʂi ^{入文}

Table 114. Example characters of 書 *shū* initial in Huìtóng Líchéng. 身 *shēn* and 少 *shǎo* represent the most common initial reading s-. 鼠 *shǔ* and 水 *shuǐ* represent characters that show palatalization with the CCX main vowel *-y. 書 *shū* is also reconstructed with a CCX main vowel *-y, and thus show palatalization even though the modern reading does not have a -y main vowel. 世 *shì* and 室 *shì* represent characters with CCX final *-i, one a non-MC *rù* tone and one an MC *rù* tone.

Dialect	身 <i>shēn</i>	少 <i>shǎo</i>	鼠 <i>shǔ</i>	水 <i>shuǐ</i>	書 <i>shū</i>	世 <i>shì</i>	室 <i>shì</i>
XX	ɛian ^{陰平}	ɛiau ^上	ey ^上	ey ^上	ey ^{陰平}	ʂɿ ^{陰去}	ʂɿ ^{次陽平}
SF	ɛien ^{陰平}	ɛiv ^上	ey ^{上文} ~ ɛiv ^{陰去白}	ey ^上	ey ^{陰平}	ʂɿ ^{陰去}	ʂɿ ^{陽平}
LD-a	ein ^{陰平}	ɛiv ^上	ey ^上	ey ^上	ey ^{陰平}	sɿ ^{陰去}	ɛi ^{陰去}
LD-b	ɛien ^{陰平}	ɛiv ^上	ey ^上	ey ^上	ey ^{陰平}	sɿ ^{陰去}	ɛi ^{陰去}
LY	ʂɛn ^{陰平}	ʂə ^上	ey ^上	ey ^上	ey ^{陰平}	sɿ ^{陰去}	ɛi ^{陰去}
AH	sən ^{陰平}	sɔ ^上	ey ^上	sei ^上	ey ^{陰平}	sɿ ^{陰去}	sɿ ^{陰去}
HT-a	sən ^{陰平}	sau ^上	ey ^上	ey ^上	ɛiau ^{陰去}	se ^{陰去}	se ^上
MC	臻開三平眞書	效開三上小書	遇開三上語書	止合三上旨書	遇開三平魚書	蟹開三去祭書	臻開三入質書
CNR	O	O		O		O	O
QYS	ʂjen ^平	ʂjäu ^上	ʂjwo ^上	ʂwi ^上	ʂjwo ^平	ʂjäi ^去	ʂjet ^入
CDC	*shin ¹	*shiau ³	*shie ³ (~ *shiu ³)	*shui ³	*shie ¹ (~ *shiu ¹)	*shiai ⁵	*shit ⁷
CCX	*ʂin ^{陰平}	*ʂiau ^上	*ʂy ^上	*ʂy ^{上白} ~ *ʂyi ^{上文}	*ʂy ^{陰平}	*ʂi ^{陰去}	*ʂi ^入 ~ *ʂi ^{陰去}

In sum, Liányuán shows velarization in all the 知 *zhī* and 章 *zhāng* initial group characters. The condition seems to be *chóngniǔ* rhymes in 咸 *xián shè kāikǒu*, 山 *shān shè kāikǒu* and 咸 *hékǒu*, 臻 *zhēn shè hékǒu*, and 止 *zhǐ shè hékǒu*, although the *chóngniǔ* rhymes in 深 *shēn shè kāikǒu*, 效 *xiào shè kāikǒu*, and 臻 *zhēn shè kāikǒu* regularly do not show velarization for both the modern reading of stops (知 *zhī*, 徹 *chè*, 澄 *chéng*, 章 *zhāng*, 昌 *chāng*) and fricatives (船 *chuán*, 禪 *shàn*, 書 *shū*). Xiāngxiāng, Shuāngfēng, Lóudǐ Lǎojiē, and Lóudǐ Jiāolóngcūn also have velarization of fricatives (船 *chuán*, 禪 *shàn*, 書 *shū*) more or less, and Ānhuà has a change to lateral approximant l-, but their conditions are quite different to the one in Liányuán. Looking at the initials, voicing seem to be the condition for Xiāngxiāng, since velarization of fricatives occur only to 船 *chuán* and 禪 *shàn* initials but not to 書 *shū* initial characters. The voicing condition seem to also apply to Shuāngfēng. There are, however, two characters 閃 *shǎn* and 善 *shàn* that are 書 *shū* initial characters but do show velarization to a voiceless x-, in contrast with the 船 *chuán* and 禪 *shàn* initials becoming voiced ɣ-. In Lóudǐ Lǎojiē and Lóudǐ Jiāolóngcūn, both have only a few characters that show velarization of fricatives, although all the characters affected are 船 *chuán* and 禪 *shàn* initial characters. In Ānhuà, which does not have velarization but has a change to lateral approximant l-, the condition also seems to be voicing in the initials, since the process only occurs to 船 *chuán* and 禪 *shàn* initials. The characters with CCX medial or main vowel *-y are never affected. Huìtóng Línchéng does not have velarization of any kind. In any case, the conditioning factor and the initial groups affected in Liányuán are very different to the ones in Xiāngxiāng, Shuāngfēng, Lóudǐ Lǎojiē, Lóudǐ Jiāolóngcūn, as well as Ānhuà, that they are probably best treated as different processes.

In looking at the finals, CCX final *-i never causes velarization in any of the dialects. The 船 *chuán*, 禪 *shàn*, and 書 *shū* initial characters are read as coronal affricates or fricatives when combined with CCX final *-i, with a split in the initials conditioned by MC *rù* tone found in the 船 *chuán* and 禪 *shàn* initial characters in Xiāngxiāng, Shuāngfēng, Lóudǐ Lǎojiē, Lóudǐ Jiāolóngcūn, Liányuán, and Ānhuà, and in 書 *shū* initial characters in Lóudǐ Lǎojiē, Lóudǐ Jiāolóngcūn, and Liányuán. Two CCX final that seem to commonly induce velarization of fricatives are *-ien and *-yn. However, the patterns in each dialect are quite different with the finals, and a general condition remains to be sorted out.

The following table summarizes the velarization patterns in the Central Xiāng dialects as discussed above. The next table below summarizes the conditioning factors for velarization in each dialect. Ānhuà does not have velarization, but it does have a change to lateral approximant l- initial in the 船 *chuán* and 禪 *shàn* initials. The process is therefore compared together here.

Table 115. Summary of velarization patterns in the Central Xiāng dialects. The second column shows the MC initials that may be affected, with the modern reading given in parenthesis. The third column shows CCX finals that cause velarization in each dialect. The fourth column shows CCX finals that do not cause velarization in each dialect. The fifth column shows the readings of the initials that have not hardened. Ānhuà does not have velarization but has a change to l- for some 船 *chuán* and 禪 *shàn* characters. The pattern is also compared in this table. If a CCX final shows velarization in some characters but not in others in a given dialect, the characters in each case are listed out for clarification. Huìtóng Línchéng does not show velarization of any kind.

Dialect	MC initials that may show velarization (modern initial)	CCX finals that show velarization	CCX finals that do not show velarization	Initials that do not show velarization
XX	船 <i>chuán</i> (ɣ-), 禪 <i>shàn</i> (ɣ-)	*-in, *-iv, *-iaŋ, *-iəu *-y, *-yn	*-i	<ul style="list-style-type: none"> dz- (是 <i>shì</i>) or dz_˩- (時 <i>shí</i>, 善 <i>shàn</i>) before *-i non-MC <i>rù</i> tone, and ʃ- before *-i with MC <i>rù</i> tone, or ɛ- before high front vowels

				(書 <i>shū</i> initial characters stay as ɣ-, or ɛ- before high front vowels)
SF	船 <i>chuán</i> (ɣ-), 禪 <i>shàn</i> (ɣ-)	*-ien, *ə (舌 <i>shé?</i>), *-iaŋ (常 <i>cháng</i> , 嘗 <i>cháng</i>), *-iəu (受 <i>shòu</i> , 壽 <i>shòu</i>), *-in *-y (殊 <i>shū</i> , 樹 <i>shù</i>), *-yn	*-i, *-iaŋ (上 <i>shàng</i> , 尚 <i>shàng</i>), *-iəu, *-iəu (熟 <i>shóu</i>), *-iəŋ *-y (述 <i>shù</i> , 睡 <i>shuì</i>)	<ul style="list-style-type: none"> dz- before *-i non-MC <i>rù</i> tone, and ɣ- before *-i with MC <i>rù</i> tone s- before *-iaŋ for the two characters 上 <i>shàng</i> and 尚 <i>shàng</i> (but not the characters 嘗 <i>cháng</i> and 常 <i>cháng</i> with the same final) ɛ- before high front vowels
	書 <i>shū</i> (x-)	*-ien	*-i, *-in, *-iəu, *-iəu, *-iaŋ, *-iaŋ *-y, *-ya ^白 ~*ye ^文 (說 <i>shuō</i>)	<ul style="list-style-type: none"> ɣ- before *-i, or ɛ- before high front vowels
LD-a	船 <i>chuán</i> (ɣ-), 禪 <i>shàn</i> (ɣ-) (only the 3 characters 善 <i>shàn</i> , 順 <i>shùn</i> , 純 <i>chún</i>)	*-ien *-yn	*-i, *-iəu, *-ie, *-in, *-iəu, *-iaŋ *-y	<ul style="list-style-type: none"> dz- before *-i non-MC <i>rù</i> tone, z- before high front vowels or ɛ- before high front vowels with MC <i>rù</i> tone (熟 <i>shóu</i>, 舌 <i>shé</i>, 實 <i>shí</i>, 述 <i>shù</i>, 食 <i>shí</i>, 十 <i>shí</i>) (except 睡 <i>shuì</i>, which has a ɛ- without MC <i>rù</i> tone) (書 <i>shū</i> initial characters stay as s-, or ɛ- before high front vowels. Before final *-i, those without MC <i>rù</i> tone are read as s-, and those with MC <i>rù</i> tone ɛ-)
LD-b	船 <i>chuán</i> (ɣ-), 禪 <i>shàn</i> (ɣ-) (only the 2 characters 順 <i>shùn</i> and 純 <i>chún</i>)	*-yn	*-i, *-iəu, *-ie, *-in, *-iəu, *-iaŋ, *-ien *-y (殊 <i>shū</i> hardening)	<ul style="list-style-type: none"> ts^h- before CCX *-i non-MC <i>rù</i> tone, and ɛ- before MC <i>rù</i> tone ɛ- before high front vowels (書 <i>shū</i> initial characters stay as s-, or ɛ- before high front vowels. Before final *-i, those without MC <i>rù</i> tone are read as s-, and those with MC <i>rù</i> tone ɛ-)
LY	船 <i>chuán</i> (x-, 順 <i>shùn</i> , 舌 <i>shé</i>), 書 <i>shū</i> (x-), 禪 <i>shàn</i> (x-)	*-ien, *ə (舌 <i>shé?</i>) *-ya~*ye, *-yn, *-y~*yi	*-i, *-iəu, *-in, *-iaŋ, *-iəu, *-iəu, *-iəŋ *-y (水 <i>shuǐ</i> , 書 <i>shū</i> , 鼠 <i>shǔ</i> , 樹 <i>shù</i> , 殊 <i>shū</i> (hardening))	<ul style="list-style-type: none"> s- before *-i non-MC <i>rù</i> tone, or ɛ- with MC <i>rù</i> tone ɣ- before non-high front vowels, or ɛ- before high front vowels (書 <i>shū</i> initial characters stay as ɣ- before non-high front vowels, s- before *-i non-MC <i>rù</i> tone or ɛ- with MC <i>rù</i> tone, or ɛ- before high front vowels)
	知 <i>zhī</i> (k-), 澄 <i>chéng</i> (k-) 章 <i>zhāng</i> (k-), 昌 <i>chāng</i> (k ^h -), 船 <i>chuán</i> (k-, 船 <i>chuán</i>)	*-ien *-yn, *-yen, *-yi	*-iəŋ, *-iəu, *-in, *-iaŋ, *-iəu, *-iəu, *-iəŋ *-y (hardening) *-i (no hardening) *-yi (錐 <i>zhuī</i> no hardening)	<ul style="list-style-type: none"> t-, t^h- before hardening finals ts-, ts^h- before non-hardening finals, or tɛ-, tɛ^h- before high front vowels
AH	船 <i>chuán</i> (> l-), 禪 <i>shàn</i> (> l-)	Finals that show > l- *-in, *-iaŋ	Finals that do not show > -l *-i, *-iəu, *-ie, *-iəu, *-ien	<ul style="list-style-type: none"> z- before *-i non-MC <i>rù</i> tone, or s- before MC <i>rù</i> tone s- before non-high front vowels, or ɛ- before high front vowels

			*-y, *-yn	(書 <i>shū</i> initial characters stay as s-, or ɛ- before high front vowels)
HT-a	--	--	--	s- before non-high front vowels, or ɛ- before high front vowels (*-i all turn to -e, parallel to *-i after MC affricates)

Table 116. Velarization conditioning factors in the Central Xiāng dialects. Ānhuà does not have velarization but has a change to l- for some 船 *chuán* and 禪 *shàn* characters. The pattern is also compared in this table. Huitóng Línchéng does not show velarization of any kind.

Dialect	Condition	Exceptions
XX	Initial voicing (船 <i>chuán</i> and 禪 <i>shàn</i> but not 書)	CCX *-i
SF	1. 船 <i>chuán</i> , 禪 <i>shàn</i> , and 書 <i>shū</i> (2 characters 閃 <i>shǎn</i> and 扇 <i>shàn</i>) 2. *-ien, *-ə, *-iaŋ, *-iəu, *-in; *-y, *-yn	CCX *-i 上 <i>shàng</i> and 尚 <i>shàng</i> (CCX *-iaŋ), 睡 <i>shuì</i> and 述 <i>shù</i> (CCX *-y), 熟 <i>shóu</i> (CCX *-iəu)
LD-a	Only 3 characters 善 <i>shàn</i> , 順 <i>shùn</i> , 純 <i>chún</i>	--
LD-b	Only 2 characters 順 <i>shùn</i> , 純 <i>chún</i>	--
LY	1. 知 <i>zhī</i> (知 <i>zhī</i> , 徹 <i>chè</i> , 澄 <i>chéng</i>) and 章 <i>zhāng</i> (章 <i>zhāng</i> , 昌 <i>chāng</i> , 船 <i>chuán</i> , 書 <i>shū</i> , 禪 <i>shàn</i>) initial group characters 2. <i>chóngniǔ</i> rhymes in 咸 <i>xián shè kāikǒu</i> , 山 <i>shān shè kāikǒu</i> and 咸 <i>xián shè kāikǒu</i> , 臻 <i>zhēn shè hékǒu</i> , and 止 <i>zhǐ shè hékǒu</i>	The <i>chóngniǔ</i> rhymes in 深 <i>shēn shè kāikǒu</i> , 效 <i>xiào shè kāikǒu</i> , and 臻 <i>zhēn shè kāikǒu</i>
AH	(> l-) initial voicing (船 <i>chuán</i> and 禪 <i>shàn</i> but not 書 <i>shū</i>)	CCX *-i CCX *-y and *-yn 舌 <i>shé</i> (CCX *-ə), 善 <i>shàn</i> (CCX *-ien), 熟 <i>shóu</i> (CCX *-iəu), 盛 <i>shèng</i> (CCX *-in)
HT-a	--	--

Whether the velarization phenomenon in Liányuán is a retention or innovation is probably worth some discussion here. It has been noted by some Chinese scholars of the reading of 章 *zhāng* group characters as velars in the Xiāng dialects can be a retention, because 章 *zhāng* group characters come from Old Chinese velars (Zhou 2007). It is true that Schuessler (1996) has proposed palatalization of Old Chinese velars, which become the palatals of 章 *zhāng* group in Middle Chinese, under the effect of some kind of following high front vowel or medial that became Middle Chinese *chóngniǔ* rhymes, but there are many differences between Liányuán velarization and the 章 *zhāng* group characters that are from Old Chinese velars. For the Old Chinese velars that

palatalized to Middle Chinese 章 *zhāng* group characters, they occur to Old Chinese *k- and *g-, but not to the aspirated *k^h- or the velar fricatives. Also, palatalization appears to have happened to characters in Middle Chinese 止 *zhǐ shè kāikǒu*, for instance the character 支 *zhī*. For the velarization phenomenon in Liányuán, however, the voiceless aspirated stops and fricatives of Middle Chinese (昌 *chāng*, 船 *chuán*, 書 *shū*, and 禪 *shàn*) are also affected. Unlike the palatalization of Old Chinese velars, the 止 *zhǐ shè kāikǒu* characters are not affected. Furthermore, velarization applies to not just 章 *zhāng* group but 知 *zhī* group division III characters as well, under the same condition. In fact, none of the 章 *zhāng* group characters are read as velar stops are reconstructed as Old Chinese velars in Baxter and Sagart's system (2014)²². These differences make it hard to posit a retention scenario for the 章 *zhāng* group characters that are read as velars.

Aside from this issue, there are two other things that are worth some mentioning here. The first one is that there seems to be a general trend for MC division III finals to turn out as having some high front medial or main vowel element in Xiāngxiāng, Shuāngfēng, and the two Lóudǐ dialects, thereby causing palatalization in the initials. Whereas in Ānhuà and Huìtóng, the more common reflex is to not have such high front element, and palatalization is found much fewer than in Xiāngxiāng, Shuāngfēng, and the two Lóudǐ dialects. Liányuán seems to be somewhere in the middle. This coincides with the fact that Ānhuà and Huìtóng are the two dialects that show less hardening. Recall that they fewer finals cause Type I hardening in Ānhuà and Huìtóng, and both of them show no sign of Type II hardening at all. This may be a side confirmation that a high front medial or main vowel element is needed for both Type I and Type II hardening.

²² There may be some differences in different scholar's reconstructions. Here I follow Baxter and Sagart's 2014 system.

Another thing to note here is MC *rù* tone as the condition for 船 *chuán*, 書 *shū*, and 禪 *shàn* initial split when combined with CCX final *-i. The split is found in 船 *chuán* and 禪 *shàn* initial characters in Xiāngxiāng, Shuāngfēng, the two Lóudǐ dialects, and Ānhuà, and is found with 書 *shū* initial characters in the two Lóudǐ dialects. Coblin reconstructs a *rù* tone category but without any consonant ending for CCX as reflex of MC *yīn rù* characters. On the other hand, MC *yáng rù* characters are reconstructed as CCX *yīn qù*. The innovation of *yáng rù* > *yīn qù* is actually selected as the criterium for classifying the Central Xiāng dialects (Coblin 2011: 192-206). It is true that we do not see any consonant ending in any of the Central Xiāng dialects. And as Coblin points out, *rù* tone is only preserved in some MC *yīn rù* characters in Liányuán and Xīnhuà. It is therefore only reasonable for Coblin to reconstruct CCX the way he has. But for the split in 船 *chuán*, 書 *shū*, and 禪 *shàn* initial characters with CCX *-i finals to happen under the condition of MC *rù* tone, this would contradict with Coblin's current reconstruction. Of course, many questions remain to be solved at this stage: Why is MC *rù* tone only a condition with CCX *-i final? What is the cause for MC *rù* tone to work this way? Can the split be found outside of 船 *chuán*, 書 *shū*, and 禪 *shàn* initial characters, i.e. with other MC initials that combine with CCX *-i? Does MC *rù* tone act as a conditioning factor for some other sound change in the Central Xiāng dialects? These questions are worth detailed study for the further understanding on the Xiāng dialects. In any case, MC *rù* tone as the conditioning factor for the split in the 船 *chuán*, 書 *shū*, and 禪 *shàn* initials suggests that *rù* tone probably exists in some form later than CCX, and we probably need to reconsider the role of *yáng rù* > *yīn qù* as the criterium for classifying the Central Xiāng dialects.

3.4 THE 船 *CHUÁN* AND 禪 *SHÀN* INITIAL CHARACTERS

Since there are some characters in the 船 *chuán* and 禪 *shàn* initials that are read as stops, and since the 船 *chuán* and 禪 *shàn* initials are a part of the 章 *zhāng* group, the 船 *chuán* and 禪 *shàn* initials are worth some discussion here.

The reconstruction of Middle Chinese 船 *chuán* and 禪 *shàn* initials have been in much debate. As is used for the QYS reconstructions in this work, scholars such as Li Fang-Kuei have reconstructed 船 *chuán* as an affricate and 禪 *shàn* a fricative. On the other hand, Pulleyblank (1962: 68-69), Baxter (2014: 14-16), and others consider 船 *chuán* a fricative and 禪 *shàn* an affricate. This problem arose because both 船 *chuán* and 禪 *shàn* initial characters have a mixed reading of affricates and fricatives in all dialects.

The same state of a mixture of readings in different manners of articulation is also found in the Xiāng dialects. There are several features that can be observed based on their different readings under different environments. These features have mostly been mentioned in the discussion in the previous section, but here I summarize the points again:

- (1) These seven Xiāng dialects all quite consistently have an initial before 止 *zhǐ shè kāikǒu* rhymes that is different to readings under different conditions. Furthermore, the readings of both 船 *chuán* and 禪 *shàn* initials are the same under such condition. Xiāngxiāng, Shuāngfēng, and Lóudǐ Lǎojiē have a voiced dental affricate dz- for both 船 *chuán* and 禪 *shàn* initial characters, Lóudǐ Jiāolóngcūn has a voiceless aspirated dental affricate ts^h-, and Liányuán has a voiceless dental fricative s-. Ānhuà and Huitóng-a do not have example

characters in 船 *chuán* initial. Below are two examples, one 船 *chuán* initial and one 禪 *shàn* initial.

Table 117. Character readings of 示 *shì* (船 *chuán* initial) and 是 *shì* (禪 *shàn* initial) in the Xiāng dialects.

Dialect	示 <i>shì</i>	是 <i>shì</i>
XX	--	dz ₁ ^{陽去}
SF	dz ₁ ^{陽去}	dz ₁ ^{陽去}
LD-a	dz ₁ ^{陽去}	dz ₁ ^{陽去}
LD-b	ts'ɿ ^{陽去}	ts'ɿ ^{陽去}
LY	sɿ ^{陽去}	sɿ ^{陽去}
AH	--	zɿ ^{陽去}
HT-a	--	se ^{陽去}
MC	止開三去至船	止開三上紙禪
CN rhyme	O	O
QYS	dzi ^去	zje ^上
CDC	*zhi6	*shi4
CCX	*zɿ ^{陽去} ~ *zɿ ^{陰去}	*zɿ ^{陽上} ~ *zɿ ^{陽去}

(2) Velar fricatives before various velarization conditions in each dialect. For the discussion of velarization, see section 3.3.

(3) Xiāngxiāng and Shuāngfēng have a voiceless retroflex fricative ʂ- reading under what seems to be the condition of *rù* tone plus CCX final *-i. This ʂ- is not found under other environments for the 船 *chuán* and 禪 *shàn* initial characters. Two examples of this type are given below.

Table 118. Character readings of 實 *shí* (船 *chuán* initial) and 十 *shí* (禪 *shàn* initial) in Xiāngxiāng and Shuāngfēng and other Xiāng dialects.

Dialect	實 <i>shí</i>	十 <i>shí</i>
XX	ʂɿ ^{陰去}	ʂɿ ^{陰去}
SF	ʂɿ ^{陰去}	ʂɿ ^{陰去}
LD-a	ei ^{陰去}	ei ^{陰去}
LD-b	ei ^{陰去}	ei ^{陰去}
LY	ei ^{陰去}	ei ^{陰去}
AH	sɿ ^{陰去}	sɿ ^{陰去}

HT-a	se ^{陰去}	se ^{陰去}
MC	臻開三入質船	深開三入緝禪
CN rhyme	O	O
QYS	dʒjet ^入	ʒjəp ^入
CDC	*zhit8	*zhip8
CCX	*ʒi ^{陰去白} ~ ʒi ^{入文}	ʒi ^{陰去}

(4) Ānhuà has a very interesting lateral approximant l- reading for both 船 *chuán* and 禪 *shàn* initial characters. The condition seems to be before finals that have a nasal ending, although there are exceptions.

Table 119. Character readings of 神 *shén*, 順 *shùn*, 上 *shàng*, 善 *shàn*, and 壽 *shòu* in Ānhuà and other Xiāng dialects.

Dialect	神 <i>shén</i>	順 <i>shùn</i>	上 <i>shàng</i>	善 <i>shàn</i>	壽 <i>shòu</i>
XX	yian ^{陽平}	yyan ^{陽去}	yan ^{陽去}	dzɿ ^{陽去}	yiei ^{陽去}
SF	yien ^{陽平}	yyen ^{陽去}	san ^{陰去文} ~ san ^{陽去白}	yī ^{陽去}	yio ^{陽去}
LD-a	zin ^{陽平}	yun ^{陽去}	ziŋ ^{陽去}	yī ^{陽去}	zio ^{陽去}
LD-b	eien ^{陽平}	yuen ^{陽去}	eiŋ ^{陽去}	ei ^上	eiŋ ^{陽去}
LY	ʂen ^{陽平}	xuən ^{陽去}	ʂŋ ^{陽去}	xi ^{陽去}	ʂau ^{陽去}
AH	lən ^{陽平}	eyn ^{陰去文} ~ yn ^{陽去白}	lan ^{陽去}	s̃ ^{陽去}	səu ^{陰去文} ~ ləu ^{陽去白}
HT-a	sen ^{陽平}	eyn ^{陽去}	san ^{陽去}	sen ^{陽去}	səu ^{陽去}
MC	臻開三平眞船	臻合三去稜船	宕開三上養禪	山開三上獮禪	流開三去宥禪
CNR	O	O		O	
QYS	dʒjen ^平		ʒjang ^上 , ʒjang ^去	ʒjän ^上 , ʒjän ^去	ʒjəu ^上 , ʒjəu ^去
CDC	*zhin ²		*zhiong ⁴ ~ *zhiong ⁶	*zhian ⁶	*zhieu ⁶
CCX	*zīn ^{陽平}		*zian ^{陽上白} (~ *zian ^{陽去文})	*zīen ^{陽去}	*zīəu ^{陽去}

The following table summarizes the above points, adding in the readings found outside of the mentioned conditions.

Table 120. 船 *chuán* and 禪 *shàn* initial possible readings besides stops in the Xiāng hardening dialects.

	船 <i>chuán</i>				禪 <i>shàn</i>			
	Velarization	CCX *-i non-MC rù tone	CCX *-i MC rù tone	Others	Velarization	CCX *-i non-MC rù tone	CCX *-i MC rù tone	Others
XX	ɣ	dz	ʂ	ɛ	ɣ	dz	ʂ	ɛ, dz
SF	ɣ, x	dz	ʂ	ɛ	ɣ	dz	ʂ	ɛ, s

LD-a	ɣ	dz	ɛ	z, ɛ	ɣ	dz	ɛ	z, ɛ
LD-b	ɣ	ts ^h	ɛ	ɛ, s	ɣ	ts ^h	ɛ	ɛ
LY	x	s	ɛ	ʂ, ɛ	x	s	ɛ	ʂ, ɛ
AH	(ɛ, Ø)	--	s	l, ɛ, s	(Ø)	z	s	l, ɛ, s, Ø
HT-a	--	--	s	s, ɛ	--	s	s	s, ɛ

As have been pointed out in the previous discussions, there are five characters of the 船 *chuán* and 禪 *shàn* initials that are almost always read as dental stops (or velar stop in Liányuán if the condition is met) in all the hardening dialects of Xiāng. These characters are given in the following table.

Table 121. The five 船 *chuán* and 禪 *shàn* initial characters that show hardening in almost all the hardening dialects of Xiāng.

Dialect	船 <i>chuán</i>	臣 <i>chén</i>	承 <i>chéng</i>	成 <i>chéng</i>	城 <i>chéng</i>
XX	d yī ^{陽平}	d Λn ^{陽平}	d Λn ^{陽平}	d Λn ^{陽平}	d Λn ^{陽平}
SF	dui ^{陽平}	di ɛn ^{陽平}	di ɛn ^{陽平}	di ɛn ^{陽平文 ~ yinɿ} 陽平白	di ɛn ^{陽平}
LD-a	dui ^{陽平}	di n ^{陽平}	di n ^{陽平}	di n ^{陽平}	di n ^{陽平}
LD-b	t 'ui ^{陽平}	t 'ɛn ^{陽平}	t 'ɛn ^{陽平}	t 'ɛn ^{陽平文 ~ eio} 陽平白	t 'ɛn ^{陽平}
LY	kui ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}	t ɛn ^{陽平}
AH	te'yē ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}
HT-a	teyen ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}	t ən ^{陽平}
MC	山合三平仙船	臻開三平真禪	曾開三平蒸禪	梗開三平清禪	梗開三平清禪
CN rhyme	O	O			
QYS	dʒjwǎn ^平	ʒjen ^平	ʒjəŋ ^平	ʒjǎŋ ^平	ʒjǎŋ ^平
CDC	*jion ²	*jin ²	*zhiŋ ² ~ *jing ²	*zhiang ² ~ *jiang ²	*zhiang ² ~ *jiang ²
CCX	*dzyen ^{陽平} ~ *ɣyen ^{陽平} (?)	*dzjn ^{陽平}	*dzjn ^{陽平}	*dzjn ^{陽平文 ~ zjɿŋ} 陽平白	*dzjn ^{陽平}

In comparison with the previous observations on the various 船 *chuán* and 禪 *shàn* initial readings, these character readings stand out because they consistently harden to stops, except for the readings for the character 船 *chuán* in Ānhuà and Huìtóng-a, which are affricates. Compare to Table 74, where most of the 船 *chuán* and 禪 *shàn* initial readings are fricatives, except 止 *zhǐ shè kāikǒu* or other finals that are reconstructed as CCX *-i by Coblin (2011) in Xiāngxiāng, Shuāngfēng, and

Lóudǐ Lǎojiē when they are read as affricates. In the discussion for both Type I and Type II hardening, however, we know that CCX *-i never induces hardening except in Huitóng-a. Furthermore, although these characters do satisfy the proposed conditions for hardening, that is a high front vowel element, there are other 船 *chuán* and 禪 *shàn* initial characters that also satisfy the conditions but do not show hardening. For example, the character 辰 *chén* has the exact same hexagram as 臣 *chén*, but of the collected data they are all read as fricatives. Another example is 盛 *chéng*, which for one of the readings has the exact same hexagram as 成 *chéng* and 城 *chéng*, but again are read as fricatives in all data. The examples of 辰 *chén* and 盛 *chéng* are given below.

Table 122. Character readings of 辰 *chén* and 盛 *chéng* in the Xiāng dialects.

Dialect	辰 <i>chén</i>	盛 <i>chéng</i>
XX	--	--
SF	yien ^{陽平}	yien ^{陽平}
LD-a	zin ^{陽平}	ein ^{陰去}
LD-b	cien ^{陽平}	--
LY	--	ʂen ^{陽平}
AH	--	--
HT-a	--	--
MC	臻開三平真禪	梗開三平清禪
CN rhyme	O	
QYS	ʒjen ^平	ʒjäng ^平
CDC	*zhin ²	*zhiang ² ~ *jiang ²
CCX	*zjin ^{陽平}	*dzjin ^{陽平}

Essentially, these five characters pose another series of hard questions related to hardening: If 船 *chuán* and 禪 *shàn* initials were previously affricates, why did only these five characters become stops while the majority of the others became fricatives? If they were previously fricatives, what was the trigger that made only these five characters become stops? Can their status help answer some questions related to hardening, such as the condition and trigger?

On the other hand, it would be interesting if we could trace back the source of these five words. Studies on the change of these five words may help sort out the problem of mixed readings of affricates and fricatives for 船 *chuán* and 禪 *shàn* initial characters in the Chinese dialects, and help solve the question of whether 船 *chuán* and 禪 *shàn* initials were affricates or fricatives. In addition, since they show great consistency in the Xiāng hardening dialects, it is likely that they came from the same source of the original ancestor language. Comparing the same five character pronunciations in the Gàn dialects that have hardening or even the other major dialect groups might be able to tell us something of the common origins of these dialects. They are not discussed in the present work, but are all questions for possible future studies.

3.5 慈利 CÍLÌ DIALECT: HARDENING IN OTHER NOT-YET CLASSIFIED DIALECTS IN HÚNÁN PROVINCE

This section discusses the dialect Cíli, a dialect located in Húnán Province that show hardening but is not included in Coblin's 2011 book, because of dialect-classification issues. There are also some dialects given in 湖南方言調查報告 *Húnán Fāngyán Diàochá Bàogào* (Yang 1974) that have hardening but are classified as Gàn dialects and are therefore excluded from this discussion. These dialects are: 岳陽 Yuèyáng, 醴陵 Lílíng, 攸縣 Yōu County, and 常寧 Chángníng. The Gàn dialects are discussed in section 1.2.6. There is also a 嘉禾 Jiāhé dialect which is classified as Southwestern Mandarin and is thus also not included in the discussion.

Cíli is located in northern Húnán Province, close to the border of Húnán Province and Húběi Province. This is a place where many different Chinese dialects and even non-Chinese languages,

locally called 土家語 Tǔjiāyǔ ‘local language’, are in use. To the north are Jiānghuái Mandarin and Southwestern Mandarin used in Húběi province, to the south and east are Xiāng dialect areas (Zhang & Qi 2017). Because of this, the classification for the major Chinese dialect used in Cílì is still under much debate. 湖南方言調查報告 *Húnán Fāngyán Diàochá Bàoào* (Studies on the Hunan Dialects) by Yang (1974: 1442) classifies Cílì as a classical Xiāng dialect. But he also classifies many dialects that are later considered as Gàn dialects, such as Liúyáng and Lǐlíng, into the same core Xiāng dialect group, leaving later scholars doubtful of his classification. Some scholars consider Cílì dialect to be Southwestern Mandarin (Zhang & Qi 2017, Li 1994), while some propose Jiānghuái Mandarin (Bao & Yan 1986). There are also some other scholars think Cílì can be classified as neither Southwestern or Jiānghuái Mandarin, and that further evidence would be needed to make a better decision (Lu 2012).

The data used here is from *Húnán Fāngyán Diàochá Bàoào* (Yang 1974: 129-145). Although the book is published in 1974, the original data of Cílì is collected in 1935 by 丁聲樹 Dīng Shēngshù. One thing to note here is that the *Húnán Fāngyán Diàochá Bàoào* does not have a complete set of characters as 方言同音字彙 *Fāngyán Tóngyīn Zìhuì* (Homophones in Dialects) studies normally would have, but only a small set of characters. As mentioned previously, *Húnán Fāngyán Diàochá Bàoào* classifies Cílì dialect as a Xiāng dialect. There are several noticeable differences in the 1935 version to the more recent documentations of Cílì as discussed above. First, the 1935 version shows hardening of 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* group characters to retroflex stops, while the later documentations do not. Second, the 1935 version has an interesting labiodental affricate series pf- before 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* supposedly rounded finals, which is not found in other Chinese dialects except in Northwestern Mandarin, as

discussed in section 1.1.5. The initial readings of 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* characters in Cǐlì basically have the same kind of distribution as in the Northwestern Mandarin dialects (Jiang 1992). This feature is also mentioned in Zhang & Qi (2017), but not documented in Lu (2012).

The Cǐlì dialect has five tones: 陰平 *yīnpíng* (25), 陽平 *yángpíng* (13), 上 *shǎng* (52), 陰去 *yīnqù* (12), and 陽去 *yángqù* (33). The initials are listed as follows:

p	p ^h	pf	pf ^h	m	f	
t	t ^h	ts	ts ^h	n	s	l
t̚	t̚ ^h	tʃ	tʃ ^h		ʃ	
k	k ^h			ŋ	x	
∅						
(zero initial)						

As documented in *Húnán Fāngyán Diàochá Bàogào*, this dialect has hardening of 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* characters to retroflex stops. The 莊 *zhuāng* group characters that have hardening are all characters that are combined with both division II and III rhymes. There are also a few 禪 *shàn* characters that show hardening: 臣 *chén*, 成 *chéng*, and 誠 *chéng*. In addition, hardening initials can combine with 止 *zhǐ shè* finals. However, there are no 山 *shān shè* characters that show hardening. Two of the common hardening characters that Coblin has for the Xiāng dialects are 展 *zhǎn* and 專 *zhuān*, which are [tʃian^上] and [tʃyan^{陰平}] in Cǐlì. Although it might be because this data set does not offer a complete set of characters, it is still interesting to see two of the common 山 *shān shè* characters that show hardening in other Xiāng dialects not have hardening in Cǐlì. Another character that is a common hardening character for the other Xiāng dialects is 沾

zhān, which is [tʃian^{陰平}] in Cǐlì and also does not have hardening. The following table shows some examples of hardening characters.

Table 123. Hardening examples of 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* characters in Cǐlì.

MC	-Voi, -Asp			-Voi, -Asp	+Voi		-Voi, Fri.	
知 <i>zhī</i>	桌 <i>zhuō</i>	中 <i>zhōng</i>	竹 <i>zhú</i>	知 <i>zhī</i>	寵 <i>chǒng</i>	蟲 <i>chóng</i>	痔 <i>zhì</i>	
MC	江開二入 覺知	通開三平 東知	通開三入 屋知	止開三 平支知	通開三上腫 徹	通開三平 東澄	止開三上 止澄	
QYS	tʰak ^入	tʃung ^平	tʃuk ^入	tʃe ^平	tʃjwong ^上	dʒung ^平	ɕi ^上	
	tʰo ^{陰平}	tʰoŋ ^{陰平}	tʰəʊ ^{陰平}	tʰi ^{陰平}	tʰoŋ ^上	tʰoŋ ^{陽平}	tʰi ^{陽去}	
莊 <i>zhuāng</i>	捉 <i>zhuō</i>	齋 <i>zhāi</i>	斬 <i>zhǎn</i>		炒 <i>chǎo</i>	柴 <i>chái</i>		
MC	江開二入 覺莊	蟹開二平 皆莊	咸開二上 賺莊		效開二上巧 初	蟹開二平 佳崇		
QYS	tʰak ^入	tʰai ^平	tʰam ^上		tʰau ^上	dʒai ^平		
	tʰo ^{陰平}	tʰai ^{陰平}	tʰan ^上		tʰau ^上	tʰai ^{陰平}		
章 <i>zhāng</i>	眾 <i>zhòng</i>	囑 <i>zhù</i>	之 <i>zhī</i>		充 <i>chōng</i>	乘 <i>chéng</i>	臣 <i>chén</i>	成 <i>chéng</i>
MC	通開三去 送章	通開三入 燭章	止開三平 之章		通開三平東 昌	曾開三平 蒸船	臻開三平 真禪	梗開三平 清禪
QYS	tʃjung ^去	tʃjwok ^入	tʃi ^平		tʃhjung ^平	dʒjɔŋ ^平	ʒjen ^平	ʒjɔŋ ^平
	tʃoŋ ^{陰去}	tʃjəʊ ^{陰平}	tʃi ^{陰平}		tʃoŋ ^{陰平}	tʃəŋ ^{陽平}	tʃəŋ ^{陽平}	tʃəŋ ^{陽平}

Some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* characters turn into labiodental affricates. The condition seems to be based on not just Middle Chinese *hékǒu*, but also any kind of rounding that supposedly was there in the final at some time. The following table gives some examples of these characters.

Table 124. Labiodentalized 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* character examples in Cǐlì.

MC	-Voi, -Asp			-Voi, +Asp	+Voi		-Voi, Fri.
知 <i>zhī</i>	椿 <i>zhuāng</i>	豬 <i>zhū</i>	追 <i>zhuī</i>	椿 <i>chūn</i>	除 <i>chú</i>	柱 <i>zhù</i>	
MC	江開二平江知	遇開三平魚知	止合三平脂知	臻合三平諄徹	遇開三平魚澄	遇合三上麌澄	
QYS	tʃang ^平	tʃwo ^平	tʃwi ^平	tʃjuən ^平	dʒwo ^平	dʒu ^上	
	pʃaŋ ^{陰平}	pʃu ^{陰平}	pʃəi ^{陰平}	pʃəŋ ^{陰平}	pʃu ^{陽平}	pʃu ^{陰去}	
莊 <i>zhuāng</i>				窗 <i>chuāng</i>	狀 <i>zhuàng</i>		
MC				江開二平江初	宕開三去漾崇		
QYS				tʃhɔŋ ^平	dʒjɔŋ ^去		
				pʃaŋ ^{陰平}	pʃaŋ ^{陽去}		
章 <i>zhāng</i>	主 <i>zhǔ</i>	拙 <i>zhuō</i>		春 <i>chūn</i>	船 <i>chuán</i>	垂 <i>chuí</i>	

MC	遇合三上虞章	山合三入薛章		臻合三平諄昌	山合三平仙船		止合三平支禪
QYS	tʃju ^上	tʃwät ^入		tʃjuən ^平	dʒjwän ^平		ʒjwě ^平
	pfu ^上	pfe ^{陰平}		pfʼən ^{陰平}	pfʼan ^{陽平}		pfʼoi ^{陽平}

There are some 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* characters that do not show hardening. The previously mentioned 展 *zhǎn*, 專 *zhuān*, and 沾 *zhān* are three of them. The table below presents all the Middle Chinese 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* affricate-initial characters that do not show hardening in Cǐlì in this data source.

Table 125. Middle Chinese 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* affricate-initial characters that do not have hardening in Cǐlì.

	-Voi, -Asp		-Voi, +Asp	+Voi
知 <i>zhī</i>	展 <i>zhǎn</i>	沾 <i>zhān</i>	徹 <i>chè</i>	澈 <i>chè</i>
MC	山開三上彌知	咸開三平鹽知	山開三入薛徹	山開三入薛澈
QYS	tʃän ^上	tʃäm ^平	tʃjät ^入	ʒjät ^入
	tʃian ^上	tʃian ^{陰平}	tʃʼie ^{陰平}	tʃʼie ^{陰平}
莊 <i>zhuāng</i>	爭 <i>zhēng</i>			崇 <i>chóng</i>
MC	梗開二平耕莊			通開三平東崇
QYS	tʃɛng ^平			dʒjuŋ ^平
	tʃin ^{陰平}			tʃʼioŋ ^{陽平}
章 <i>zhāng</i>	專 <i>zhuān</i>		樞	
MC	山合三平仙章		遇合三平虞昌	
QYS	tʃjwän ^平		tʃju ^平	
	tʃyan ^{陰平}		tʃʼy ^{陰平}	

Unlike most of the Central Xiāng dialects, the characters of division III 知 *zhī* group and 章 *zhāng* initials combined with 止 *zhǐ shè* rhymes or other rhymes that have CCX final *-i do show hardening. The table below shows the division III 知 *zhī* group and 章 *zhāng* initial characters that have 止 *zhǐ shè* rhymes or other rhymes that have CCX final *-i and show hardening.

Table 126. Division III 知 *zhī* group and 章 *zhāng* initial characters with 止 *zhǐ shè* rhymes or similar finals that show hardening in Cǐlì.

	-Voi, -Asp	+Voi
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知 <i>zhī</i>	知 <i>zhī</i>	致 <i>zhì</i>		遲 <i>chí</i>	痔 <i>zhì</i>	滯 <i>zhì</i>
MC	止開三平支知	止開三去至知		止開三平脂澄	止開三上止澄	蟹開三去祭澄
QYS	tje ^平	tʰi ^去		di ^平	di ^上	dʒai ^去
	tʰi ^{陰平}	tʰi ^{陰去}		tʰi ^{陽平}	tʰi ^{陽去}	tʰi ^{陽去}
章 <i>zhāng</i>	至 <i>zhì</i>	志 <i>zhì</i>	之 <i>zhī</i>			
MC	止開三去至章	止開三去志章	止開三平之章			
QYS	tʰi ^去	tʰi ^去	tʰi ^平			
	tʰi ^{陰去}	tʰi ^{陰去}	tʰi ^{陰平}			

Cíli does not show Type II hardening, i.e. hardening of MC 見 *jiàn* initial group characters, or velarization. The 見 *jiàn* initial group characters remain velar stops or are read as palatal alveolar tʃ-, tʃʰ- before high front medials or main vowels. The following table gives some examples of 見 *jiàn* initial group characters.

Table 127. Examples of 見 *jiàn* initial group characters in Cíli.

	江 <i>jiāng</i>	孤 <i>gū</i>	空 <i>kōng</i>	極 <i>jí</i>
MC	江開二平江見	遇開一平模見	通開一平東溪	曾開三入職羣
QYS	kɑŋ ^平	kuo ^平	khung ^平	gʒək ^入
	tʃiɑŋ ^平	ku ^{陰平}	k'oŋ ^平	tʃi ^{陰去}

Characters of 船 *chuán*, 禪 *shàn*, and 書 *shū* initials of the 章 *zhāng* group can essentially be grouped into two types of readings: an aspirated labiodental affricate fʃ- before MC *hékǒu* rhymes, or a palato-alveolar fricative ʃ- before *kāikǒu* rhymes. The 莊 *zhuāng* initial group voiceless fricative 生 *shēng* initial also show this split. There is one interesting character 沙 of the 生 *shēng* initial that is read with s- initial instead of ʃ- or f-. This is the only case of 船 *chuán*, 禪 *shàn*, 書 *shū*, and 生 *shēng* initial characters that is read with an s- initial in the data set.

Table 128. 船 *chuán*, 禪 *shàn*, 書 *shū*, and 生 *shēng* initial character readings in Cíli. (a) Characters read with ʃ- initial, and (b) characters read with f- initial.

(a)

	繩 <i>shéng</i>	實 <i>shí</i>	上 <i>shàng</i>	是 <i>shì</i>	獸 <i>shòu</i>	世 <i>shì</i>	生 <i>shēng</i>	師 <i>shī</i>	沙 <i>shā</i>
MC	曾開三平 蒸船	臻開三入 質船	宕開三去 漾禪	止開三上 紙禪	流開三去 宥書	蟹開三去 祭書	梗開二平 庚生	止開三平 脂生	假開二平 麻生
QYS	dʒjəŋ ^平	dʒjet ^入	ʒjɑŋ ^去	ʒje ^上	ʃjəu ^去	ʃjǎi ^去	ʂəŋ ^平	ʃi ^平	ʃa ^平
	ʃin ^{陽平}	ʃi ^{陽去}	ʃiaŋ ^{陽去}	ʃi ^{陽去}	ʃiəʊ ^{陰去}	ʃi ^{陰去}	ʃin ^{陰平}	ʃi ^{陰平}	sa ^{陰平}

(b)

	睡 <i>shuì</i>	樹 <i>shù</i>	稅 <i>shuì</i>	說 <i>shuō</i>	書 <i>shū</i>	雙 <i>shuāng</i>	刷 <i>shuā</i>
MC	止合三去寘禪	遇合三去遇禪	蟹合三去祭書	蟹合三去祭書	遇開三平魚書	江開二平江生	山合二入黠生
QYS	ʒjwe ^去	ʒju ^去	ʃjwǎi ^去	ʃjwǎt ^入	ʃjwo ^平	ʃǎŋ ^平	ʃjwǎt ^入
	fʔi ^{陽去}	fu ^{陽去}	fʔi ^{陰去}	fe ^{陰平}	fu ^{陰平}	faŋ ^{陰平}	fa ^{陰平}

In the Central Xiāng dialects, there are five 船 *chuán* and 禪 *shàn* initial characters that are almost always hardened in all of the Central Xiāng dialects that show hardening. Cǐlì appears to have a similar phenomenon. The following table lists the five examples of 船 *chuán* and 禪 *shàn* initial characters that show hardening given in *Húnán Fāngyán Diàochá Bàoào*.

Table 129. Middle Chinese fricative 船 *chuán* and 禪 *shàn* initial character readings in Cǐlì.

	+Voi	+Voi, Fri.			
	船 <i>chuán</i>	臣 <i>chén</i>	成 <i>chéng</i>	誠 <i>chéng</i>	垂 <i>chuí</i>
MC	山合三平仙船	臻開三平眞禪	梗開三平清禪	梗開三平清禪	止合三平支禪
QYS	dʒjwǎn ^平	ʒjen ^平	ʒjǎŋ ^平	ʒjǎŋ ^平	ʒjê ^平
Cǐlì	pʔ'an ^{陽平}	tʔ'ən ^{陽平}	tʔ'ən ^{陽平}	tʔ'ən ^{陽平}	pʔ'əi ^{陽平}

It is interesting to see that although reconstructed as fricatives by Li Fang-Kuei and other scholars, none of the five 船 *chuán* and 禪 *shàn* initial characters are read as fricative initials. Note again that 臣 *chén*, 成 *chéng*, and 船 *chuán* are three of the five 船 *chuán* and 禪 *shàn* initial characters that are read as stops in almost all the Xiāng dialects that show hardening. 誠 *chéng* does not show up in Coblin's data, but it is a homophone to 成 *chéng* in the QYS.

To sum up, the hardening pattern in Cílì is quite different to the previously discussed Central Xiāng dialects in several aspects: (1) Type II hardening does not occur in Cílì; (2) hardening not only occurs to division III 知 *zhī* and 章 *zhāng* initial group characters, but also to 莊 *zhuāng* initial group characters that combine with division II rhymes. None of the Central Xiāng dialects show hardening with 莊 *zhuāng* initial group characters; (3) 止 *zhǐ shè* still permits hardening; (4) labiodentalization. There is also one interesting similarity, which is that three of the five 船 *chuán* and 禪 *shàn* initial characters that are read as stops in almost all the Xiāng dialects also show hardening in Cílì.

The cause of Cílì dialect's hardening and labiodentalization remains uncertain. As mentioned earlier, Jiang (1992) observes that the 知 *zhī* group, 莊 *zhuāng* group, and 章 *zhāng* character initials basically have the same kind of distribution as in the Northwestern Mandarin dialects. However, Jiang himself points out that the geographical distance between Cílì and the Northwestern Mandarin dialects that have labiodental affricate initials, such as Xī'ān and 渭南 Wèinán regions, is quite far. It is not clear at this stage to say if the two places ever had any kind of connection or relation to each other.

CHAPTER 4. DISCUSSION AND CONCLUSION

In the previous chapter I went through the hardening patterns in the Central Xiāng dialects. In this section I start with comparing the two types of hardening. The generalized conditions and exceptions for both Type I and Type II hardening are shown here again for an easier comparison. For a more detailed pattern on the CCX finals that show hardening and those that do not, see the end of sections 3.1 and 3.2.

Table 70. Generalized conditions and exceptions in each dialect for Type I hardening.

	Condition	Hardening exceptions
XX	CCX medial or main vowel *-i and *-y	1. CCX final *-i 2. CCX final *-ien

SF	CCX medial or main vowel *-i and *-y	1. CCX final *-i 2. CCX final *-iəu (except 粥 and 竹, which are the only two characters that show hardening with this final) 3. CCX final *-yi (錐 and 迨)
LD-a	CCX medial or main vowel *-i and *-y	1. CCX final *-i 2. CCX final *-iəu 3. CCX final *-ien: 展、戰、沾 4. CCX final *-ib 5. The two characters 杖 and 丈 (with the CCX final *-iaŋ; the only Central Xiang dialect that does not show hardening with these two characters) 6. CCX final *-yi: 錐、迨 7. CCX final *-y
LD-b	CCX medial or main vowel *-i and *-y	1. CCX final *-i 2. CCX final *-iəu (except 竹, 粥, 祝, 畜) 3. CCX final *-yi (錐 and 迨)
LY	CCX medial or main vowel *-i and *-y	1. CCX final *-i 2. 錐 (CCX final *-yi; 迨 with the same CCX final show velarization)
AH	CCX medial or main vowel *-i	1. CCX final *-i
HT-a	CCX medial or main vowel *-i	--

Table 91. Generalized conditions and exceptions in each dialect for Type II hardening.

	Condition	Hardening exceptions
XX	CCX medial or main vowel *-y	--
SF	CCX medial or main vowel *-y	--
LD-a	CCX medial or main vowel *-y	1. Some CCX final *-y characters 據 <i>jù</i> , 鉅 <i>jù</i> , 去 <i>qù</i> , 懼 <i>jù</i> , 屈 <i>qū</i> , which all palatalized)
LD-b	CCX medial or main vowel *-y	--
LY	CCX medial or main vowel *-y	1. CCX final *-yn
AH	--	--
HT-a	--	--

We can see several differences for Type I and Type II hardening:

- (1) CCX medial and main vowel *-i is a condition for Type I hardening (except for CCX final *-i in Xiāngxiāng, Shuāngfēng, Lóudǐ Lǎojiē, Lóudǐ Jiāolóngcūn, Liányuán, and Ānhuà).

It is not a regular condition for Type II hardening.

- (2) Ānhuà and Huìtóng Línchéng show Type I hardening but not Type II hardening.

Another difference mentioned previously is:

(3) Velarization of affricates in Liányuán is found as a subtype of Type I hardening (occurs with division III 知 *zhī* and 章 *zhāng* group characters), but is not for Type II hardening (does not occur with 見 *jiàn* group characters).

Coblin discusses the two types of hardening together. In fact, his definition for “hardening” in his study is “the change of earlier “shibilants”, i.e. retroflex and secondary palatal affricates, to stops” (Coblin 2011: 47). This gives out the impression that the two types of hardening are one phenomenon. In summarizing Type I and Type II hardening, I want to bring out the question of whether they are really one process. Even when they do have the same end result of a hardened initial, the conditions do appear to be different. For one thing, CCX medial and main vowel *-i commonly induce Type I hardening in almost all these dialects, while they almost never cause Type II hardening except in Lóudǐ Lǎojiē, Lóudǐ Jiāolóngcūn, and Liányuán, in the two CCX finals *-in and *-iəu. Also, Type I hardening occurs all across these Central Xiāng dialects, but Type II hardening occurs not in Ānhuà and Huitóng-a.

The condition of a high front vowel triggering hardening is also interesting. Bybee and Easterday’s 2019 article does not specifically talk about the general conditions that could induce strengthening in the world’s languages. But to think about it, a very common sound change under the condition of a following high front medial or main vowel is palatalization. On the level of co-articulation, it is much easier to pronounce a consonant around the palatal area when expecting a following high front vowel or medial. In this view, hardening under this condition seems to be going against the most natural sound change process.

In sections 1.2 and 1.3, I went through how some of the scholars such as Luo (1940) considered hardening phenomenon in the Gàn and Xiāng dialects to be more of a retention, for the reason that

the 知 *zhī* initial group characters were known to come from OC dental stops. After going through the two types of hardening patterns, it is quite clear that the retention scenario is not possible. First of all, Type II hardening cannot be retention, since it occurs to 見 *jiàn* initial group characters, which are from OC velar stops. Secondly, the retention hypothesis would not be able to explain Type I hardening either, because the set of MC initials that show the phenomenon is different to the set of MC initials that are from OC dental stops. OC dental stops are reconstructed for 知 *zhī* initial group characters, in both divisions II and III. In the Central Xiāng dialects, however, only the division III 知 *zhī* initial group characters are affected. In addition, the 章 *zhāng* initial group characters which were never dental stops in OC are also affected by the change. This piece of evidence itself quite strongly disproves the retention scenario.

Other than the two types of hardening, I also discussed the pattern of velarization. Velarization of previous affricates to velar stops only occurs in Liányuán, as a subtype of Type I hardening. The condition may have something to do with *chóngniǔ* rhymes, since all of the velarization cases are found in rhymes that have *chóngniǔ*. Interestingly, velarization of fricatives in Liányuán has the same condition as velarization to velar stops. Some scholars (Zhou 2007) have proposed that readings as velars in these dialects is a retention, because it is known that some MC 章 *zhāng* group characters are from Old Chinese velars. I concluded that the change can only be an innovation, because of the following three reasons: (1) Old Chinese *k- and *g- show palatalization to MC 章 *zhāng* group characters, but not to the aspirated *k^h- or the velar fricatives (Schuessler 1996). In Liányuán, however, the MC voiceless aspirated stops and fricatives (昌 *chāng*, 船 *chuán*, 書 *shū*, and 禪 *shàn*) are also affected. (2) Palatalization of OC velars appears to have happened to characters in MC 止 *zhǐ shè kāikǒu*, for instance 支 *zhī*. But the 止 *zhǐ shè kāikǒu*

characters in Liányuán are not affected. (3) Velarization is found not just with 章 *zhāng* group but 知 *zhī* group division III characters as well, under the same condition. In fact, none of the 章 *zhāng* group characters are read as velar stops are reconstructed as Old Chinese velars in Baxter and Sagart's system (2014). Based on these three reasons it is hard to say the characters that are read as velars in Liányuán are retentions from an earlier stage, and we must conclude that they are actually innovations.

Aside from velarization to velar stops, Xiāngxiāng, Shuāngfēng, Lóudǐ Lǎojiē, and Lóudǐ Jiāolóngcūn also show velarization of fricatives, where the 船 *chuán* and 禪 *shàn* initial characters may be read as velar fricatives. Since it affects only 船 *chuán* and 禪 *shàn* initials but not 書 *shū* initials, the condition seems to be voicing in the initials. The characters with CCX *-i are never affected. Other than that, the pattern for the finals that cause velarization in each dialect is quite different, and the patten may still need to be found to explain the situation. In addition to velarization, I found a split in the 船 *chuán*, 禪 *shàn*, and 書 *shū* initial characters that seems to be conditioned by MC *rù* tone. This suggests that *rù* tone probably existed in some form at least in CCX, even though none of the Central Xiāng dialects preserved a consonant ending, and only Liányuán and Xīnhuà have a *rù* tone category preserved in some characters.

In looking at hardening patterns I also discovered that there are five 船 *chuán* and 禪 *shàn* initial characters that regularly show hardening in almost all the Central Xiāng dialects. This problem is interesting in two aspects: (1) Fricatives are the more common readings for 船 *chuán* and 禪 *shàn* initial characters in the Central Xiāng dialects. The only place we see affricate readings for 船 *chuán* and 禪 *shàn* initial characters is in front of CCX final *-i. However, that environment is also the regular environment for the Central Xiāng dialects to not show hardening, except in Huìtóng

Línchéng; (2) Reconstruction for 船 *chuán* and 禪 *shàn* initials is still an ongoing debate, precisely because the character readings of these two initials are a mixture of affricates and fricatives in most dialects, as seen in the Central Xiāng dialects. This issue of the five characters is therefore brought about in the hope that future studies on the topic may be able to help solve not just questions on hardening, such as the condition and trigger, but also on the reconstruction of 船 *chuán* and 禪 *shàn* initial characters, or even on the common origins of related dialects.

In the last section I went through a dialect Cílì, which is located in northern Húnán Province and also show hardening. Cílì represents hardening dialects in Húnán Province whose subgrouping is still in debate. Unlike some of the other dialects in Húnán Province that show hardening, such as Lǐlíng, which are located in eastern Húnán Province and have been identified as Gàn dialects, Cílì seems to have some Mandarin features that lead some scholars to classify it as a Mandarin dialect (Zhang & Qi 2017, Li 1994, Bao & Yang 1986), but also may have some features from contact with local non-Chinese languages that make scholars indecisive of its source (Lu 2012). Nevertheless, using data from *Húnán Fāngyán Diàochá Bàogào* (Yang 1974: 129-145), I compared the hardening pattern in Cílì to the Central Xiāng dialects that have hardening. Hardening in Cílì shows up in the division II and III 知 *zhī*, 莊 *zhuāng*, and 章 *zhāng* initial groups. Also, unlike most of the Central Xiāng dialects where the MC 止 *zhǐ shè* rhymes or other rhymes that are reconstructed as CCX *-i do not show hardening, in Cílì these final do show hardening. In addition, Cílì does not show velarization or Type II hardening. There is also labiodentalization found in Cílì which is not seen in any of the Central Xiāng dialects. On the other hand, three of the five 船 *chuán* and 禪 *shàn* initial characters that are read as stops in almost all the Xiāng dialects also show hardening in Cílì. To sum up, we see a very different pattern of hardening in Cílì to the other Central Xiāng dialects that show hardening. Cílì may represent a different type of hardening

and definitely aspires more in depth studies, but for now it is probably safe to attribute the pattern difference to that Cíli is indeed not a Central Xiāng dialect.

In sum, I addressed the following issues in this study:

- (1) The patterns of Type I and Type II hardening. Different to Coblin's (2011) assumption that they are one process, in looking at the patterns I concluded that they might actually be two different processes even though they have the same end result to dental or retroflex stops in the Central Xiāng dialects. Additionally, the hardening patterns also proves that both hardening processes must be innovations rather than retentions, since the set of characters affected do not match up with the set of characters that are reconstructed as OC dental stops.
- (2) Patterns of velarization of stops and fricatives in Liányuán and velarization of fricatives in the other Central Xiāng dialects. Coblin (2011) notices that Liányuán has velarization to velar stops in addition to hardening. I took a step further and proposed a possible condition for velarization of stops in Liányuán, which is having a MC *chóngniǔ* rhyme. I also discovered that Liányuán has velarization of fricatives, and that the condition for velarization of fricatives is the same as the condition for velarization of stops. In looking at the pattern I concluded that velarization in Liányuán could only be an innovation. In Xiāngxiāng, Shuāngfēng, Lóudǐ Lǎojiē, and Lóudǐ Jiāolóngcūn, there are also velarization of fricatives in 船 *chuán* and 禪 *shàn* initials, but the conditioning factor is mainly voicing in the initial, which is different to the one in Liányuán. Ānhuà does not have velarization of fricatives but it has a change of 船 *chuán* and 禪 *shàn* initials to l-, which seems to be also conditioned by voicing. Additionally, although CCX final *-i never induces velarization in these dialects, I found that MC *rù* tone may be a conditioning factor in the 船 *chuán*, 禪 *shàn*, and 書 *shū* initial split in some of the Central Xiāng dialects.

- (3) 船 *chuán* and 禪 *shàn* initial character readings, especially on the five characters that are regularly read as stops in almost all the Central Xiāng dialects that show hardening.
- (4) A comparison of the dialect Cílì, which is located in Húnán Province but not classified as a Xiāng dialect by later scholars. The pattern in Cílì is different to the Central Xiāng dialects in that it has hardening with division II 知 and 莊 initials in addition to the division III 知 and 章 initials, 止攝 or CCX final *-i characters also show hardening, no Type II hardening or velarization, and that it has labiodentalization. On the other hand, Cílì also has three of the five 船 *chuán* and 禪 *shàn* initial characters that commonly show hardening in the Central Xiāng dialects read as stops. Comparison to the pattern of the Central Xiāng dialects interesting because not classified as a Xiāng or Gàn dialect, which are the two dialect groups that have multiple dialects showing hardening, but is classified more commonly as a Mandarin dialect, in which hardening is less common.

Several important questions remain to be answered on the issue of hardening. First, what is the motivation and/or trigger behind such a change, if this change is in a direction opposite to a much more common sound change? High quality recordings of a dialect that has hardening may be able to answer this question, and also other questions such as the actual identity of the hardened sound, and could there be other allophones linked with the hardened initial. Second, if this sound change is rarely seen in other language families as well as other Chinese dialect groups, why is it commonly found among the Xiāng dialects, and also the Gàn dialect group? Furthermore, can this sound change serve as some evidence or link to explain the relationship between the Xiāng and Gàn dialects? Also, what is the role of the 船 *chuán* and 禪 *shàn* initial characters in the question of hardening? As hardening is a hard issue, these questions are harder to solve. More in-depth historical phonological work will be needed for answering these questions. On the other hand, as

the relationship and the classification of the Xiāng as well as Gàn dialects remain problematic, hardening and other related sound changes may be able to provide a different route to approach those issues. Further studies will also be needed to determine the triggers and actual processes of Type I and Type II hardenings.

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