Palatalization and retroflection in early modern Chinese

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Abstract. From the late Middle Chinese period (1000 - 1300) to the early Modern Chinese period (1300 - 1800), some initial consonants in Mandarin Chinese experienced drastic changes, in which velar consonants [k], [kʰ], [x], and [nɣ] were fronted to alveolo-palatals [t͡ɕ], [t͡ɕʰ], [ɕ] and palatal-fricative [j]. Then the original [t͡ɕ], [t͡ɕʰ], [ɕ], and [j] that appeared in earlier-created words (plus part of alveolar consonants [t͡s], [t͡sʰ], [s]) changed to retroflexes [t͡ʂ], [t͡ʂʰ], [ʂ], and [ʐ].

Based on the analysis of sound change in some historically related characters, such as

废 ← 技 ← 支; (kui → t͡ɕɻ → t͡ʂɻ)　　窟 ← 屈 ← 出 (kʰu → t͡ɕʰu → t͡ʂʰu)

and comparisons of pronunciations in Middle Chinese, Early Modern Chinese, and Standard Chinese, as well as the empirical data recently collected, this paper argues that

1) palatalization and retroflection were two phases of a continual sound change process, like a push chain as described by Lubowicz (2011), rather than two individual events as Wang (1957) suggested,

2) palatalization became unconditioned over time, contradictory to the prevailing assumption made by Wang (1957, 1985) and repeated by other phonologists such as Liu (2023) that palatalization could only be triggered by front vowel [i] or [j]; and

3) palatalization and retroflection in the Chinese language are still in progress; for example, many Northern Mandarin speakers are changing their pronunciation of these words:

卡 (kʰa → t͡ɕʰja); 客 (kʰe → t͡ɕʰje); 更 (kəŋ → t͡ɕiŋ),

unlike the claim made by Wang (1957, 1985) and repeated by Liu (2023) that they were completed at the beginning of the nineteenth century "without exceptions."

Keywords. Phonology, Chinese, Consonants, Palatalization, Retroflection

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Introduction. Human language sounds change constantly. Tracking, describing, and analyzing these changes have always been among the most interesting tasks for historical linguists worldwide. Since people had no way to save their voices before modern recording devices were invented, studying sound changes that happened long ago has never been an easy task.

Some languages have adopted various kinds of writing symbols based on sound. Throughout history, sound changes have left traces on the written records. By comparing printed records of different times, many insightful studies have been made on sound change in alphabetic languages, such as Grimm's Law (Grimm 1822), Verner's Law (Verner 1876), and Otto Jespersen's Great Vowel Shift (Jespersen 1941), to name a few.

On the other hand, the Chinese writing system was created with more than 40 thousand pictographs and ideographs. Much of this ancient language is still discernible today. For example, when the Chinese ancestors created a word for "mountain," they sketched a mountain, which was later regulated step by step to its modern form of character 山.

From *Learn to read with these 20 Chinese pictographs*, by Hollie in Blog Learner, Sept. 22, 2017

Thousands of written symbols like this have carried their semantic meanings continuously with no or only moderate changes. As a result, even today anyone who can memorize about two thousand characters can read and understand articles and poems written hundreds of years ago. However, how these characters were pronounced in the past and how they evolved to the sounds they represent today is a difficult puzzle to solve.

Fortunately, the Chinese 音韵学 ***yinyunxue*** (phonology) forefathers have left some precious rhyme dictionaries. The earliest works of Chinese phonology, such as 【切韵】***Qie yun*** (601) (A Dictionary of Segmenting Rimes), 【广韵】***Guang yun*** (1008) (An Extended Dictionary of Segmenting Rimes), and 【中原音韵】***Zhongyuan yinyun*** (1324) (Sounds and Rimes of the Central Plains), have enabled us to imagine how characters would have probably sounded many years ago.

Early philologists and missionaries from Europe made tremendous contributions to the development of Chinese phonology, too. Joshua Marshman (1768 - 1837) might be the first Western philologist to try reconstructing Early and Middle Chinese. His Dissertation on the Chinese Characters and Sounds of the Chinese Language (1809) can never be overvalued. Bernhard Karlgren (1889 – 1978), known in China by his Chinese name 高本汉, was another unforgettable master who pioneered the study of Chinese historical phonology using modern

comparative methods. His doctoral thesis Studies on Chinese Phonology was translated into Chinese by Yuanren Chao et al in 1936.

Southern dialects provide another useful resource for empirical studies of sound change in Chinese. In his review of Joshua Marshman's remarkable contributions to the study of Chinese historical philology, Georg Orlandi (2022) quoted Qing philologist Jiang Yong (1681 – 1762) as saying

"本凡一韵之音变，则同类之音皆随之变。虽变，而古音未尝不存。各处方言往往有古音存焉……"

(When a sound change occur(s) in a specific rhyme, all the sounds of the same type are affected by the same change. But, although sound changes have occurred, it is not that ancient sounds have been completely lost, since [portion of] ancient sounds can be found in many local dialects...)

Chinese philologists have noticed that phonological features of Cantonese, Hakka, Hokkien, and other southern dialects are very similar to those described in【中原音韵】 (Sounds and Rimes of the Central Plains).[1]

【康熙字典】***Kangxi Zidian*** (The Kangxi Dictionary 1716), the first official dictionary in China's history, was chiefly compiled by Zhang Yushu and Chen Tingjing, under the order of the Qing Emperor Kangxi, who named the dictionary and wrote the preface himself. For each Chinese character, it lists the pronunciations in the Tang ([唐韻]), Song ([集韵]), Yuan([韵会]), and Ming ([正韵]) times before the current one(音). So, this dictionary makes it possible to trace when a sound change happened and which phonemes were affected. The Kangxi Dictionary should be recognized as one of the most authoritative and reliable sources used to examine the phonological features of Early Modern Chinese.

This paper focuses on the palatalization of the initial velars and the retroflection of the alveolo-palatals from Late Middle Chinese (1000 – 1300) to Early Modern Chinese (1300-1800) and after. Section 1 provides a brief review of the traditional studies on the topic. Section 2 analyzes examples illustrating palatalization and retroflection and presents three arguments on these sound changes. The conclusion arrives in Section 3.

1. A brief review of the traditional approach. Discussions on when and how palatalization and retroflection of the initial consonants in the Chinese language originated have never reached a consensus. Some people doubt whether alveoli-palatals and retroflex consonants were brought into Chinese by the Mongolians who ruled China for 89 years in the 13th century Yuan Dynasty or arrived with the Manchus who built the Qing Dynasty and ruled China from 1644 to 1911. Other people think that alveoli-palatals and retroflex consonants always existed in Chinese since ancient times. There is also a suggestion that only Northern Mandarin varieties "retain" retroflex initial consonants, which "have been lost" in southern dialects.[2] However, the dominant opinion is always a traditional one which holds that all sound changes in Middle Chinese and Early

[1] Wang, Li. 1957, 1958. Hanyu Yuyinshi (History of Chinese phonology). Beijing: China Social Science.
[2] Wikipedia: Mandarin Chinese.

Modern Chinese were recorded in【切韵】***Qie yun*** (601) (A Dictionary of Segmenting Rimes), 【广韵】***Guang yun*** (1008) (An Extended Dictionary of Segmenting Rimes), and 【中原音韵】***Zhongyuan yinyun*** (1324) (Sounds and Rimes of the Central Plains). One of the most influential scholars who adopted this approach to the study of sound change in Chinese is Wang Li (1900 – 1986), known as the founding father of modern Chinese phonology.

1.1 Foundation laid by Wang, Li

1.1.1 Palatalization. Wang (1957,1985) pointed out that the initial alveolo-palatals [t͡ɕ] , [t͡ɕʰ], [ɕ] in Modern Chinese had two origins: one was Middle Chinese velars [k], [kʰ], [x], and the other was alveolars [t͡s], [t͡sʰ], [s]. He described the palatalization as

"舌根破裂、舌根摩擦、舌尖破裂摩擦、舌尖摩擦都由于受舌面前元音（i，j）的影响，而变为舌面前辅音（t͡ɕ，t͡ɕʰ，ɕ）。这是语音学上所谓同化作用。"[3]

（Velar explosives, velar fricative, alveolar explosive-fricatives, and alveolar fricative, under the influence of front vowels (i, j), all became alveolo-palatal consonants (t͡ɕ，t͡ɕʰ，ɕ). This is called assimilation in phonetics).

Wang exemplified the palatalization with these morphemes quoted from【广韵】***Guang yun***:

A. Velars k, kʰ, x → t͡ɕ, t͡ɕʰ, ɕ

见母：基 kɨə → t͡ɕi　　卷 kɪwɛn → t͡ɕyan

溪母：启 kʰiei → t͡ɕʰi　　圈 kʰɪwɛn → t͡ɕʰyan

群母：琴 gʰɨem → t͡ɕʰin　　懼 gʰɨu → t͡ɕy

晓母：香 xɨaŋ → ɕiɑŋ　　虚 xɨo → ɕy

匣母：形 ɣieŋ → ɕiŋ　　玄 ɣiwen → ɕyan

B. Alveolars t͡s, t͡sʰ, s → t͡ɕ, t͡ɕʰ, ɕ

精母：将 t͡sɨɑŋ → t͡ɕɨɑŋ　　俊 t͡sɨun → t͡ɕyn

清母：秋 t͡sʰɪəu → tɕʰiu　　取 t͡sʰɪu → tɕʰy

從母：秦 dzʰiēn → tɕʰin　　绝 dzʰĭwɛt → t͡ɕye

心母：修 sĭəu → ɕiu　　需 sĭu → ɕy

邪母：习 zĭəp → ɕi　　旬 zĭuən → ɕyn

Wang noticed that a group of characters beginning with [k], [kʰ], [x] or [t͡s], [t͡sʰ], [s] followed by [i] or [y] were exceptionally not palatalized. His explanation for this exception is that they either changed or lost the [i] or [y], such as

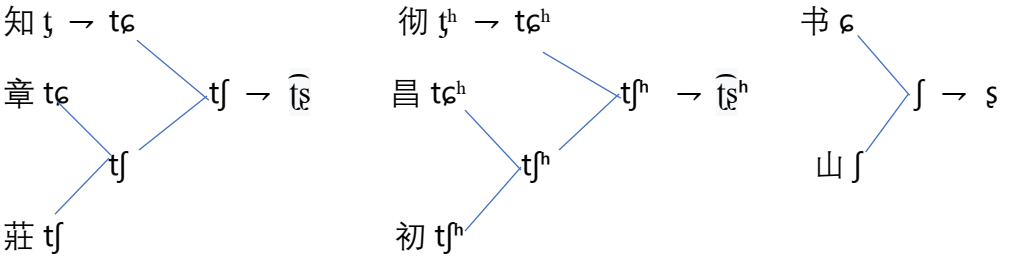
[3] Wang, Li. 1957, 1958. Hanyushigao (A sketch of the history of Chinese). P144. Beijing: Science.

岁 sĭwɛi → swɛi → sui　桂 kiwei → kuei → kuei　足 tsi̯wok → tsu → tsu[4]

As for those phonemes with initial [k], [kʰ], [x] without the presence of [i] or [j] but still palatalized anyhow, Wang suggested that there should be an intermediate step of adding an [i]. For example,

家假价 [ka → **kia** → t͡ɕia]　街解 [kai → **kiai** → t͡ɕiai → t͡ɕie][5]

1.1.2 Retroflection. Wang (1985) described the origins of retroflexes [t͡ʂ], [t͡ʂʰ], [ʂ] as "very intriguing." They came from 12 initial consonants: 知彻澄，章昌船书禅，莊初崇山。By the time of【切韵】***Qie yun*** (601) (A Dictionary of Segmenting Rimes), 张昌船书 assimilated into 莊初崇山, and 知彻澄 came into the 莊初崇 group, too. Originally, the initial consonants of 莊初崇山 were [tʃ], [tʃʰ], [dʒ], [ʃ]. Then, the voiced sound phased out over time. With the tip of the tongue reaching to the palate, they finally became [t͡ʂ], [t͡ʂʰ], [ʂ] in Modern Chinese. He mapped the sound changes of the initial consonants of 知章莊，彻昌初，书山 as follows:



Changes of 澄母 group: ɖʰ → ɖʐʰ → ɖʒʰ → t͡ʂʰ (Level tone); tʂ (Oblique tone)

1.1.3 Origin of ʐ. Wang (1958, 1985) pointed out that the Modern Chinese initial [ʐ] was indirectly derived from 日母[nʑ]. He explained how Middle Chinese phoneme "people" 人 [nʑĭən] changed to Modern Chinese 人 [ʐən]. Consonant [nʑ] was an explosive-fricative sound. When the explosive element became dominant, the fricative element disappeared, and [nʑ]

[4] Phoneme 足 "foot" did go through the process of palatalization: 足 tsi̯wok → t͡ɕi̯ok → t͡ɕi̯o → t͡ɕi̯ɑʊ̯. A new character 脚 was invented to reflect the sound change. Today phoneme 脚 still sounds [t͡ɕi̯ok] in Cantonese and Hakka, [t͡ɕi̯o] in Hunan and Wu dialects, and [t͡ɕi̯ɑʊ̯] in Northern Mandarin, while 足[tsu] retains as a classic form.

[5] However, Wang did not provide any evidence to support his presumed intermediate step of losing or adding [i]. No trace of the suggested intermediate pronunciation of "家 [kia]" or "街 [kiai]" can be found in any southern dialect. Even today, Cantonese, Hakka, and Hunan dialect speakers still pronounce 家假价 as [ka], not [kia], and 街解 as [kai], not [kiai].

changed to [ɲ], hence 人 sounds [ɲin] as in Hakka. Whereas, when the fricative element dominated, the explosive element disappeared, and [nʑ] changed to a dental fricative [z], hence 人 sounds [zen] as in Wu dialect.

Several 喻母 phonemes including 荣容鎔 first assimilated into 日母 group and then changed to [ʐ],. Therefore, in Beijing dialect, they sound [ʐʯʊŋ] instead of [jʊŋ].[6]

1.2 A recent study by Sha Liu. Sha Liu (Liu, 2023) argues that the factor of frequency is positively associated with palatalization, and the factor of frequency change is negatively associated. It is very interesting that, in the Data section, Liu gives a timespan for the palatalization as "*Stretched from the beginning of the eighteenth century until the beginning of the nineteenth century and was completed without exception (Morrison 1815–23, Edkins 1857, 1864, Wang 1957, Akiyasu 1967, Chen 1976, Pulleyblank 1984).*" A traditional description of palatalization is provided:

"*Palatalization concerns the velars ([k], [k^h], and [x]): the velars were palatalized before high front vowels and glides to [tɕ], [tɕ^h], and [ɕ] (Pulleyblank 1984; see also Chen 1976, Li 1999, Handel 2017).*"[7] Then, a rule is given:

- k → tɕ /_____i, j
- k^h → tɕ^h /_____i, j
- x → ɕ /_____i, j

Examples are listed in a table:

Early Mandarin (1300 – 1500)	**Middle Mandarin (1500 – 1800)**	**Gloss**
[kip]	[tɕi]	" urgent"急
[k^{h}jt]	[tɕ^{h}i]	"beg, ask" 乞
[xjeh]	[ɕi]	"opera" 戏

(Note: Early Mandarin and Middle Mandarin correspond to Middle Chinese and Early Modern Chinese.)

[6] In Cantonese, phoneme 人 sounds [jan], indicating that Middle Chinese [nʑ] did change to [j] first, then it became [ʐ], together with the [j] group. In Hunan and Wu dialects, 荣容鎔 do sound [jyŋ] [jʊŋ] [jʊŋ], not like Northern Mandarin [ʐʯʊŋ]. Evidence found in Southern dialects show that the initial consonant of this group has experienced the whole process of palatalization and retroflection: [nʑ] → [j] → [ʐ].

[7] Liu, Sha. 2023. Factors in sound change: A quantitative analysis of palatalization in Northern Mandarin. Open Linguistics. De Gruyter. Open Access Jan. 27, 2023

To sum up, the popularly accepted theory about palatalization and retroflection in Chinese contains three debatable assumptions, namely, that these two events are unrelated to one another; that palatalization was conditioned: only when triggered by a front vowel [i] or [j]; and that palatalization and retroflection were completed in the early nineteenth century without exception.

2. Discussion. Wang Li and other Chinese phonologists have made tremendous contributions to the study of Chinese phonology. Without their knowledgeable research, we might still be in the dark about the long history of sound change that evolved in the Chinese language. Their research work heavily relies on classical rhyme dictionaries, such as [切韵]***Qie Yun*** (601)，[广韵]***Guang Yun*** (1008), and [中原音韵] ***Zhongyuan Yinyun*** (1324). Of course, these rhyme dictionaries form an important source for the study of sound change in Chinese, but they were products of the Golden Age Principle (Labov 2001), compiled for a single purpose, i.e., to regulate people's use of the language or correct the "mistakes" people made while speaking. Therefore, they are conservative and biased in nature and always lag behind the actual development of the language behavior of the speakers.

Southern dialects of Chinese offer another useful source for the study of sound change. For historical reasons, Cantonese, Hakka, Wu, Hokkien, and Hunan dialects still retain many phonological features of Middle Chinese. When a sound change occurred in Northern Mandarin, the original sound could still be found in southern dialects.

In addition, some Chinese characters may give us valuable insights as to how sound changes happened in the past, because many earlier invented characters were utilized as phonetic elements in the later created characters.

2.1 Palatalization and retroflection are two related phases of a process. This paper argues that palatalization and retroflection in Early Modern Chinese are two phases of a continual process of sound change, more like a "push chain" as described by Lubowicz (2011) rather than two individual events as Wang (1958, 1985) and other traditional philologists believe. In Phase I, the velars [k], [k^h], [x], and [nʑ] changed to alveolo-palatals [tɕ], [$tɕ^h$], [ɕ], and [j]. In Phase II, the original alveolo-palatals [tɕ], [$tɕ^h$], [ɕ], and [j] became retroflexes [tʂ], [$tʂ^h$], [ʂ], and [ʐ], although how long the gap was between the two phases requires further study. Here is the rule:

$$k \rightharpoonup tɕ \rightharpoonup tʂ$$

$$k^h \rightharpoonup tɕ^h \rightharpoonup tʂ^h$$

$$x \rightharpoonup ɕ \rightharpoonup ʂ$$

$$nʑ \rightharpoonup j \rightharpoonup ʐ$$

The rule can be illustrated by the pronunciations of some series of characters.

2.1.1 庋 ← 技 ← 支: k → tɕ → tʂ In the earliest stage of character invention, 支(branch) was depicted by drawing a hanging branch of a bamboo tree. Then, to create 技 (skill), a pictograph of a hand was put on the left side as the semantic component, indicating that this new character has something to do with hands, while the earlier invented character 支 was put on the right as the phonetic component. Later, the creative ancestors invented 庋 (shelved storage without doors) by using a pictograph 广 on the top to denote that it is something in the house, and the character 技 was put underneath as the sound symbol. Now that the newest character 庋 sounds [kuɻ], we can be certain that both the earlier characters 技 and 支 were pronounced similarly, with an initial velar [k], at the time when 庋 came into being. According to The Kangxi Dictionary[8], during Phase 1 of the sound change when palatalization started, the pronunciation of 支 changed to [tɕi] in the Tang period, and then it was followed by 技 in the Song period. In Phase 2, the initial consonant of the earliest 支 further changed to retroflex [tʂ] in the Ming period. This explains why today in standard Chinese 庋, 技 and 支 are pronounced as **[**kuɻ], [tɕi], and [tʂɻ̩] respectively.

2.1.2 窟← 屈← 出: k^h → $tɕ^h$ → $tʂ^h$ In this series, character 出(out) was the earliest to be created, by sketching a foot out of a doorway. Later, 屈(bend) was formed, with a 尸(body) on the top as the semantic component to indicate that it has something to do with our body, and the existing character 出 was used as the phonetic component. 窟(cave) was the last to be made, with a 穴(hole) on the top to suggest its meaning and 屈 as the phonetic symbol for its pronunciation. Now that the newest character 窟 sounds [k^hu], it can be inferred that both 屈 and 出 were pronounced [k^hu] when 窟 was created. The Kangxi Dictionary clearly recorded when the sound change occurred.[9] First, the initial consonant of 出 was palatalized to [$tɕ^h$] in the Tang period, and then the same happened to 屈 in the Song period. This change left trace marks in Hunan and Wu dialects where both 出 and 屈 are homophones of [$tɕ^h$u]. In Phase 2, when some alveolo-palatals became retroflexes, Northern Mandarin speakers began to sound 出 as [$tʂ^h$u] after the Song period. Hence, 窟, 屈, and 出 are pronounced [k^hu], [$tɕ^h$u], and [$tʂ^h$u] respectively in standard Chinese today.

2.1.3 虎 ← 虐/ 虛 / 摅: x → ɕ → ʂ These three characters share the same phonetic symbol 虎[xu] (stripes on a tiger's body). Therefore, it can be inferred that 虐 (cry), 虛(empty), and 摅(express) all sounded [xu] when they were created. At a certain time before the Tang period, palatalization

[8] 支 【唐韻】【集韵】【韵会】: 章移切; 【正韵】: 旨而切; 音"卮"。技 【唐韵】渠绮切; 【集韵】【韵会】【正韵】: 巨绮切; 音"奇"上声。庋 【唐韵】过委切; ; 【集韵】【韵会】【正韵】: 古委切; 音"诡"。

[9] 出【唐韻】赤律切; 【集韵】【韵会】【正韵】: 尺律切; 音"春"入声。屈【广韵】区勿切; 【集韵】【韵会】【正韵】: 曲勿切; 音"詘"。窟【唐韵】【集韵】【韵会】【正韵】: 苦骨切; 音"崛"。

happened to 虚(empty) and 摅 (express) and changed their sound from [xu] to [ɕu]. Even today in most southern dialects 虚 and 摅 are still homophones of [ɕu]. In the Song period, 摅 experienced retroflection and began to sound [ʂu]. The Kangxi Dictionary recorded the sound changes that had happened to them since the Tang Dynasty.[10]

2.1.4 日人让 Group: **nʑ → j → ʐ** These three phonemes or characters were among the earliest to experience sound change. During Phase 1, the initial consonant [nʑ] changed to palatal fricative [j], which left traces in southern dialects. In Phase 2, palatal fricative [j] became retroflex [ʐ].

According to The Kangxi Dictionary[11], the phoneme 日(sun) was pronounced [nʑi] in the Tang period. Later in the Song period, the initial consonant changed to palatal fricative [j] as in Cantonese 日 [jat] or to a dental sibilant [ɻ] as in Hunan dialect 日[ɻɻ̩]. When retroflection happened to the j-group phonemes, 日 began to sound [ʐ.ɻ̩].

Character 人(people) was pronounced [nʑiɜ̌ən] in Middle Chinese. When palatalization happened, [nʑ] changed to palatal fricative [j] as in Cantonese 人[jan], or [ɻen] as in Hunan and Wu dialects. In Early Modern Mandarin, the palatal fricative [j] became retroflex [ʐ], hence in Standard Chinese 人 is pronounced [ʐen].

Phoneme 让 (give way) was sounded [nʑiɜ̌ɑŋ] in Middle Chinese, like the sound of 让 in Hunan dialect. Later, the initial [nʑ] changed to palatal fricative [j] as in Cantonese and Hakka dialects 让[joəŋ]. Finally, [j] became retroflex [ʐ] as in Modern Mandarin 让[ʐɑŋ].

The above examples show that palatalization and retroflection are two related phases of a continual sound change, like a push chain as described by Lubowicz (2011), although it is not clear how long it took from Phase 1 to Phase 2.

2.2 Palatalization was not necessarily conditioned. The traditional theory describes palatalization of the velars [k], [kʰ], and [x] to [tɕi], [tɕʰi], and [ɕi] as conditioned, i.e., it could happen only when triggered by the front vowel [i] or [y]] (Wang 1985, Liu 2023). This author argues that palatalization might have started as a conditioned sound change, but once it started, it became unconditioned.

In the first wave, phonemes like 急(urgent) [kip], 乞 (beg)[kʰjt], and 戏(play) [xjeh] changed their sound to [tɕi], [tɕʰi], and [ɕi], under the influence of front vowels [i] or [j]. Later, phonemes like 家(home) [ka], 掐(pinch) [kʰa], and 虾 (shrimp) [xa], in which there is no [i] or [j] involved,

[10] 虐【唐韵】: 荒乌切;【韵会】: 荒胡切; 音"呼"。虚 【唐韵】: 朽居切;【集韵】【韵会】【正韵】: 休居切; 音"嘘"。摅【唐韵】: 丑居切;【集韵】【韵会】【正韵】: 抽居切; 音"舒"。

[11] 日【唐韵】【正韵】: 人质切;【集韵】【韵会】: 入质切; 音"驲"。人【唐韵】: 如邻切;【集韵】【韵会】【正韵】: 而邻切; 音"仁"。让【唐韵】【集韵】【韵会】: 人样切;【正韵】: 而亮切; 音"壤"去声。

changed to [tɕia], [tɕʰia], and [ɕia] anyway. Without being influenced by [i]] or [j], velars [k], [kʰ], and [x] directly changed to [tɕi-], [tɕʰi-], and [ɕi-], with [i] as an offglide. Today, 家、掐、虾 still sound [ka], [kʰa], and [xa] in Cantonese, Hakka, and Hunan dialects, but no evidence of the traditionally assumed intermediate step of [kia], [kʰia], and [xia] can be found.

Examples of unconditioned palatalization are plenty, to take just a few:

Gloss	Middle Chinese (Southern Dialects)	Early Modern Chinese* *(Kangxi Dictionary)	Morden Chinese (Northern Mandarin)
江 river	[kʊŋ]	古双切 → 古双切, "杠"	[tɕiɑŋ]
军 army	[kuən]	举云切 → 拘云切, "君"	[tɕyn]
季 season	[kuɪ]	居悸切 → 居悸切, "奇"	[tɕi]
强 strong	[kʰɔŋ]	巨良切 → 其两切, "彊"	[tɕʰiɑŋ]
群 group	[kʰuən]	渠云切 → 衢云切, "羣"	[tɕʰyn]
穷 poor	[kʰʊŋ]	居雄切 →居雄切, "弓 "	[tɕʰiʊŋ]
学 learn	[xɔk]	胡觉切→ 辖觉切, "鷽"	[ɕye]
咸 salty	[xam]	胡监切 → 胡岩切, "諴"	[ɕiən]
下 down	[xa]	胡雅切 → 亥雅切, "遐"	[ɕia]

*Note: Under The Kangxi Dictionary, the first pronunciation is from [唐韵] ***The Tang Rimes*** (732). The second is from [正韵] ***The Right Rimes*** (1375). The character in the quotation marks shows the pronunciation of the Kangxi times (1716).

Many examples show that palatalization could still happen to the initial velar consonants without being triggered by a front vowel [i] or [j].

2.3 Palatalization and retroflection are still in progress. It is widely believed that palatalization of the velars began in the late eighteenth century and was completed in the early nineteenth century "without exception" (Wang 1985; Liu 2023). However, the evidence below shows that palatalization is still in progress even today, and it is unconditioned.

In the northern part of China, many people have begun to sound 卡 [kʰa] as t͡ɕʰia], 客 [kʰə] as [t͡ɕʰiɛ], and 更 [kəŋ] as [t͡ɕiŋ], although the state language authority declares that these variations are either dialectal versions or mispronunciations. [12]

[12] In 1985, the National Language and Characters Working Committee published A List of Multi-pronunciation Words in Putonghua, with a clear purpose of regulating the pronunciations of those words that have been sounded differently among the people. This authoritative list includes hundreds of multi-pronunciation words, marked with Standard Pronunciation, Dialectal Pronunciation, Occasional Pronunciation, or Mispronunciation. The List was updated in 2016. 卡 [kʰa] / t͡ɕʰia], 客 [kʰə] / [t͡ɕʰiɛ], and 更 [kəŋ] / [t͡ɕiŋ] are on the list.

From May 18 to June 5, 2024, with the help of a group of volunteers, this author conducted a language survey in Changchun and Beijing, to see how people actually pronounce the words 卡, 客, and 更. During the survey, randomly picked subjects were given these sentences embedded with the phonemes 卡, 客, and 更:

1. 一根鱼刺**卡**在喉咙里了。"卡" **ka** 还是 **qia**？
2. 村口设了一个**卡**子，盘查进村的人。"卡子" **ka** zi 还是 **qia** zi？
3. 我家来**客**了！"客" **ke** 还是 **qie**？
4. 当地习俗，新娘的娘家**客**受到特别的尊敬。"娘家**客**"niangjia **ke** 还是 niangjia **qie**?
5. 你厂里需要一个打**更**的吗？ "打更" da **geng** 还是 da **jing**？
6. 深**更**半夜打什么电话？"深更半夜" shen **geng** ban ye 还是 shen **jing** ban ye?

2.3.1 Language Survey in Changchun. 16 randomly selected subjects were invited to read aloud the 5 sentences first. Then they were asked how to say these sentences while talking to friends. Results of the survey are shown in the chart below:

Situation		**Reading**	**Speaking**
(1) 一根鱼刺**卡**在喉咙里了。A piece of fishbone got stuck in the throat,	[kʰa]	10	7
	[t͡ɕʰia]	6	9
(2) 村口设了一个**卡**子盘查每一个进村的人。A checkpoint was set up to check everyone who wanted to enter the village.	[kʰa]	0	0
	[t͡ɕʰia]	16	16
(3) 我家来**客**了！We have got a visitor!	[kʰə]	12	4
	[t͡ɕʰiɛ]	4	12
(4) 当地习俗，新娘的娘家**客**受到特别的尊敬。It's a custom that the bride's brother is highly respected.	[kʰə]	11	0
	[t͡ɕʰiɛ]	5	16
(5) 你们厂里还要个打**更**的吗? Does your factory need a security patroller?	[kəŋ]	4	0
	[t͡ɕi̯ŋ]	12	16
(6) 深**更**半夜打什么电话？ Why did you make phone calls at midnight?	[kəŋ]	15	11
	[t͡ɕi̯ŋ]	1	5

卡 (choke): When 卡 is used as a verb as in Sentence 1, about 63% of the subjects pronounced it [kʰa], but 37% shifted to [tɕʰia] in reading. While speaking, 44 % of the subjects pronounced it [kʰa] and 56% of them pronounced it [tɕʰia]. When 卡 is used as a noun as in Sentence 2, 100% of the subjects pronounced it [tɕʰia], both in reading and in speaking.

客 (guest): In Sentence 3, 客 is used as a common noun. 75% of the subjects pronounced it [kʰ ə] when reading aloud, and 25% shifted to [t͡ɕʰiɛ]. While speaking, only 25% of the subjects pronounced it [kʰ ə], but 75% of them would say [t͡ɕʰiɛ]. In Sentence 4, 客 is used in a combined proper noun 娘家**客** (the bride's brother). When the subjects read aloud, 69% of them pronounced it [kʰ ə], only 31% of them read it [t͡ɕʰiɛ]. However, 100% of the subjects admitted that they would say [t͡ɕʰiɛ] in their daily conversations.

更(shift): In Sentence 5, 打更(security patroller) is a colloquial term. When the subjects were reading aloud, 25% of them pronounced 更 as [kəŋ], and 75% of them shifted to the pronunciation of [t͡ɕiŋ]. While in conversations, 100% of the subjects would pronounce it as [t͡ɕiŋ]. In Sentence 6, 更 is used in the idiom 深更半夜 (at midnight). About 94 of the subjects pronounced it as [kəŋ] in reading and 69% in speaking. However, 31% of the subjects insisted that [t͡ɕiŋ] would be the right pronunciation.

The language survey in Changchun shows that palatalization of the initial velar consonants in phonemes 卡, 客, and 更 is still happening among the Northern Mandarin speakers in Changchun, although the sound change is more noticeable in speaking than in reading.

3.2 Language Survey in Beijing. The language survey in Beijing was focused on speaking. During the survey, 38 randomly picked subjects were asked how to say these sentences in their daily conversations. (Pingyin is used instead of IPA)

The results are shown in the chart below.

Text	Pronunciations	
1. 一根鱼刺**卡**在喉咙里了。 A piece of fishbone got stuck in the throat.	[kʰa] 18	[t͡ɕʰia] 20
2. 村口设了一个**卡**子盘查每一个进村的人。 A checkpoint was set up to check everyone who wanted to enter the village.	[kʰa] 8	[t͡ɕʰia] 30
3. 我家来**客**了! We have got a visitor!	[kʰə] 25	[t͡ɕʰiɛ] 13
4. 当地习俗，新娘的娘家**客**受到特别的尊敬。 It's a custom that the bride's brother is highly respected.	[kʰə] 4	[t͡ɕʰiɛ] 34
5. 你们厂里还要个打**更**的吗? Does your factory need a security patroller?	[kəŋ] 3	[t͡ɕiŋ] 35
6. 深**更**半夜打什么电话? Why did you make phone calls at midnight?	[kəŋ] 33	[t͡ɕiŋ] 5

卡 (choke): When it is used as a verb as in Sentence 1, 47% of the subjects pronounced 卡 as [kʰa], while 53% of them said [tɕʰia]. In Sentence 2, 卡 is used as a noun. Only 20% of the subjects pronounced it [kʰa], and 80% of them pronounced it as [tɕʰia].

客 (guest): When it is used as a common noun as in Sentence 3, 客 was pronounced [kʰ ə] by 69% of the subjects, while 31% of them pronounced it as [t͡ɕʰiɛ]. In Sentence 4, 客 is used in a proper noun 娘家**客** (the bride's brother). Only 11% of the subjects pronounced it [kʰə], while 89% of them pronounced it [t͡ɕʰiɛ].

更(shift): In Sentence 5, 更 is used in the phrase 打更 (security patroller). Only about 8% of the subjects pronounced it as [da kəŋ], and 92% of them said [da t͡ɕiŋ]. When it comes to the idiomatic phrase 深更半夜 (midnight) in Sentence 6, 87% of the subjects sticked to the standard pronunciation of 深更半夜 [ʂən **kəŋ** pan jə], but 13% of them said they would prefer the sound of [ʂən **t͡ɕiŋ** pan jə].

Results of the language survey in Changchun and Beijing show that the government's language policy of promoting Putonghua as the Standard Chinese does affect how people pronounce each word when they read, but it seems to have only limited influence on people's oral language. Efforts of regulating the language may slow down, but cannot stop, the progress of sound change. Palatalization of the initial velar consonants in phonemes 卡, 客, and 更 is definitely happening among the Northern Mandarin speakers.

2.3.3 Examples of retroflection. This author found two examples of retroflection that emerged recently. It is interesting to note that the internet is playing a role in spreading the new sound of retroflects.

One is 妹子[mei tsɻ] (young woman) →妹纸 [mei t͡ʂ]: Phoneme 妹[mei] means "girl" or "younger sister." Character 子[tsɻ] functions as an auxiliary without semantic meaning, as in 桌子[t͡ʂuɔ tsɻ] (table) and 椅子[ji tsɻ] (chair). Now many people, especially young people, have begun to say 妹子 as [mei t͡ʂɻ] instead of [mei tsɻ]. To reflect this change from alveolar [ts] to retroflex [t͡ʂ], they even altered the written form into 妹纸, and of course 纸 [t͡ʂ] only functions as an auxiliary and has lost its semantic meaning of "paper".

The other is 怎么了[tsənməla] (what happened) → 肿么了[:t͡ʂɔŋməla]: The initial alveolar consonant [ts] in phoneme 怎 changed to retroflex [t͡ʂ] among many young Mandarin speakers. To reflect this change, they write 肿么了[t͡ʂɔŋməla] instead of 怎么了[tsənməla] on the web.

Why do people change 妹子[mei tsɻ] to 妹纸 [mei t͡ʂɻ] and 怎么了[tsənməla] to 肿么了 [t͡ʂɔŋməla]？ A Chinese search engine 百度一下(***baiduyixia***) gives this answer: *"It started in Hunan Province where people do not distinguish [ts] and [t͡ʂ] in the dialect. The new version is getting popular on the internet, especially among young people."* That is to say: First, it started as a "mistake" or a joke. Second, it is favored by young people who think it is fun.

Many sound changes started as a "mistake." When a "wrong" form was well received or liked by the younger generation, it got popular and eventually became a new norm. Akshay R Maggu et al (2016) were right to point out:

"Individuals who misperceive and produce speech in a slightly divergent manner (called innovators) contribute to variability in the society, eventually leading to sound change."[13]

Language is arbitrary. No matter how hard conservative scholars or administrators try to regulate the language, they can hardly change people's speaking behavior, which is the decisive factor in sound change in their spoken language. Who knows? There may be one day when most Chinese speakers pronounce the auxiliary 子 as **[t͡ʂɻ]** in words like 妹子(girl)、桌子(table)、椅子(chair)、鞋子(shoes)、袜子(socks)、and 帽子(hat), and the current standard pronunciation of 子[tsɻ] becomes awkward and old fashioned.

3. Concluding remarks. This paper does not intend to overturn the traditional theories about palatalization and retroflection of initial velar consonants. Instead, it proposes a different perspective on the subject to stimulate and encourage further study.

Based on the study of the phonetic components in a sampling of Chinese characters, this paper argues that palatalization and retroflection are two phases of a continual process of sound change, instead of two individual events as commonly believed by the traditional Chinese phonologists. Palatalization of velars [k], [kʰ], [x] and [nʑ] to [tɕ], [tɕʰ], [ɕ] and [j] is the first phase, which resulted in many words falling into the [tɕ], [tɕʰ], [ɕ] and [j] group. In the second phase, the earlier [tɕ], [tɕʰ], [ɕ] and [j] changed to retroflexes [t͡ʂ], [t͡ʂʰ], [ʂ] and [ʐ]. About how long the gap was between the two phases still needs further study.

Traditional Chinese phonologists claim that palatalization in Early Modern Chinese is a conditioned sound change. It is possible that velars before front vowels [i] or [j] changed first, such as 急 [kip → tɕi], 乞 [kʰjt → tɕʰi], and 戏 [xjeh → ɕi]. This paper argues that, over time, other phonemes beginning with [k], [kʰ], and [x] but with no presence of [i] or [j] started to make the same change by analogy, such as 家[ka → tɕia], 掐 [kʰa → tɕʰia], and 虾[xa → ɕia], and this is unconditioned palatalization with an offglide -i-. No evidence can be found that support the traditionally presumed intermediate step of [kia], [kʰia], [xia].

[13] Maggu, A. R., Liu, F., Antoniou, M., & Wong, P. C. M. (2016). Neural correlates of indicators of sound change in Cantonese: Evidence from cortical and subcortical processes. *Frontiers in Human Neuroscience, 10*, 652. [pdf]

Although on a large scale, palatalization and retroflection took place in the early nineteenth century, they are still in progress even today. In the northern part of China, more people now pronounce 更[kəŋ] as [**tɕiŋ**], 卡[kʰa] as [**tɕʰia**], and 客 [kʰe] as [**tɕʰie**]. The trend is so strong that both pronunciations of 卡, [kʰa] and [tɕʰia], have been recognized by some official dictionaries, such as 新华字典 (The Xinhua Dictionary). The new pronunciations [tɕʰie] for 客 [kʰe] and [tɕiŋ] for 更 [kəŋ] have not been officially recognized yet. It takes time, as always.

Most recently, 妹子[mei tsɻ](young girl) has been replaced by 妹纸[mei t͡ʂɻ], and 怎么了[tsənməla] (What happened) by 肿么了[t͡ʂəŋməla] among the younger generation. It started as a joke mocking Hunan dialect speakers who do not distinguish [t͡ʂ] from [tsɻ]. However, young people like the new version and feel it fun, and the internet has helped it spread all over the country. Very probably, more evidence of the progressing palatalization and retroflection will emerge in the future.

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