Restrictions on Consonant + Glide (CG) Sequences in Chinese Varieties

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Restrictions on CG onsets involve both OCP and anti-OCP constraints: dissimilation of major articulator features for distinctiveness of phonetic cues, and agreement of dependent features like backness for ease of articulation. In some languages (Mandarin and Shangfu) the feature [back] plays a key role, while Putian ranks CG backness agreement relatively low.

1. Introduction

Some languages, like Korean, allow any consonant + glide (CG) combinations, while other languages, like Kirundi, avoid all CG sequences. Many languages have restrictions on CG onsets: for example, some varieties of Italian disallow palatals preceding [j] and [w], and some varieties of American English disallow coronals followed by the glide [j]. In Chinese varieties, consonant + glide (CG) combinations are allowed, but with a relatively complex system of restrictions. We examine restrictions on CG clusters in Mandarin Chinese, Shangfu Chinese, and Putian Chinese, and investigate the features that play a role in restricting CG onsets. We argue that both OCP (in particular, No Lab + Lab) and CG [back] agreement constraints are needed to explain onset grammaticality in Chinese varieties.

According to Liu & Repetti (2019), in Mandarin, no fricatives or affricates can precede [j, ɥ], except the palatals [t͡ɕ, t͡ɕʰ, ɕ]. In contrast, all fricatives and affricates can precede [w], except the palatals. Furthermore, Mandarin velars are disallowed before [j, ɥ], yet can occur before the velar glide [w], and labials cannot combine with labial glide [ɥ, w] as onsets. [tɥ] and [tʰɥ] are also banned, but all other CG sequences are legal. Overall, two principles are needed to explain Mandarin CG onset restrictions: *LabLab (1)[1] and various [back] agreement constraints (2-4). The three backness agreement constraints require the two segments of certain consonant + glide sequences to be both

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[1] Duanmu's (2000: 32) *Articulator Dissimilation Principle* ("Identical articulators cannot occur in succession") can account for some but not all of the restrictions on Mandarin CG onsets.

[+ba] or both [-ba]. If the word-initial consonant is [0ba], then the relevant Agree[back] constraint is violated.[2]

(1) *LabLab – A labial consonant cannot occur with a labial glide [ɥ]/[w]
(2) Agree[back]: C$_{[-son, +cont]}$ j – A [-son, +cont] consonant (affricate or fricative) and the following glide [j] must have the same backness value: [-back]
(3) Agree[back]: C$_{[-son]}$ ɥ – An obstruent and the following glide [ɥ] must have the same backness value: [-back]
(4) Agree[back]: DorG – A dorsal consonant (palatal or velar) and any following glide ([j ɥ w]) must have the same backness value

This study analyzes CG patterns in two other varieties of Chinese: one that is similar to Mandarin (Shangfu Chinese) and one that is quite different (Putian Chinese). Shangfu, as part of Central Plains varieties, is geographically closer to and differs minimally from Standard Chinese (Mandarin). Spoken in southern Henan and northern Anhui in eastern China, Shangfu's consonant inventory is similar to Mandarin Chinese, except that Shangfu has the voiced fricative [z]. The first author is a native speaker of this variety. In contrast, Putian, spoken in the central area of Fujian Province, differs maximally from Mandarin. It belongs to the coastal Min language group with approximately 5 million native speakers. Without palatals [tɕ, tɕʰ, ɕ] or retroflexes [tʂ, tʂʰ, ʂ, ʐ], its consonant inventory includes the lateral fricative [ɬ] and velar nasal [ŋ] which Mandarin and Shangfu lack. The Shangfu data in the following discussion come from Compilation Commission of Chorography of Putian (1964, 2001). We analyze Cj (§2), Cɥ (§3), and Cw (§4) sequences in Shangfu, Mandarin, and Putian, and conclude (§5) that Shangfu imposes even stricter backness agreement requirements on CG sequences than Mandarin does, while Putian is less restrictive.

2. C+j in Shangfu, Mandarin, and Putian

In (5), we see that Putian allows all Cj sequences, whereas Shangfu and Mandarin behave similarly to each other regarding Cj sequences.[3]

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[2] The backness feature specification of [j] and [ɥ] is [-back], while [w] is [+back]. Furthermore, we analyze the labial consonants and non-palatal coronals as [0 back], the palatal consonants as [-back], and the velars as [+back] (Riggle 2011, Kenstowicz 1994, Hayes 2011, etc.).

[3] The "—" symbol is used when a consonant is not present in the inventory. Labiodental [f], palatals [tɕ, tɕʰ, ɕ] and retroflexes [tʂ, tʂʰ, ʂ, ʐ] are not in Putian's consonant inventory, nor are [s] and [z]. The lateral fricative [ɬ] and velar nasal [ŋ] are absent in Mandarin and Shangfu, and [z] is not found in Mandarin.

(5) Cj in Shangfu, Mandarin, and Putian

	Cj	Shangfu	Mandarin	Putian
labial	p	√	√	√
	p^h	√	√	√
	m	√	√	√
	f	*	*	—
non-palatal coronal	t	√	√	√
	t^h	√	√	√
	n	√	√	√
	l	√	√	√
	ts	*	*	√
	ts^h	*	*	√
	s	*	*	—
	ɬ	—	—	√
	z	*	—	—
	tʂ	*	*	—
	tʂ^h	*	*	—
	ʂ	*	*	—
	ʐ	*	*	—
palatal	tɕ	√	√	—
	tɕ^h	√	√	—
	ɕ	√	√	—
velar	k	*	*	√
	k^h	*	*	√
	x	*	*	√
	ŋ	—	—	√

The Shangfu and Mandarin data can be accounted for with the constraints in (2) and (4): fricatives and affricates, as well as and palatals and velars, must have the same backness value as the following glide [j]: [-back]. However, Putian allows fricatives and affricates, as well as velars to precede [j]. An interesting effect of Putian's tolerance for Cj sequences can be found in its consonant inventory. Duanmu (2000: 31) claims that Mandarin combinations [tsj, ts^hj, sj] could be palatalized and became [tɕ, tɕ^h, ɕ]. The present study argues that this sound change can be interpreted as an effect of the backness agreement constraint in (2). Since Putian does not require backness agreement of these sequences, they were not palatalized, and palatal consonants are not present in the Putian consonant inventory.

3. C+ɥ in Shangfu, Mandarin, and Putian

In (6), we see that only labial + [ɥ] groups are penalized in Putian. Shangfu and Mandarin are more restrictive and behave similarly to each other.

(6) Cɥ in Shangfu, Mandarin, and Putian

	Cɥ	Shangfu	Mandarin	Putian
	p	*	*	*
	pʰ	*	*	*
	m	*	*	*
labial	f	*	*	—
	t	*	*	√
	tʰ	*	*	√
	n	√	√	√
	l	√	√	√
	ts	*	*	√
	tsʰ	*	*	√
	s	*	*	—
	ɬ	—	—	√
	z	*	—	—
	tʂ	*	*	—
	tʂʰ	*	*	—
non-palatal	ʂ	*	*	—
coronal	ʐ	*	*	—
	tɕ	√	√	—
	tɕʰ	√	√	—
palatal	ɕ	√	√	—
	k	*	*	√
	kʰ	*	*	√
	x	*	*	√
velar	ŋ	—	—	√

The Shangfu and Mandarin facts are accounted for with the constraints in (1) and (3): the labial consonants are banned before [ɥ] because of (1), and the non-palatal obstruents + [ɥ] are penalized by (3).[4] In Putian, on the other hand, only the labial + [ɥ] clusters are penalized; all other sequences of non-labials (coronals or velars) plus [ɥ] are permitted: 强[kɥauŋ] 'strong', 却[kʰɥau] 'but', 仰[ŋɥauŋ] 'look up', 靴[xɥau] 'boot'. The only relevant constraint for Putian is defined in (7).

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[4] The constraint in (4) can also account for the ban on dorsal consonant + [ɥ] sequences, but since all dorsal consonants in Mandarin and Shangful are obstruents, the constraint in (3) is sufficient.

(7) Putian constraint: *Cɥ-LabLab - A labial consonant cannot occur with [ɥ]

4. C+w in Shangfu, Mandarin, and Putian

In (8), we see that Putian allows any consonant to precede [w], while Mandarin is more restrictive, and Shangfu even more so.

(8) Cw in Shangfu, Mandarin, and Putian

	Cw	Shangfu	Mandarin	Putian
labial	p	*	*	√
	pʰ	*	*	√
	m	*	*	√
	f	*	*	—
non-palatal coronal	t	√	√	√
	tʰ	√	√	√
	n	√	√	√
	l	√	√	√
	ts	*	√	√
	tsʰ	*	√	√
	s	*	√	—
	ɬ	—	—	√
	z	*	—	—
	tʂ	*	√	—
	tʂʰ	*	√	—
	ʂ	*	√	—
	ʐ	*	√	—
palatal	tɕ	*	*	—
	tɕʰ	*	*	—
	ɕ	*	*	—
velar	k	√	√	√
	kʰ	√	√	√
	x	√	√	√
	ŋ	—	—	√

In Putian, the labial velar glide [w] can co-occur with all consonants, including a labial consonant [p, pʰ, m], as in 杯[pwai] 'cup', 泼[pʰwa] 'splash' and 满[mwaŋ] 'full'. The adjacent labial features in onset are not banned here, while they are before the glide [ɥ] (§3), highlighting the restricted nature of [ɥ] as compared to [j, w]. The Shangfu and Mandarin patterns are accounted for by constraints (1) and (4): a labial consonant cannot precede the labial glide [w] (1), and a dorsal consonant can precede [w] because they

share the [+back] feature specification (4). The differences between Shangfu and Mandarin can be found among non-palatal coronal fricatives and affricates, which Shangfu bars before [w], whereas Mandarin does not. Thus, sequences like [tsw, tsʰw, sw, zw, tʂʰw, tʂw, ʂw, ʐw] are missing in Shangfu, which indicates that Shangfu requires backness agreement not only with C[-son,+cont]+j and C[-son,+cont]+ɥ sequences, but also C[-son,+cont]+w sequences. We can account for this restriction with the constraint in (9) requiring affricates and fricatives to agree in backness with any following glide, not only [j, ɥ], but also [w].

(9) Shangfu constraint: Agree[back]: $C_{[-son,+cont]}G - A$ [-son, +cont] consonant (affricate or fricative) and any following glide ([j ɥ w]) must have the same backness value

5 Summary

We have seen that Putian is very tolerant of CG sequences, banning only labial consonants before [ɥ]. Mandarin and Shangfu are more restrictive, banning labial consonants + [ɥ] or [w]. Furthermore, unlike Putian, Mandarin and Shangfu also require backness agreement between fricatives/affricates and [j], obstruents and [ɥ], and dorsal consonants and any glide. Shangfu is even more concerned with backness agreement than Mandarin, requiring all fricatives and affricates to have the same backness value as any following glide. In conclusion, phonotactic constraints on CG sequences differ in these three varieties of Chinese with Putian being the most permissive and Shangfu the least, but all impose some restrictions that can be characterized as both OCP and anti-OCP constraints.

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