

Backness Agreement in Consonant + Glide Onsets in Mandarin

Yang Liu, Lori Repetti
Stony Brook University

1 Introduction

Most languages have restrictions on Consonant + Glide (CG) sequences, and Mandarin has a particularly complex system. An inventory of Mandarin CG sequences can be found in (1).¹

(1) Mandarin CG sequences²

		j Dor [-ba]	ɥ Lab,Dor [-ba]	w Lab,Dor [+ba]
Lab [0ba]	p			
	p ^h			
	m			
	f			
Cor [0ba]	t			
	t ^h			
	n			
	l			
	ts			
	ts ^h			
	s			
	tɕ			
	tɕ ^h			
	ʃ			
	ʒ			
	ʐ			
Pal (Cor,Dor) [-ba]	tɕ			
	tɕ ^h			
	ɕ			
Dor [+ba]	k			
	k ^h			
	x			

Many linguists study CG restrictions by focusing on articulator features: Labial, Coronal, Dorsal (Duanmu 2000, Hume 1990, Kochetov 2016), and Duanmu (2000: 32) argues that restrictions on Mandarin CG onsets can be accounted for by the Articulator Dissimilation Principle³: “Identical articulators cannot

¹ Shaded cells mean that CG sequence is absent.

² The consonant [ʒ] has been analyzed as an obstruent or a sonorant (Duanmu 2000). We analyze it as a voiced fricative since it behaves more like an obstruent than a sonorant: (i) all initial sonorants in Mandarin can be followed by [j], yet [ʒ] + [j] is missing; (ii) no non-palatal fricatives + [j] sequences are allowed, and neither is *[ʒj].

³ See also Yi & Duanmu (2015) and Gong, S. & Zhang, J. (2019) for Articulator Dissimilation.

occur in succession.” However, this proposal does not cover all onset data. Mandarin onsets like [fj] are ungrammatical even though the initial consonant [f] and the following glide [j] have different articulators. What constraints penalize [fj]? Furthermore, Duanmu does not discuss Mandarin palatals [tʃ̥, tʃ̥ʰ, ʃ̥]. What constraints penalize palatals + [w], but not palatals + [j, ɥ]? In this paper, we discuss restrictions on Mandarin CG onsets and show the need for both articulator features and backness agreement.

2 OCP and Backness Agreement Constraints

We propose that the presence and absence of particular CG sequences in Mandarin can be accounted for using two types of constraints: an OCP constraint (CG: *LabLab) and a group of backness agreement constraints (CG: backness agreement).

- (2) CG: *LabLab - labial consonant and a labial glide sequence are not legal
- (3) CG: backness agreement - a consonant + glide sequence must have the same backness feature specification

The OCP constraint (2) is in line with Duanmu’s (2000) Articulator Dissimilation Principle, so that a labial consonant ([p, pʰ, f, m]) followed by a labial glide ([ɥ, w]) is not a legal sequence. The constraint would rule out sequences such as *[pw] but not [pj] or [tw].⁴

In order to motivate the backness agreement constraints, we have to clarify the backness feature specifications for consonants and glides. Since [back] is a subfeature of the DORSAL node, only velar consonants, palatal consonants, and vowels/glides have a backness feature. Following Riggle (2011), we specify the palatal consonants [ç, tʃ̥ʰ, tʃ̥] as [-back], and the velar consonants [kʰ, k, x, ŋ] as [+back]. Furthermore, we follow Duanmu (2000), Hayes (2011), Kenstowicz (1994), Riggle (2011), and others in analyzing all vowels, and therefore glides, as having a DORSAL place node: [j, ɥ] are [-back], [w] is [+back].⁵ The labial consonants and non-palatal coronal consonants do not have a back feature specification ([0back]).

- (4) [back] specification

palatal consonants	[ç, tʃ̥ʰ, tʃ̥]	[-back]
velar consonants	[kʰ, k, x, ŋ]	[+back]
front glides	[j, ɥ]	[-back]
back glide	[w]	[+back]

The backness agreement constraint in (3) does not apply to all CG sequences in Mandarin. It is sub-specified for certain types of consonants and glides only, as defined in (5a-5c).

- (5) backness agreement
 - (a) Agree[back]:DorG - An initial dorsal consonant (palatal or velar) and any following glide ([j ɥ w]) must have the same backness value.
 - (b) Agree[back]:C_[-son] ɥ - An initial obstruent and the following glide [ɥ] must have the same backness value: [-back]
 - (c) 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]⁶

⁴ OCP-based phonotactic constraints contribute to Mandarin non-word judgment (Gong, Shuxiao, & Zhang, Jie. 2019).

⁵ The glides [ɥ] and [w] also have a LABIAL feature, and Duanmu (2000) claims that [w] is LAB but not DOR. Some have argued that the front glides [j, ɥ] can also be analyzed as having a CORONAL articulator (Broselow & Niyondagara 1991, Hume 1994).

⁶ We analyze affricates as both [-cont] and [+cont] following Riggle (2011) and others. However, others label affricates as [-cont] (Hayes 2011).

The backness agreement constraints in (5) are always violated if the consonant does not have a backness feature specification. Hence, the relevant labial consonant + glide sequences or non-palatal coronal consonant + glide sequences always violate these constraints.

3 Legal and Illegal Cj, Cq and Cw Sequences

In order to account for the attested and unattested Cj sequences, we need two constraints: Agree[back]:C_[-son, +cont]j and Agree[back]:DorG. The former rules out all fricatives and affricates followed by [j], except the palatal consonants followed by [j] since they share a [-back] feature specification. The latter constraint rules out the velar consonant + [j] sequences since velar consonants are [+back] and [j] is [-back]. Note that we need both constraints because the velar consonants are not all covered by the first constraint since [k, k^h] are [-cont]. All other Cj sequences involving stops and sonorants are legal.

What about Cq sequences? Two constraints allow us to account for the attested and unattested forms: *LabLab and Agree[back]:C_[-son]q. The OCP constraint rules out labial consonants ([p, p^h, m, f]) followed by [q]. The agreement constraint rules out all obstruents followed by [q] that do not share a backness feature, i.e., all of the non-palatal obstruents since only the palatal obstruents share the [-back] feature specification with [q]. Note that another agreement constraint also applies to some of these sequences: Agree[back]:DorG also applies in some of the same contexts as Agree[back]:C_[-son]q because all dorsals in Mandarin are [-son] (obstruents); however, Agree[back]:DorG would not allow us to account for the absence of the non-palatal coronal obstruent + [q] sequences.

In order to account for Cw sequences, we need two constraints: *LabLab and Agree[back]:DorG. The first one rules out all cases of [w] preceded by a labial consonant. The second one rules out all cases of [w] ([+back]) preceded by a palatal consonant ([-back]). All other sequences are allowed.

4 Conclusion

Duanmu (2000)'s Articulator Dissimilation claim is not explanatory enough for Mandarin onsets. Articulator features and backness values are both needed for the four constraints on Mandarin CG sequences: *CG-LabLab, Agree[back]:DorG, Agree[back]:C_[-son]q and Agree[back]:C_[-son, +cont]j. Mandarin requires 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.

5 References

- Broselow, Ellen & Niyondagara, Alice. 1991. "Morphological Structure in Kirundi Palatalization: Implications for Feature Geometry." in F. Katamba (ed.) *Afrikanistische Arbeitspapiere* 25:131-155.
- Duanmu, San. 2000. *The Phonology of Standard Chinese*. Oxford: Oxford University Press.
- Gong, Shuxiao. & Zhang, Jie. 2019. "The Gradient Acceptability in Mandarin Nonword Judgment." Conference presentation at the Annual Meeting of Phonology. Stony Brook University, US.
- Hayes, Bruce. 2011. *Introductory Phonology*. Hoboken, NJ: Wiley-Blackwell.
- Hume, Elizabeth. 1990. "Front Vowels, Palatal Consonants and the Rule of Umlaut in Korean" in *Proceedings of NELS 20*, GLSA, Department of Linguistics, University of Massachusetts, Amherst, pp. 230-243.
- Hume, Elizabeth. 1994. *Vowels, Coronal Consonants and their Interaction in Nonlinear Phonology*. New York: Garland Publishing.
- Kenstowicz, Michael. 1994. *Phonology in Generative Grammar*. Cambridge, Mass. & Oxford: Blackwell.
- Kochetov, Alexei. 2016. "Palatalization and glide strengthening as competing repair strategies: Evidence from Kirundi." *Glossa: A Journal of General Linguistics* 1(1): 14. 1–31, DOI: <http://dx.doi.org/10.5334/gjgl.32>
- Riggle, Jason. 2011. Phonological Feature Chart – University of Chicago version 11.02. <http://hum.uchicago.edu/~jriggle/>
- Yi, Li & Duanmu, San. 2015. "Phonemes, Features, and Syllables: Converting Onset and Rime Inventories to Consonants and Vowels." *Language and Linguistics* 16(6), 819–842.