Backness Agreement in Consonant + Glide Onsets in Mandarin

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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) Mandarin CG sequences

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

1 Shaded cells mean that CG sequence is absent.
2 The consonant [z] has been analyzed as an obstructuent or a sonorant (Duanmu 2000). We analyze it as a voiced fricative since it behaves more like an obstructuent than a sonorant: (i) all initial sonorants in Mandarin can be followed by [j], yet [z] + [j] is missing; (ii) no non-palatal fricatives + [j] sequences are allowed, and neither is *[z].
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 [ʨ, ʨʰ, ɕ]. 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 ([ʢ, w]) is not a legal sequence. The constraint would rule out sequences such as *[pw] but not [pj] or [tw].

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, ʨʰ, ʨ] as [-back], and the velar consonants [kʰ, k, ʰ, ȵ] 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]. The labial consonants and non-palatal coronal consonants do not have a back feature specification ([0back]).

(4) [back] specification

| palatal consonants | [ç, ʨʰ, ʨ] | [-back] |
| velar consonants   | [kʰ, k, ʰ, ȵ] | [+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]

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, Cɣ and Cw Sequences

In order to account for the attested and unattested Cj sequences, we need two constraints: Agree\[back\]:C[\{\text{son},+\text{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, kh] are [-cont]. All other Cj sequences involving stops and sonorants are legal.

What about Cɣ sequences? Two constraints allow us to account for the attested and unattested forms: *LabLab and Agree\[back\]:C[\{\text{son}\}]ɣ. The OCP constraint rules out labial consonants (\{p, pʰ, m, f\}) followed by [ɣ]. The agreement constraint rules out all obstruents followed by [ɣ] 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 [ɣ]. 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[\{\text{son}\}]ɣ 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 + [ɣ] 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 ([+\text{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[\{\text{son}\}]ɣ and Agree\[back\]:C[\{\text{son},+\text{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

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Contents

A Morphosyntactic Analysis of Ostensible Lexical Categories in Arabic ......................... 1
  Saleem Abdelhady and Phil Branigan
A Comparison of Length Between Geminates and Singletons in Crow .......................... 8
  Constantino Damian
Modern Eastern Armenian: SOV or SVO? ................................................................. 11
  Pegah Faghiri and Pollet Samvelian
Information Structure and Syntax: Two Positions for Focus in Basque ....................... 19
  Matteo Fiorini
When Syntax Transforms a Function Word: The Case of Negation .......................... 31
  Matteo Greco
Is Italian Swedish? An Uncommon Look at Italian Laryngeal Phonology ............... 42
  Bálint Huszthy
On the Distribution of the Copula in African American English ........................... 51
  Kwang-sup Kim
Backness Agreement in Consonant + Glide Onsets in Mandarin ........................... 63
  Yang Liu and Lori Repetti
Spanish Language Influence on English Language and Vice Versa ....................... 66
  Gia Mosashvili
Nominative-Genitive Conversion in Japanese, Focus, and Improper Movement ........ 78
  Masao Ochi
Another Kind of Negative Concord Items in Japanese ............................................. 89
  Takeshi Oguro
Persian: Quantity Sensitive and Iambic ................................................................. 98
  Fatemeh Samavati
Verb Types for Deictic Directional Particles ......................................................... 109
  Ronald P. Schaefer and Francis O. Egbokhare
Emphasis Spread in Saffarini Arabic ................................................................. 120
  Reem Saleh and Chris Golston
Superiority & WH Scope ....................................................................................... 133
  Nicholas Sobin