

Phonological structure of /g/ in Mongolic languages

UETA Naoki
Hokuyo University, JAPAN

1. Introduction

The /g/ phoneme is a common sound in Mongolic languages and is normally categorized as one of the weak stops, /b/, /d/, and /g/, as opposed to the strong counterparts, /p/, /t/, and /k/. However, its phonetic and phonological status is not necessarily clear. Specifically, it is debatable whether /g/ in Mongolic languages can be classified as an obstruent, a sound formed by obstructing airflow.

The present study claims that the Mongolic /g/ can be categorized as not only an obstruent but also a sonorant and a glide. This complexity is manifested by (i) phonetic realization, (ii) coda constraint, and (iii) behavior as an epenthetic consonant.

2. Phonetic Realization of /g/

2.1 Phonetic Realization of /g/ in Khalkha Mongolian

In Khalkha Mongolian, /g/ is generally regarded as a voiced velar stop, although this language basically has an aspiration contrast (e.g., /t^h-t/). In their study, Svantesson et al. (2005) presented the inventory of consonants, as shown in Table 1. According to this inventory, /g/, /g^j/, and /G/ are the only voiced stops in Khalkha Mongolian.

Table 1: The inventory of consonants in Khalkha Mongolian
(Svantesson et al. 2005: 25 (6) *Mongolian consonant phonemes*)

	<i>labial</i>	<i>palatalized labial</i>	<i>dental</i>	<i>alveopalatal</i>	<i>palatal</i>	<i>velar</i>	<i>uvular</i>
<i>voiceless aspirated stops</i>	(p ^h)	(p ^{jh})	t ^h	t ^{jh}			
<i>voiceless unaspirated stops</i>	p	p ^j	t	t ^j			
<i>voiced stops</i>					g ^j	g	G
<i>voiceless aspirated affricates</i>			c ^h	č ^h			
<i>voiceless unaspirated affricates</i>			c	č			
<i>voiceless fricatives</i>			s	š	x ^j	x	
<i>nasals</i>	m	m ^j	n	n ^j		ŋ	
<i>voiced lateral fricatives</i>				ɬ	ɬ ^j		
<i>voiceless lateral fricative</i>				(ɬ)			
<i>rhotics</i>				r	r ^j		
<i>glides</i>	w	w ^j			j		

However, /g/, /g^j/, and /G/ are seldom phonetically realized as pure voiced stops [g], [g^j], and [G]. Ueta (2018) highlighted the fact that word-initial /g/ is generally pronounced with a short positive VOT value, which is a typical characteristic of voiceless unaspirated consonants, and that there is no phonetic reason to consider word-initial /g/ as voice consonant from at least the perspective of the VOT data. On the contrary, Ueta (2020a) also demonstrated that the intervocalic /g/ is normally pronounced with either voicing and spirantization, resulting in /ɣ/, or with clear formant structure like a sonorant or glide. Figures 1 and 2 show the waveforms and spectrograms of word-initial and intervocalic /g/, respectively.

In summary, /g/ in Khalkha Mongolian has the phonetic characteristics of both an obstruent and a sonorant.

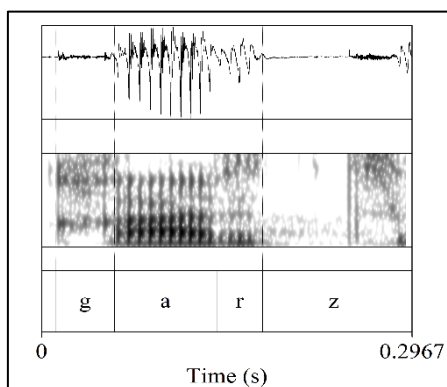


Figure 1: Word-initial /g/

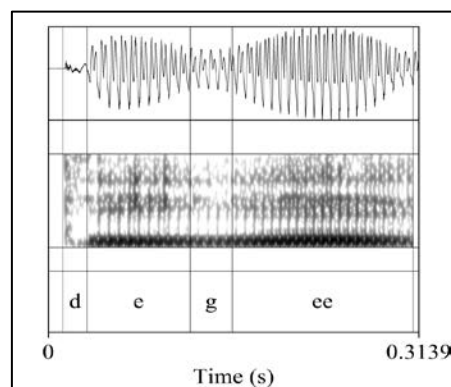


Figure 2: Intervocalic /g/

2.2 Phonetic Realization of /g/ in Other Mongolic languages

/g/ in other Mongolic languages also has a variety of phonetic realizations. This section summarizes the descriptions of how /g/ is realized in Mongolic languages other than Khalkha Mongolian based on Janhunen (ed.) (2003).

In Ordos, although weak stops, including /g/, are characterized by a lack of aspiration rather than voicedness, fully voiced allophones occur for

/b/ and /g/, especially intervocally or next to a nasal sound, and they may further be weakened to the continuant sounds [β] and [ɣ] (Georg 2003a: 196). In Mongghul, although the weak segments, including /g/, are voiceless (or slightly voiced) unaspirated sounds, they can be fully voiced and spirantized (Georg 2003b: 291). Similarly, in Oirat, /g/, like other weak consonants, is most commonly realized as voiceless and unaspirated, and voiced realization is also observed (Birtalan 2003: 214). In Shira Yughur, /g/ (and /G/) is characterized as an unaspirated sound, and it can occur with a fricative pronunciation, which is probably allophonic (Nugteren 2003: 267).

In Dagur, the strong and weak stops are differentiated by either the presence or absence of aspiration, and /g/ is categorized as a voiceless unaspirated stop. However, /b/ and /g/ are voiced and spirantized intervocally and syllable-finally. In addition, /b/, /w/, and /g/ are often free variation before the vowel /u/, and a merger between /g/ and /j/ is possible before the vowel /i/ (Tsumagari 2003: 131–132). These facts suggest that /g/ in Dagur serves a similar phonetic role to glides.

In Buryat, the distinguishing feature between the strong and weak stops is the sound's voicing rather than its aspiration, and /g/ is realized as a voiced stop [g] (Skribnik 2003: 105). Similarly, /g/ in Moghol seems to be consistently realized as [g], judging from the description offered by Weiers (2003: 251); only [g] is presented as the phonetic realization of /g/ while both [b] and [β] are presented for /b/.

With respect to Mangghuer, Slater (2003) offered no description of the phonetic realization of /g/. However, Ueta (2020b) clarified that /g/ is consistently realized as the voiceless unaspirated stop even in an intervocalic position.

As for Bonan and Santa, there are no precise descriptions on the realization of /g/ except that the weak segments in Bonan are characterized as unaspirated and/or voiced (Hugjiltu 2003: 327), and the weak stops in Santa

are unaspirated and the postvelar sounds have two allophonic sounds [g] and [ɣ] (Kim 2003: 349–350). As for Khamnigan Mongol (Janhunen 2003) and Kalmuck (Bläsing 2003), there are similarly no descriptions except that the uvular sound in Kalmuck is spirantized [ɣ].

Table 2 shows the summary of descriptions on the realization of /g/ in Mongolic languages.

Table 2: The realization of /g/ in Mongolic languages*

Language	[k]	[g]	[ɣ]	others
Khalkha Mongolian	+		+	
Ordos	+	+	+	
Mongghul	+		+	
Oirat	+	+		
Shira Yughur	+		(+)	[x]? [ɣ]?
Dagur	+		+	/b, w/ ~ /g/ (free variation) /g/ ~ /j/ (merger)
Buryat	–	+		
Moghol		+		
Mangghuer	+	–	–	
Bonan	(+)	(+)		
Santa	+			
Khamnigan Mongol				
Kalmuck				

* Blank cells do not necessarily imply that the sound does not exist; they instead suggest that there is no description in the study herein referred to.

Table 2 shows that at least Khalkha Mongolian, Ordos, Mongghul, and Dagur have [ɣ] as an allophone for /g/. In other words, /g/ in these languages has the characteristic of continuant, and perhaps sonorant, as well as stop.

It is universally quite common in linguistics, however, that /g/ and /b/ are easily spirantized intervocalically (Lavoie 2001). Therefore, phonetic basis alone is insufficient to claim that the Mongolic /g/ has the characteristic of either a sonorant or a glide. The following two sections, thus, address the phonological phenomena of /g/ in Mongolic languages.

3. Coda Constraint in Khalkha Mongolian

As shown in Table 1, Svantesson et al. (2005) regard /g/, /g^j/, and /G/ as voiced stops. They claimed that this is phonologically supported by the coda constraint. In Khalkha Mongolian, two successive consonants may or may not form a coda, as listed in Table 3, depending on the coda constraint below.

Table 3: Possible codas (based on Svantesson et al. 2005: 66 Table 6.2 *Two-consonant codas*, summarized and reconstructed)

A \ B	t ^h , č ^h	t, č	s, š	g, G	m, n	ɣ, r	w, j
t ^h , č ^h	—	—	—	—	—	—	—
t, č	—	—	—	—	—	—	—
s, š	+	—	—	—	—	—	—
g, G	+	+	+	—	—	—	—
m, n	+	+	+	—	—	—	—
ɣ, r	+	+	+	—	—	—	—
w, j	+	+	+	—	—	—	—

A: The first consonant B: The second consonant

+: Possible coda -: Impossible coda

A string of two consonants is a possible coda if, and only if, it has decreasing sonority, that is, if it consists of a voiced consonant followed

by a voiceless consonant. (Svantesson et al. 2005: 67 (2) *Coda constraint*)

Table 3 suggests the important facts: /g/ and /G/ cannot compose a syllable coda with any preceding consonant, which is more parallel to the sonorant /ᠭ/ and /r/ than to obstruents. In particular, it is notable that /g/ and /G/ cannot form a coda with /ᠭ/ and /r/ preceding it. Generally speaking, the sonority of sonorants is higher than that of voiced stops (see Clements 1990, among others); therefore, voiced stops are expected to compose a possible coda with a preceding sonorant. However, this is not the case in Khalkha Mongolian. This fact suggests that /g/ and /G/ in Khalkha Mongolian can be regarded as a voiced sonorant from the perspective of sonority.

This interpretation is also supported by Cyrillic orthography. Mongolian consonants are categorized into three groups, as shown in (1).

- (1) a. б, в, г, л, м, н, р <b, w, g, l, m, n, r>: ‘consonants with a vowel’
- b. д, ж, з, с, т, х, ц, ч, ш <d, ᠳ, dz, s, t, kh, ts, č, š>: ‘consonants without resonance’
- c. к, п, ф, щ <k, p, f, šč>: ‘special consonants’

The consonants in group (1a) need to be accompanied with a vowel either before or after them. For example, words like *баамап* <baatar> ‘hero’ are possible whereas words like *баамп* <baatr> do not exist because *p* <r> is not accompanied with a vowel. On the contrary, the consonants without resonance in group (1b) are not necessarily accompanied with a vowel; words like *урт* <urt> ‘long’ are possible. The special consonants in (1c) are used only in loanwords or onomatopoeias.¹

As is clear from (1), the consonants with a vowel are ones whose sonority is relatively high while consonants without resonance are ones whose

¹ /j/ is treated as a vowel in Mongolian orthography.

sonority is relatively low. The letter *ᠷ* <g>, which represents /g/ and /G/, is included in consonants with a vowel, the same as the sonorants <w, l, m, n, r>.² This fact also supports the characterization of /g/ and /G/ as sonorants.

4. Behavior as an Epenthetic Consonant

4.1 Behavior as an Epenthetic Consonant in Khalkha Mongolian

In Khalkha Mongolian, /g/ is inserted between two long vowels at a morpheme boundary in order to avoid a crash between the two long vowels, as shown in (2).

- (2) seree-g-eer
fork-EC-INST

In regards to this phenomenon, Svantesson et al. (2005) offered an explanation with underspecification theory. According to them, each consonant is specified by the place features [labial], [palatal], [apical], [velar], and [pharyngeal], as shown in (3).

- (3) *Place features for consonants* (Svantesson et al. 2005: 45 (5))

<i>labials</i> (<i>p^h</i> , <i>p</i> , <i>m</i> , <i>w</i>)	[labial]
<i>palatalized labials</i> (<i>p^{jh}</i> , <i>p^j</i> , <i>m^j</i> , <i>w^j</i>)	[labial, palatal]
<i>dentals</i> (<i>t^h</i> , <i>t</i> , <i>c^h</i> , <i>c</i> , <i>s</i> , <i>n</i> , <i>ʃ</i> , <i>r</i>)	[apical]

² ᠖ is also one of the consonants with a vowel. Ueta (2020a) suggests that can also be regarded as the voiced stop /b/ because it is often pronounced with partial or complete voicing and spirantization, in line with the realization of /g/ and /G/. However, Svantesson et al. (2005) regard as voiceless unaspirated stop /p/.

<i>alveopalatals</i> ($t^h, t^j, \check{c}^h, \check{c}^j, \check{s}, n^j, \check{g}^j, r^j$)	[apical, palatal]
<i>palatals</i> (g^j, x^j, j)	[palatal]
<i>velars</i> (g, x, η)	[velar]
<i>uvulars</i> (ʁ)	[velar, pharyngeal]

Moreover, they claim that the feature [velar] is redundant; velars are unmarked consonants without any place feature, and uvulars have only [pharyngeal] feature. Since consonant epenthesis can be supposed as the process to insert a consonant without any place features, it is reasonable that /g/ functions as the epenthetic consonant.

To advance this interpretation a step forward, it should be explained why a consonant with no place feature can be phonetically realized as the velar sound. In general, consonants without any place features are realized as the glottal sounds /ʔ/ or /h/. These are significantly common epenthetic consonants alongside the glides /j/ or /w/ as well as coronals (Casali 2011, Gordon 2016). Since Khalkha Mongolian has no glottal sound, it is possible to assume that /g/ has no place feature and that a default rule such as the one shown in (4) is applied.

(4) [] > [velar] (default rule)

However, it is still unclear why the feature [velar] is supplemented. In addition, if we suppose that /g/ is a stop, it also must be explained why the obstruent must be epenthesized in intervocalic conditions.

This phenomenon suggests the possibility that /g/ in Khalkha Mongolian serves as a glide. As mentioned above, glides are common epenthetic consonants because they are unobtrusive in intervocalic conditions, and the phonetic characteristics of /g/ in Khalkha Mongolian is similar to glides. Supposing that /g/ is a glide without any place features, the reason it does

not become a glottal sound becomes explainable; glides are kinds of sonorants, and sonorants cannot be realized without a place to articulate somewhere at supralarynx. In other words, a compensational place feature must be added because no glottal sonorant can be assumed. Since the other glides in Khalkha Mongolian, /w/ and /j/, have the features [labial] and [palatal], respectively, it is natural to assume that [velar] is supplemented to the glide that has no place feature.

4.2 Behavior as an Epenthetic Consonant in Other Mongolic Languages

In many Mongolic languages, as well as Khalkha Mongolian, /g/ (or /ɣ/) functions as the epenthetic consonant. According to Janhunen (ed.) (2003), Ordos, Shira Yughur, Dagur,³ Buryat, and Khamnigan Mongol have the epenthetic /g/, and Oirat and Kalmuck have the epenthetic /ɣ/. Examples of the epenthetic /g/ in Buryat and Khamnigan Mongol are given in (5) and (6), respectively.

(5) zholoo-g-oor (Skribnik 2003: 107)

bridle-EC-INSTR

(6) boo-g-aad (Janhunen 2003: 88)

to descend-EC-CP

As shown in Table 2, Ordos, Dagur (and Shira Yughur) have the allophone [ɣ] for /g/, which means that /g/ is phonetically similar to a sonorant in these languages. In addition, Shira Yughur, Buryat, and Khamnigan Mongol

³ In Dagur, /g/ is epenthized in the verbal conjugations, while /j/ is inserted in the nominal declension (Tsumagari 2003: 134). This also suggests the similarity of /g/ to a glide.

have the phonemic /h/, which is regarded as a consonant without any place features. For these languages, it is insufficient to state that /g/ simply has no place feature. Instead, by treating /g/ as a glide with no place feature, both the behavior of /g/ as the epenthetic consonant and the existence of /h/ can be explained in compatible ways.

5. Conclusion

The present study claims that the Mongolic /g/ has the characteristics of obstruent, sonorant, and glide sounds through the analyses of phonetic realization, coda constraint, and behavior as an epenthetic consonant. As highlighted in Sections 3 and 4, /g/ in Mongolic languages is phonologically likely to be a sonorant with no place feature. Following this interpretation, word-initial /g/ is phonetically strengthened to the stop. It is usually realized as the voiceless (unaspirated) stop [k] likely because [voice] is unspecified, which is natural for sonorants. It is no wonder that sonorants can be realized without voicing; in Khalkha Mongolian, for example, /r/ and /ʁ/, and even vowels, are often devoiced. In summary, this study considers that the complexity of the Mongolic /g/ is attributed to the imperfection of its phonological specification.

Acknowledgments

This study was supported by JSPS KAKENHI Grant Number 17J06051.

Abbreviations

CP: converb. perfect, EC: epenthetic consonant, INST: instrumental

References

- Birtalan, Ágnes (2003) Oirat. In: Juha Janhunen (ed.) *The Mongolic languages*, 210–228. London: Routledge.
- Bläsing, Uwe (2003) Kalmuck. In: Juha Janhunen (ed.) *The Mongolic languages*, 229–247. London: Routledge.
- Casali, Roderic F. (2011) Hiatus resolution. In: Marc van Oostendorp, Colin Ewen, Elizabeth Hume, and Keren Rice (eds.) *The Blackwell companion to phonology*, 1434–1460. Chichester: Wiley-Blackwell.
- Clements, George N. (1990) The role of the sonority cycle in core syllabification. In: John Kingston and Mary E. Beckman (eds.) *Papers in laboratory phonology 1: Between the grammar and physics of speech*, 283–333. Cambridge: Cambridge University Press.
- Georg, Stefan (2003a) Ordos. In: Juha Janhunen (ed.) *The Mongolic languages*, 193–209. London: Routledge.
- Georg, Stefan (2003b) Mongghul. In: Juha Janhunen (ed.) *The Mongolic languages*, 286–306. London: Routledge.
- Gordon, Matthew K. (2016) *Phonological typology*. Oxford: Oxford University Press.
- Hugjiltu, Wu (2003) Bonan. In: Juha Janhunen (ed.) *The Mongolic languages*, 325–345. London: Routledge.
- Janhunen, Juha (ed.) (2003) *The Mongolic languages*. London: Routledge.
- Janhunen, Juha (2003) Khamnigan Mongol. In: Juha Janhunen (ed.) *The Mongolic languages*, 83–101. London: Routledge.
- Kim, Stephen S. (2003) Santa. In: Juha Janhunen (ed.) *The Mongolic languages*, 346–363. London: Routledge.
- Lavoie, Lisa M. (2001) *Consonant strength*. New York: Garland Publishing.
- Nugteren, Hans (2003) Shira Yughur. In: Juha Janhunen (ed.) *The Mongolic languages*, 265–285. London: Routledge.

15th Seoul International Altaistic Conference, July 16-17, 2021

- Skribnik, Elena (2003) Buryat. In: Juha Janhunen (ed.) *The Mongolic languages*, 102–128. London: Routledge.
- Slater, Keith W. (2003) Mangghuer. In: Juha Janhunen (ed.) *The Mongolic languages*, 307–324. London: Routledge.
- Svantesson, Jan-Olof, Anna Tsendina, Anastasia Karlsson, and Vivan Franzén (2005) *The phonology of Mongolian*. Oxford: Oxford University Press.
- Tsumagari, Toshiro (2003) Dagur. In: Juha Janhunen (ed.) *The Mongolic languages*, 129–153. London: Routledge.
- Ueta, Naoki (2018) Voice onset time of word-initial stops and affricates in Khalkha Mongolian. *Journal of the Phonetic Society of Japan* 22 (2): 131–140.
- Ueta, Naoki (2020a) Mongorugo haruhahoogen no gochuu heesaon no on-seeteki barieeshon to on'in kaishaku [Phonetic variation and phonological interpretations of word-medial stops in Khalkha Mongolian]. *Bulletin of the Japanese Association for Mongolian Studies* 50: 1–18.
- Ueta, Naoki (2020b) Minwa dozokugo ni okeru taikisee no tairitsu no on-seeteki tokuchoo [The phonetic characteristics in the aspiration contrast in Minhe Mangghuer]. *Journal of Kijutsuken* 12: 51–70.
- Weiers, Michael (2003) Moghol. In: Juha Janhunen (ed.) *The Mongolic languages*, 248–264. London: Routledge.

ABSTRACT

Phonological structure of /g/ in Mongolic languages

UETA Naoki

Hokuyo University, JAPAN

Most Mongolic languages have the /g/ sound. Although it is a common sound in Mongolic languages, its phonetic and phonological status is not necessarily clear. This study claims that the Mongolic /g/ has characteristics of obstruent, sonorant, and glide. This complexity is manifested by its phonetic realization, coda constraint, and behavior as an epenthetic consonant.

In some Mongolic languages, including Khalkha Mongolian, /g/ is realized with a complete closure and with short positive VOT value in word-initial position, which are typical characteristics of (unaspirated) obstruents. On the contrary, the intervocalic /g/ is pronounced with voicing and spirantization, resulting in /ɣ/, or even with clear formant structure, like a sonorant or glide.

As for the coda constraint in Khalkha Mongolian, /g/ cannot compose a coda with any preceding consonant, which is more parallel to the sonorant /ɣ/ and /r/ than to obstruents.

In many Mongolic languages, /g/ is inserted between two vowels at a morpheme boundary in order to avoid a hiatus. This behavior of /g/ might be interpreted by supposing that phonologically /g/ has no place feature and thus functions as an epenthetic consonant. However, it should be explained why and how the feature [velar] is supplemented in the phonetic representation, and why the obstruent must be epenthesized in intervocalic

15th Seoul International Altaistic Conference, July 16-17, 2021

conditions, if /g/ is regarded as a stop. This phenomenon suggests the possibility that /g/ in Mongolic languages serves as a glide.