

Acknowledgement

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Mongolian Syllable Structure

Jan-Olof Svantesson

Introduction

In this article, the syllable structure of standard Khalkha Mongolian is described and exemplified in some detail. The related problems of how Mongolian words are divided into syllables, and how epenthetic vowels are introduced are treated in Svantesson forthc.

The description is based on recordings and observations of Ulaanbaatar speakers. The semi-official orthographic dictionary by Damdinsürén & Osor 1983 has been used as an authoritative source of standard Khalkha forms, and the reverse alphabetical dictionaries by Vietze & Zenker 1976 and Bold 1976 have been especially useful for finding examples.

The phoneme system of standard Mongolian is given here for reference:

<i>Vowels:</i>	i	u	ir	ur		ui	
	ɔ		ɔ:			ɔi	
	e	e	e:	e:			
	a	ɔ	a:	ɔ:		ai	ɔi
<i>Consonants:</i>							
Labials	p	b				m	w
Palatalized labials	p'	b'				m'	w'
Dentals	t	d	c [ts]	z [dz]	s	n	l [ɮ] r
Palatalized dentals	t'	d'				n'	l' [ɮ'] r'
Alveopalatals			č [tʃ]	ž [dʒ]	š [ʃ]		
Palatal							j
Velars		g			x	ŋ	
Palatalized velars		g'			x'		
Uvular		g					

(Note that z and ž denote the affricates [dz] and [dʒ], respectively.)

My analysis differs from what is usually given in Western sources (e.g. Poppe 1951, 1970, Street 1963, Beffa & Hamayon 1975), but is rather similar to the analysis of many Mongolian, Russian and Japanese writers (e.g. Todaeva 1951, Nadeljaev 1957, Sanžeev 1959, Coloo 1976, Möömöö

1977, Saitō 1986). Mongolian has vowel harmony based on the feature [pharyngeal] (or [Advance Tongue Root]); cf. Svantesson 1985.

Mongolian is currently (1994) written with a variant of the Cyrillic alphabet that represents the surface phonetics faithfully but in a rather complicated way. The contrasts /g/ ~ /g/ and /ŋ/ ~ /n/ are not indicated by separate consonant letters but by the absence or presence of a following orthographic vowel which may be mute (e.g. *баг* <bag> /bag/ 'team' vs. *бага* <baga> /bag/ 'small'; *хан* <xan> /xan/ 'king' vs. *хана* <xana> /xan/ 'wall'). This leads to some underdifferentiation since /g/ and /g/ may contrast before a vowel (e.g. *зургаа* <zɔrgaa> /zɔrga/ 'picture-REFL' or /zɔrga/ 'six'), although such cases are not very frequent. There is also some orthographic overdifferentiation. Thus, the orthographic diphthong *эй* <ej>, which is found only in non-initial syllables, is pronounced in the same way as *ээ* <ee> in this position, i.e. as /e/ (for instance, *зэртэй* <gertej> 'house-COM' and *зэртээ* <gertee> 'house-DAT-REFL' are both pronounced /girtə/). Furthermore, the orthography distinguishes between short *э* <e> and *у* <i> in initial syllables, but at least Ulaanbaatar speakers pronounce both as /i/.

In the phonemization used here, long and short vowels contrast only in the first syllable. Non-reduced vowels in non-initial syllables are analysed as short vowels (cf. Stuart & Haltod 1957). In most traditional analyses of Mongolian, these vowels are regarded as being long, although their duration in normal pronunciation is much shorter than long initial vowels and only slightly longer than short initial vowels (Svantesson 1990).

Non-initial syllables may contain schwas ([ə], fronted to [ɪ] after palatalized consonants and alveopalatals). I will regard them as epenthetic vowels which are absent from underlying forms and derived by rules (see Svantesson *forthc.*). In the orthography, what I regard as short full vowels in non-initial syllables are written as double vowels (e.g. *залуу* <zalɔwɔ> /zalɔ/ 'young'). Schwas are written as single vowels, following formal rules of vowel harmony (e.g. *хамар* <xamar> [xamər] 'nose', *өвөл* <ɕwɔl> [ɕwəl] winter) or as *у* <i> after palatalized consonants or alveopalatals (*адил* <adil> [ad'ɪl] 'like').

In this article, Mongolian words will be given in their orthographic form, in underlying form without schwas and in phonetic form with schwas and syllable boundaries (·).

The following abbreviations are used in the glosses: ABL ablative, ADJ adjective-forming suffix, COLL collective, COM comitative, DAT dative, IMP

imperative, IRR unreal mood, NONP non-past, PL plural, PROG progressive, REFL reflexive, TERM terminal.

Syllable types

In this section I will exemplify all types of surface syllables that can occur in different positions in a word.

The number of possible syllable types is greatest in word-initial position, where long and short vowels contrast, and where syllables may or may not have an onset. Schwas do not occur in initial syllables.

(1) Word-initial syllable types

CV	/jala/	[ja.la]	ялаа	'fly'
V	/adɔ/	[a.dɔ]	адуу	'horse'
CV:	/tɔ:lai/	[tɔ:lai]	туулай	'hare'
V:	/arɔl/	[ar.rɔl]	ааруул	'dried curds'
CVi	/baiʃŋ/	[bai.ʃŋ]	байшин	'building'
Vi	/aimg/	[ai.məg]	аймаг	'district'
CVC	/xɛndi/	[xɛn.di]	хөндий	'hollow'
VC	/ulgr/	[ul.gər]	үлгэр	'story'
CV:C	/barwgai/	[bar.w.gai]	баавгай	'bear'
V:C	/ɔrxai/	[ɔr.xai]	уурхай	'mine'
CViC	/nailzɔr/	[nail.zɔr]	найлзуур	'sprout'
ViC	/ail-tai/	[ail.tai]	айлтай	'household-COM'
CVCC	/xandgai/	[xand.gai]	хандгай	'elk'
VCC	/arslŋ/	[ars.ləŋ]	арслан	'lion'
CV:CC	/gams-tai/	[gams.tai]	гаанстай	'pipe-COM'
V:CC	/aɪlz-tai/	[aɪlz.tai]	аалзтай	'spider-COM'
CViCC	/mails-tai/	[mails.tai]	майлстай	'cypress-COM'
ViCC	/ɔims-tɔi/	[ɔims.tɔi]	оймстой	'stocking-COM'
CVCCC	/daws-t-tai/	[dawst.tai]	давсттай	'salty-COM'
VCCC	/ils-t-te/	[ilst.te]	элстэй	'sandy-COM'
CV:CCC	/nurs-ɕ-te/	[nursɕ.te]	нүүрсчтэй	'coal-miner-COM'
V:CCC	/ɔr-s-tl-a/	[ɔrst.la]	уурстлаа	'steam-VERB-TERM-REFL'
CViCCC	/noir-s-tl-ɔ/	[noirst.lɔ]	нойрстлоо	'sleep-VERB-TERM-REFL'
ViCCC	/ai-ms-tl-a/	[aimst.la]	аймстлаа	'fear-VERB-TERM-REFL'

A monosyllabic word can consist of any type of syllable that can be an initial syllable of a polysyllabic word, except that words of the type (C)V (where V is a short vowel) do not occur. (Some monosyllabic pronouns are

written with an orthographic short vowel, e.g. *бу* <bi> 'I', *ма* <ta> 'you', but are nevertheless pronounced with a long vowel ([bi:], [ta:]) when found in focussed position.)

(2) *Monosyllabic words*

CV:	/gu:/	[gu:]	гүү	'mare'
V:	/ɔ:/	[ɔ:]	оо	'powder'
CVi	/xui/	[xui]	хүй	'kin'
Vi	/ai/	[ai]	ай	'category'
CVC	/tɔt/	[tɔt]	тогь	'parrot'
VC	/aj/	[aj]	ая	'melody'
CV:C	/su:l/	[su:l]	сүүл	'tail'
V:C	/a:w/	[a:w]	аав	'father'
CViC	/zuil/	[zuil]	зүйл	'sort'
ViC	/ail/	[ail]	айл	'household'
CVCC	/daws/	[daws]	давс	'salt'
VCC	/ard/	[ard]	ард	'people'
CV:CC	/gams/	[gams]	гаанс	'pipe'
V:CC	/a:lz/	[a:lz]	аалз	'spider'
CViCC	/mails/	[mails]	майлс	'cypress'
ViCC	/ɔims/	[ɔims]	оймс	'stocking'
CVCCC	/daws-t/	[dawst]	давст	'salty' ('salt-ADJ')
VCCC	/ils-t/	[ilst]	элст	'sandy' ('sand-ADJ')
CV:CCC	/nu:rs-ʃ/	[nu:rsč]	нүүрсч	'coal-miner' ('coal-ACTOR')
V:CCC	<i>no examples found – probably accidental gap</i>			
CViCCC	/mailst/	[mailst]	майлст	'cypress-ADJ'
ViCCC	/ɔimst/	[ɔimst]	оймст	'stocking-ADJ'

Non-initial syllables always begin with a consonant, and there is no short/long vowel contrast in them. The only difference between word-internal and word-final syllables is that a schwa cannot occur in absolute word-final position.

(3) *Word-internal syllable types*

CV	/jala-tai/	[ja.la.tai]	ялаатай	'fly-COM'
CVi	/tɔ:lai-tai/	[tɔ:lai.tai]	туулайтай	'hare-COM'
Сә	/arɣl-a/	[ar.gə.la]	аргалаа	'dried dung-REFL'

CVC	/arɔl-tai/	[a.rɔl.tai]	аарултай	'dried curds-COM'
CViC	/xarai-sɲ-as/	[xa.rais.nas]	харайснаас	'jump-PAST-ABL'
СәC	/sarmgčɲ/	[sar.məg.čɲ]	сармагчин	'monkey'
CVCC	/sana-rx-sɲ/	[sa.narx.səɲ]	санаархсан	'intend-PAST'
CViCC	/bɔzɣai-rx-sɲ/	[bɔz.gairx.səɲ]	бузгайрхсан	'be haughty-PAST'
СәCC	/sɔrwlž-l-gč/	[sɔr.wəłž.ləgč]	сурвалжлагч	'journalist' (‘root-VERB-AGENT’)
CVCCC	/sana-rx-tl-a/	[sa.narxt.la]	санаархтлаа	'intend-TERM-REFL'
CViCCC	/bɔzɣai-rx-tl-a/	[bɔz.gairxt.la]	бузгайрхтлаа	'be haughty-TERM-REFL'
СәCCC	/nɔl'ms-t-tai/	[nɔ.l'ɪmst.tai]	нулимсттай	'tearful-COM' (‘tear-ADJ-COM’)

(4) *Word-final syllable types*

CV	/jala/	[ja.la]	ялаа	'fly'
CVi	/tɔ:lai/	[tɔ:lai]	туулай	'hare'
CVC	/ʃagšɔr/	[ʃag.šɔr]	шагшуур	'biscuit-stick'
CViC	/xarai-x/	[xa.raix]	харайх	'jump-IRR'
СәC	/ulɣr/	[ul.gər]	үлгэр	'story'
CVCC	/sana-rx/	[sa.narx]	санаарх	'to intend' ('thought-VERB')
CViCC	/bɔzɣai-rx/	[bɔz.gairx]	бузгайрх	'be haughty' ('good-VERB')
СәCC	/gɔdmž/	[gɔ.dəmž]	гудамж	'street'
CVCCC	/mөгөrs-t/	[mөгerst]	мөгөөрст	'gristly' ('gristle-ADJ')
CViCCC	<i>no examples found – probably accidental gap</i>			
СәCCC	/nɔl'ms-t/	[nɔ.l'ɪmst]	нулимст	'tearful' ('tear-ADJ')

These examples illustrate the facts that long vowels occur only in initial syllables and schwas only in non-initial syllables, while short vowels and diphthongs occur in any position. Any vowel type (short, long, diphthong or schwa) can combine with any number of following tautosyllabic consonants (one, two or three).

An intervocalic consonant cluster always consists of a possible word-final consonant string followed by a single consonant, i.e. at most four consonants; see (1) and (3).

Onsets

I will assume that words are divided into syllables in such a way that a consonant which is followed by a vowel is an onset, and does not belong to

a coda, e.g. *санаа* /sana/ [sa.na] 'thought', *халхаа* /xalx-a/ [xal.xa] 'shield-REFL' (not *[san.a], *[xalx.a]). This kind of syllable division is regarded as uncontroversial in the phonological literature (see e.g. Kuryłowicz 1948:83, Kahn 1976:24, Selkirk 1982, Clements & Keyser 1983:37, Itô 1989). As for Mongolian, a rule that divides syllables in this way is given explicitly by Todaeva 1951:39-40, and can also be inferred from examples given in works by other native Mongolian scholars, for instance Sanžeev 1959:18 and Cenggeltei 1979:149. This syllable division is also supported by the fact, mentioned above and illustrated in (1) and (3), that the only consonant strings that can occur intervocally in surface forms are those that consist of a possible word-final surface consonant cluster plus one consonant which may occur word-initially.

Vowels never meet inside words. If a suffix beginning with a vowel (e.g. reflexive *-a/-ɔ/-e/-ə*) is added to a word ending in a vowel, an epenthetic consonant, *ɠ* or *g* depending on the vowel harmony class, is inserted between them:

(5) /mal/	[mal]	мал	'cattle'	<i>reflexive:</i>	[ma.la]	малаа
/sana/	[sa.na]	санаа	'thought'		[sa.na.ɠa]	санаага
/xu/	[xu]	хүү	'boy'		[xu.ɠe]	хүүгээ

Any consonant may be a surface onset, except *ŋ*. The velar nasal never appears as a syllable onset in monomorphemic words, and if it becomes an onset as the result of a morphological operation, it is changed to *n*:

(6) /xɑŋ/	[xɑŋ]	хаан	'Khan'
/xɑŋ-as/	[xɑi.nas]	хаанаас	'Khan-ABL'
/xu:xŋ/	[xu:xəŋ]	хүүхэн	'girl'
/xu:xŋ-es/	[xu:x.nes]	хүүхнээс	'girl-ABL'

Rhymes

As seen in (1)–(4) above, the rhyme of a Mongolian surface syllable consists of a nucleus vowel (short, long, diphthong or schwa) which can be followed by a coda consisting of at most three consonants. In this section, the possible codas will be characterized in terms of a sonority scale.

Any single consonant except *b* and *b'* can be a coda. The historical explanation for these exceptions is that Old Mongolian *b* developed into *w* when preceded by a vowel, e.g. *tabu* > *taw* 'five', *gobi* > *ɠow* 'desert'

Two-consonant codas are exemplified in (7), in word-final and word-internal position. The examples of word-internal codas given here are

formed by adding the comitative case suffix *-tai* ~ *-tɔi* ~ *-te* (which can be added to any uninflected noun or adjective).

(7)					<i>comitative:</i>	
a.	/ʒims/	[ʒims]	жимс	'fruit'	[ʒims.te]	жимстэй
	/xuns/	[xuns]	хүнс	'foodstuff'	[xuns.te]	хүнстэй
	/ɔn's/	[ɔn's]	оньс	'spring'	[ɔn's.tɔi]	оньстой
	/cɔŋx/	[cɔŋx]	цонх	'window'	[cɔŋx.tɔi]	цонхтой
	/limb/	[limb]	лимбэ	'flute'	[limb.te]	лимбэтэй
	/dɔnd/	[dɔnd]	дунд	'middle'	[dɔnd.tai]	дундтай
b.	/ɔls/	[ɔls]	улс	'state'	[ɔls.tai]	улстай
	/talx/	[talx]	талх	'bread'	[talx.tai]	талхтай
	/ar'x'/	[ar'x']	архи	'liquor'	[ar'x'.tai]	архитай
	/ard/	[ard]	ард	'people'	[ard.tai]	ардтай
	/a:lz/	[a:lz]	аалз	'spider'	[a:lz.tai]	аалзтай
	/arc/	[arc]	аарц	'curds'	[arc.tai]	аарцтай
c.	/uj-s/	[uj:s]	үес	'time-PL'	[uj:s.te]	үестэй
	/sawx/	[sawx]	савх	'chopsticks'	[sawx.tai]	савхтай
	/sɔwd/	[sɔwd]	сувд	'pearl'	[sɔwd.tai]	сувдтай
	/ɠɔj-d/	[ɠɔj:d]	гоёд	'elegant-DAT'		

The two-consonant codas exemplified in (7) consist of a sonorant (nasal (7a), liquid (7b) or glide (7c)) followed by an obstruent, and are thus consistent with the well-known 'sonority law', saying that syllables generally have decreasing sonority from the vowel nucleus towards the edges (Whitney 1866, 1874, Sievers 1876:111 ff., Jespersen 1897-99:525; for a recent treatment, see Clements 1990 who also surveys older and newer literature on this subject).

Different authors give somewhat different versions of the sonority scale, and also differ as to the exact way of interpreting it. Clements (1990, 1992) maintains that a sonority scale which universally accounts for core syllabification is derivable from the major class features (cf. Basbøll 1977) and involves the four consonant classes obstruents (O), nasals (N), liquids (L) and glides (G), each being more sonorous than the preceding one (and less sonorous than the vowels): $O < N < L < G (< V)$.

As seen in (7), the combinations NO, LO and GO are possible codas. The other combinations of the four sonority classes are exemplified in (8). These do not form codas, and a schwa must be inserted between them to

make a well-formed syllable. (This assertion will be modified somewhat below.)

(8) OO	/x'atd/	[x'a.təd]	Хятад	'China'
	/ɔts/	[ɔ.təs]	утас	'thread'
	/ɔtč/	[ɔ.təč]	оточ	'physician'
	/mɔxs/	[mɔ.xəs]	мөхөс	'weak'
	/gaixš/	[gai.xəš]	гайхас	'wonder'
	/gids/	[gi.dəs]	гэдэс	'belly'
ON	/dɔtn/	[dɔ.tən]	дотоно	'inside'
	/ɔx'ŋ/	[ɔ.x'ŋ]	охин	'daughter'
	/xatŋ/	[xa.təŋ]	хатан	'queen'
	/tɔtm/	[tɔ.təm]	тутам	'each'
OL	/saxl/	[sa.xəl]	сахал	'beard'
	/ažl/	[a.žil]	ажил	'work'
	/batr/	[bai.tər]	баатар	'hero'
	/gazr/	[ga.zər]	газар	'place'
OG	/sidw/	[si.dəw]	сэдэв	'theme'
	/tesw/	[tɛ.səw]	төсөв	'plan'
NN	/ɔmn/	[ɔ.mən]	өмнө	'southern'
	/unŋ/	[u.nəŋ]	үнэн	'truth'
NL	/xamr/	[xa.mər]	хамар	'nose'
	/ɔnl/	[ɔ.nəl]	онол	'theory'
	/tam'r/	[ta.m'ɾ]	тамир	'strength'
	/unr/	[u.nər]	үнэр	'smell'
NG	/ɔn-w/	[ɔ.nəw]	унав	'fall-PAST'
	/nim-w/	[ni.məw]	нэмэв	'add-PAST'
LN	/al'm/	[a.l'm]	алим	'apple'
	/durm/	[du.rəm]	дүрэм	'rule'
	/ɔlŋ/	[ɔ.ləŋ]	олон	'many'
	/xurŋ/	[xu.rəŋ]	хүрэн	'brown'
LL	/ɔɔr'l/	[ɔɔ.r'l]	гурил	'flour'
	/bɔlr/	[bɔ.lər]	болор	'crystal'
	/gir/	[gi.rəl]	гэрэл	'light'
LG	/dɔrw/	[dɔ.rəw]	дөрөв	'four'
	/bɔr'w'/	[bɔ.r'ɾw']	борви	'skin bag'
	/galw/	[ga.ləw]	галав	'era'

GN	/sawŋ/	[sa.wəŋ]	савах	'soap'
	/nɔjŋ/	[nɔ.jəŋ]	ноён	'lord'
	/aw-n/	[a.wən]	авна	'take-NONP'
	/ɔj-n/	[ɔ.jən]	оёно	'sew-NONP'
GL	/xɔjr/	[xɔ.jər]	хоёр	'two'
	/əwl/	[ə.wəl]	өвөл	'winter'
	/sɔjl/	[sɔ.jəl]	соёл	'culture'
	/əwr/	[ə.wər]	өвөр	'breast'
GG	/ɔj-w/	[ɔ.jəw]	уяв	'bind-PAST'
	/aw-w/	[a.wəw]	авав	'take-PAST'

The examples in (7) and (8) show that the three classes nasals, liquids and glides are treated as having the same sonority value in Mongolian syllabification, which can be described by using only two sonority classes (in addition to the vowels), obstruents and sonorants (S), and a correspondingly simpler sonority scale: $O < S (< V)$.

Thus the codas obey a very strict form of the sonority law applicable at the surface level:

(9) *Coda constraint*: A string of (zero or more) consonants is a possible coda if and only if it has strictly decreasing sonority.

A consonant string may fulfill the coda constraint without actually occurring as a coda, but in that case it does not occur in underlying strings, either because of a segmental rule or because it is an accidental gap. For instance, a consonant preceding a palatalized consonant is always itself palatalized, so codas like **rx'* or **nd'* never occur, although they are admitted by the coda constraint.

It can be noted that the length of the coda need not be specified, since it cannot be greater than the number of distinct sonority classes (cf. Steriade 1982:223). Thus there is no need to stipulate a syllable template (Selkirk 1982; Clements & Keyser 1983, etc.). (Three-consonant codas will be treated below.)

Voiced velar and uvular stops

The examples given so far do not involve the voiced velar and uvular stops *g*, *g'* and *ɣ* (the class of these three sounds will be denoted Γ). Their behaviour is exemplified in (10). (As in (7), word-internal examples can be

constructed from uninflected nouns and adjectives by adding the comitative suffix.)

(10) ГО	/sags/	[sags]	сарс	'basket'
	/bags/	[bagš]	багш	'teacher'
	/bugd/	[bugd]	бүгд	'all'
	/igc/	[igc]	эгц	'steep'
	/tagt/	[tagt]	тагт	'balcony'
	/bōgd/	[bōgd]	богд	'holy'
ГS	/bōg'-d/	[bōg'd]	богьд	'experienced-DAT'
	/zag's/	[zag's]	загьс	'let foal suckle another foal's mother'
ГS	/өг-w/	[өгәw]	өгөв	'to give-PAST'
	/šugl/	[šu.gəl]	шүгэл	'whistle'
	/agr/	[a.gər]	агар	'aloe'
	/bōg'n/	[bō.g'm]	богино	'short'
ОГ	/usg/	[u.səg]	үсэг	'script'
	/otg/	[ot.təg]	отог	'clan'
	/ōtg/	[ō.təg]	утага	'meaning'
СГ	/ajg/	[a.jəg]	аяга	'cup'
	/bilg/	[bi.ləg]	бэлэг	'gift'
	/xailg/	[xai.ləg]	хаалга	'door'
	/ōng/	[ō.nəg]	унага	'foal'
ХС	/xōng/	[xō.nəg]	хоног	'gutter'
	ГГ	/sag/	[sa.gəg]	сагар
ГГ	/cōg'-g/	[cō.g'ig]	цогиг	'to canter-IMP'
	/ilgg/	[il.gəg]	элгэг	'sieve'

These examples are compatible with the coda constraint provided that the voiced velar and uvular stops are counted as sonorants in Mongolian, although they are phonetically obstruents.

The decision to regard *g*, *g'*, *g* as sonorants minimizes the number of exceptions, but some still remain. One is the combination *gs*, which does not form a coda, but requires a schwa, as in /zags/ [za.gəs] *загас* 'fish'. The clusters *gs* and *g's* are possible codas, however (see examples given above).

Other exceptions are the clusters *ηg*, *ηg'*, *ηg*, which are allowed as codas, although they violate the Mongolian sonority law where *g*, *g'*, *g* are regarded as sonorants (this place of articulation of the velar nasal is assimilated to a following obstruent):

(11)	/mōŋg/	[mōŋg]	мөнгө	'silver'
	/aŋg'/	[aŋ'g']	анги	'class'
	/m'aŋg/	[m'aŋg]	мянга	'thousand'

Fricative-stop codas

The clusters *st*, *sč*, *xt*, *xč* and *x't* occur as codas, although they consist of two obstruents and thus violate the sonority law as formulated above. Examples are given in (12), where word-internal examples are constructed mechanically by adding the comitative suffix, as in (7):

(12)	/us-t/	[ust]	үст	'hairy' ('hair-ADJ')
	/us-t-te/	[ust.te]	үсттэй	
	/ōs-č/	[ōsč]	усч	'swimmer' ('water-ACTOR')
	/ōs-č-tai/	[ōsč.tai]	усчтай	
	/tuix-t/	[tuixt]	түүхт	'historical' ('history-ADJ')
	/tuix-t-te/	[tuixt.te]	түүхттэй	
	/caxč/	[caxč]	цахч	'magpie'
	/caxč-tai/	[caxč.tai]	цахчтай	
	/bōx'-t/	[bōx't]	бохьт	'become tar-filled' ('tar-VERB')

Although one might expect that the similar sequences *x't* and *xč* can form codas as well, I have found no examples that prove or disprove this. Presumably they are accidental gaps, since palatalized consonants have a fairly low frequency of occurrence.

It is not the case that all voiceless fricatives (*s*, *š*, *x*, *x'*) form coda clusters with voiceless coronal stops and affricates (*t*, *t'*, *c*, *č*), since *š* and *c* do not form coda clusters of this type:

(13)	*št] _σ	/xōšt/	[xō.šit]	(not *[xōšt])	хушит	'a kind of tree'
	ʔšč] _σ				(no examples found)	
	sc] _σ	/nis-cge/	[ni.səc.ge]	([nisc.ge])	нисэцгээ	'to fly-COLL'
	xc] _σ	/xəx-c/	[xə.xəc]	([xəxc])	хөхөц	'indigo' (xəx 'blue')
	šc] _σ	/tuš-cge/	[tu.šic.ge]	([tušc.ge])	түшицгээ	'to lean against-COLL'

Thus, the dental and velar fricatives *s* and *x* form codas with the dental stop *t* and the alveopalatal affricate *č* [tʃ], but not with the dental affricate *c* [ts].

Clusters of fricatives and stops (or affricates) with different voicing value do not form codas, but trigger epenthesis, e.g.:

(14)	*sd] _σ	/usd/	[u.səd]	үсэд	'very'
	*xd] _σ	/xuxd/	[xu.xəd]	хүүхэд	'child'
	*šž] _σ	/xus-ž/	[xu.səž]	хүсэж	'want-PROG'
	*xž] _σ	/ux-ž/	[u.xəž]	үхэж	'die-PROG'

Three-consonant codas

Any sonorant followed by one of the clusters *-st*, *-sč*, *-xt*, *xč*, *x't* may form a coda, and no other three-consonant codas occur. Examples (see also (1)-(4) above):

(15)	/ils-t/	[ilst]	элст	'sandy' ('sand-ADJ')
	/ils-t-te/	[ilst.te]	элстгэй	
	/daws-t/	[dawst]	давст	'salty' ('salt-ADJ')
	/daws-t-tai/	[dawst.tai]	давсттай	
	/žims-t/	[žimst]	жимст	'having fruit' ('fruit-ADJ')
	/žims-t-te/	[žimst.te]	жимстгэй	
	/irx-t/	[irxt]	эрхт	'competent' ('rights-ADJ')
	/irx-t-te/	[irxt.te]	эрхтгэй	
	/nuɾs-č/	[nuɾsč]	нүүрсч	'coal-miner' ('coal-ACTOR')
	/nuɾs-č-te/	[nuɾsč.te]	нүүрсчтэй	
	/zigs-č/	[zigsč]	зэгсч	'warbler' (cf. [zigs] 'reed')
	/zigs-č-te/	[zigsč.te]	зэгсчтэй	
	/šarx-č/	[šarxč]	шархч	'coroner' ('wound-ACTOR')
	/šarx-č-tai/	[šarxč.tai]	шархчтай	
	/gar'x'-t-la/	[gar'x't.la]	гархитлаа	'was circular' ('ring-VERB-PAST')

The only exceptions known to me are *gst* and *gsč* which are impossible as codas, and trigger epenthesis, as a consequence of the fact, mentioned above, that *gs* is an impossible coda: /zags-č/ [za.gəsč] *зaгac* 'fisherman' ('fish-ACTOR'); cf. /zags/ [za.gəs] *зaгac* 'fish'.

Conclusion

Mongolian syllable structure is governed by the facts that a syllable onset is unmarked, containing one consonant, and that the form of the coda is determined by the sonority law, saying that codas must have decreasing sonority according to a sonority scale with only two classes: obstruents and sonorants (including voiced velar/uvular stops). There is thus no need for syllable templates.

There are some exceptions to this simple characterization of Mongolian syllables, in particular the three-consonant codas which involve a sonorant and certain fricative-stop combinations. A possible way to cope with these is

to retain the coda constraint (9), and assume that fricatives and stops/affricates have different sonority value. This approach allows some non-occurring codas which have to be filtered out (cf. Svantesson forthc.).

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