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Consonantalization and Obfuscation

Arienne Dwyer

1. Introduction

The relationship between fortis/lenis consonantal distinctions and historical vowel length in Turkic is well-known (Johanson 1984-86). While this shows up in modern Turkish as a consonant voicing distinction (ad 'name' (< a:d < *at$_2$) vs. at 'horse' (< at < *at$_1$)), in a handful of languages on the eastern edge of the Turkic world, such distinctions have been reanalyzed as a "vocalic glottalization", e.g. Tuva at 'name', aʾt 'horse'. This suprasegmental phenomenon, also referred to as consonantal "pre-aspiration", occurs in Tuva, Tofalar/Karagas, Sarïgh Yoghur, Salar, and the Kälpin vernacular of Uyghur.[1]

The seemingly unrelated process of "spirantization" (e.g. Uyghur /it/ → i̯ʃt 'dog') occurs in the easternmost subset of the above group: Uyghur, Sarïgh Yoghur, and Salar. Curiously, in those languages which exhibit both "glottalization" and "spirantization", all "glottalized" vowels are low, while all "spirantized" vowels are high. I hypothesize that these two processes have become one rule synchronically (vocalic consonantalization); the presence of similar rules in neighboring languages suggests it has become an areal phenomenon.

Other relatively recent development obscure the Old Turkic fortis/lenis distinction even further. In Salar, a weakened consonantal *h* has merged with preaspirated *h*, and an optional *h*-insertion rule has been generalized to all voiceless stops (e.g. etʰ~eʰtʰ- 'to do') (Dwyer, forthcoming 1999). The result is that the presence of a laryngeal/glottalic element (ʰ/ʔ) in modern Salar appears unsystematic and unrelated to historical Turkic.

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1 Sarïgh Yoghur [sarɨʁ joʁur] (also known as Yellow Uyghur) is spoken in the Gansu corridor of western China and has ca. 4000 speakers. The language is considered by some to be a remnant of 9th c. Uyghur (not modern Uyghur); Sarïgh Yoghur contains many archaisms, many of which are features shared with South Siberian Turkic. Salar [salar gaʰʧa], with close to 60,000 speakers, is also a language preserving many archaisms; Salar shares many features with Oghuz-Turkic. It is spoken primarily on the northern edge of the Tibetan plateau, in the modern-day Chinese province of Qinghai, as well as in neighboring Gansu province and to the northwest in the Xinjiang Uyghur Autonomous Region (Eastern Turkistan). Kälpin Uyghur [kɛlpin ʊjʁur] is a variety of modern Uyghur (Eastern Turkic) with about 18,000 speakers, but an isolate, spoken in the foothills of Eastern Turkestan near Aqsu, where the Tian Shan mountains meet the Taklamakan desert.

Table 1. Secondary *h* in some eastern Turkic languages

Salar	Sarïgh Yoghur	Kälpin Uyghur	Std. Uyghur	gloss
aʰtʰ	aʰtʰ	aʰtʰ	atʰ	'horse'
aʰmuʃ	aʰldon	aʰ(l)tmiʃ	atʰmiʃ	'sixty'
neʰʧʰe	niʤi	nɛʰʧʧʰɛ	nɛʧʧʰɛ	'how many?'
xotʰ-	ɢoʰpʰ-	qʰoʰpʰ-	qʰopʰ-	'to get up, arise'
toʰqʰus	toʰɢəs	tʰoʰqqʰus	tʰoqqʰuz	'nine'
i̯ʃtʰ	i̯ʂtʰ	i̯ʃtʰ	i̯ʃtʰ	'dog'

2. Consonantal distinctions and historical vowel length

Fortis consonants (usually realized as voiceless aspirates) are associated with Old Turkic short vowels, and lenis (usually voiced unaspirated) consonants with long vowels. Many modern Turkic languages have lost Old Turkic ('primary') vowel length distinctions; consonantal distinctions, which Johanson proposed as determinant, are observable in word-final position in most modern Turkic languages. In a wide range of modern Turkic languages, e.g. modern Turkish and Uyghur, historical lenis consonants in word-final position are also realized as voiceless ('name' *at_2 > /ad/ → [at]),[2] so that the only remaining distinction is one of aspiration (Uyghur, Turkish 'horse' *at_1 > /at/ → [atʰ]). But when a vocalic suffix (e.g. the third-person possessive) is added, then the lenis consonants in Turkish and Uyghur surface as voiced: [adi] 'name-*IIIposs*'; cf. [atʰi] 'horse-*IIIposs*'.

In a handful of languages on the northeastern and eastern edges of the Turkic world, such historical distinctions show up as a glottalic plosive- or aspiration-distinction (ˀ/ʰ). This has been referred to as "vocalic glottalization" (e.g. Tuva at 'name' vs. aˀt 'horse') or as "consonantal preaspiration" (e.g. Salar at 'name' vs. aʰt 'horse').[3] Constriction of the pharynx and larynx during articulation

[2] Word-final -g/ɣ is more complicated, being devoiced in many of the geographically easternmost Turkic languages, e.g. Fuyü *tax* 'mountain', preserved in others, e.g. modern Uyghur, Salar *taɣ*, and weakened to -w in Qïpchaq (Qazaq *taw*) and -j/-0 in western Oghuz (Tksh. *ta:*). In modern Turkish, final lenis consonants -d and -g are 50% less likely than -b to devoice (Sharon Inkelas 1998, pers. comm.).

[3] The first to observe preaspiration in Sarïgh Yoghur and link it to Yakut vowel length was Malov (1957); Janhunen (1980) established a relationship between Tuva and Tofalar glottalized vowels and Yakut short vowels; for synchronic and diachronic accounts of the phenomenon in Sarïgh Yoghur, see Chen 1986; Roos (1998) compared lists of reflexes of Old Turkic long and short vowels in these relevant modern Turkic languages.

of nonhigh vowels in initial syllables results in a breathy or pharyngealized quality to the vowel. It occurs in the environment $C_1V\ C_2$, where C_2 is a voiceless stop (and C_1 includes epenthetic glottal stops before initial vowels).[4] In addition to Tuva and Salar, this suprasegmental phenomenon occurs also in Tofalar, Sarïgh Yoghur, and the Kälpin vernacular of modern Uyghur.

In Table 2 below, minimal glottalized/non-glottalized pairs of non-high vowels in initial syllables reflect Old Turkic vowel length distinctions: a historical long vowel + weak (lenis) consonant sequence appears in Tuva, Salar, Sarïgh Yoghur, and Kälpin Uyghur as a short vowel + strong (fortis) consonant sequence; a historical short vowel + weak consonant appears in the four languages with glottalization or aspiration between the vocalic and consonantal segments. Standard Uyghur, which does not reflect such distinctions with glottalization, is given for comparison.

Table 2. Consonantal and vocalic oppositions[5]

C.Tkc	Tuva	Tofa	Salar	SarYoghur[6]	KälpinUy	Std. Uy.	gloss
o:t	ot	ot	ot^h	ot^h	ot^h	ot^h	'fire'
ot	oʾt	oʾt	o^{h}t^h	o^{h}t^h	o^{h}t^h	ot^h	'grass'
a:t	at	at	at	at^h	at	at(^{h})	'name'
at	aʾt	aʾt	a^{h}t	a^{h}t^h	a^{h}t	at^h	'horse'
ɛ:t-	ɛt-	--	e^{h}t^h-	et^h-	ɛt^h-	ɛt^h-	'to do'
ɛt	ɛʾt	ɛʾt	et^h∼e^{h}t^h	ɛ^{h}t^h∼ɛt^h	ɛ^{h}t^h	ɛt^h	'meat'
ø:t	øt	øt	o^{h}t^{h}ə	øt^h	øt^h	øt^h	'gallbladder'
øt-	øʾt-	øʾt-	o^{h}t^h-	o^{h}t-	ø^{h}t^h-	ot^h-	'to pass'
a:q	aq	aq	aχ	aq^h	aq^h	aq^h	'white'
aq-	aʾq-	aʾχ-	aχ-	a^{h}q^h-	aq^h-	aq^h-	'to flow'

These distinctions occur between nonhigh vowels and voiceless obstruents. These are not completely regular in the modern languages: in the last three pairs in Salar, and in the last pair in Kälpin Uyghur, no distinction is made. Yet where the distinction does occur, it reflects a phonemic distinction in these modern languages.

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[4] C_1 is apparently *any* consonant in Salar; however, in Sarïgh Yoghur, it is restricted to voiceless consonants.

[5] Data from the following sources: Common Turkic: Clauson (1968); Tuva: Pal'mbax (1955); Tofalar: Rassadin (1995); Salar: author's fieldwork; Sarïgh Yoghur: Lei (1992) and Roos (1998); Kälpin Uyghur: Osmanov (1990).

[6] Sarïgh Yoghur is also reported to also have metathesized variants of certain forms (e.g. o^{h}t∼họt, aht^h∼haṭ^h), irrelevant to the current discussion.

3. Secondary glottalization (h)

The development of a secondary glottalic element (h/ʔ) as a result of consonant lenition is attested in languages such as Gaelic and Icelandic. In the latter, *h* occurs as a part of consonantal lenition in geminates and non-geminate clusters:

Table 3. Weakened-consonant *h*: Icelandic (Dwyer 1999)

/detta/	[dɛʰta]	'fall'
/tappi/	[taʰpʰʊ]	'cork'
/epli/	[ɛʰ(p)li]	'apple'

In several Turkic languages, a secondary *h* occurs in the same environment in initial syllables; as in Icelandic 'apple' above, concomitant consonant lenition does not always occur. However in the three Turkic languages under investigation, the secondary *h* is not limited to geminates; it occurs (likely originally) in C_1C_2 sequences, where C_2 is voiceless, including geminates; but also (likely a later development) in sequences, where either consonant can be a sonorant: e.g. Salar *ohta* 'middle, center'< *orta*; Salar *kehmen* 'wide-bladed hoe' < *ketmen*. In Table 4 below, with Old Turkic and Standard Uyghur for comparison, we see that lenition is complete in Salar but much less regular in Sarïgh Yoghur and Kälpin Uyghur:

Table 4. Weakened-consonant *h*: Turkic

Old Turkic	Salar	Sarïgh Yoghur	Kälpin Uyghur	Std. Uyghur	gloss
altmɨʃ	aʰmuʃ	aʰldon	aʰ(l)tmiʃ	atʰmiʃ	'sixty'
atla(n)-	ahla-	atta-	aʰtʰla-	atʰla-	'to step over'
tatlïq	tɛhli	tatəɣ	tʰaʰtʰliʁ	tʰatʰliqʰ	'sweet'
tart-	tah-	tahrtʰ-	tʰaʰ(r)tʰ-	tʰartʰ-	'to pull'
toquz	toʰqʰus	toʰɢəs	tʰoʰqqʰus	tʰoqqʰuz	'nine'

Rather than reflecting an Old Turkic vowel length distinction, the data in Table 4 are simply the result of weakening of *t*, *l*, and *r* to *h* before voiceless anterior obstruents and liquids. It is not distinctive, hence there is a great deal of variation among speakers of all three languages in the application of the rule (e.g. Salar etʰ∼eʰtʰ 'to do'; Kälpin Uyghur øʰl-∼øɬ- 'to die', aʰltʰɛ-∼aɬtʰɛ 'six'). The presence of such a secondary *h* as above is a rather common phenomenon shared by other dialects of the area, e.g. Xotän (Khotan) Uyghur. In Salar, Sarïgh Yoghur, and Kälpin Uyghur, this rule has been optionally generalized to all non-high vowels preceding voiceless anterior obstruents. It does not involve the historical vowel shortening process.

Table 5. Optional generalization in voiceless-preconsonantal position

C Turkic	Salar	SYoghur	Kälpin Uy	Std. Uyghur	gloss
taːʃ	tɛʰʃ	tas	tʰaʃ	tʰaʃ	'stone'
näntʃä	neʰʧʰe	niʤi	nɛʰʧʧʰɛ	nɛʧʧʰɛ	'how many?'
qop-	χotʰ-	ɢoʰpʰ-	qʰoʰpʰ-	qʰopʰ-	'get up, arise'

In Kälpin Uyghur, such a generalization has resulted in the following minimal pairs:

Table 6. Generalization in Kälpin Uyghur (Osmanov 1990)

kʰøʰpʰ-	'to increase' (CT *køp*)	kʰøpʰ	'many' (CT *køp*)
saʰpʰ	'clean'	sapʰ	'handle' (CT *sap*, SY *sapʰ*)
jaʰtʰ-	'to lie down' (CT *jat-*, SY *jaʰt-*)	jatʰ	'unknown, foreign'

Items with and without glottalized *h* stem from OT short vowel + strong consonant combinations; its presence here then is not tied to historical consonant distinctions. This optional *h*-insertion rule has also been generalized to non-Turkic lexemes:

Table 7. Generalization of h-insertion to non-Turkic lexemes

Salar	Sarïgh Yoghur	gloss	source
ɢaʰʧʰa	qoʰɢa, cf. qoqa 'peak (of hat)'	'talk, language'	Amdo Tibetan (Labrang *ka tɕa* < Written Tibetan <*skad tɕha*>)
tuʰʃmɛn	---	'enemy'	Persian *dušman*
tʰiutʰ	taʰtʰ, cf. taʰtʰ 'rust'	'Tibetan'	WM. *töbed*, Mng. *tever~tevad~ted*; cf. eastern Middle Tkc. *tybyt*

In Salar and Sarïgh Yoghur, the first two examples represent generalization by analogy; Sarïgh Yoghur taʰtʰ 'Tibetan' may also simply reflect a weakened consonant *v* < *h* (e.g. SY taʰtʰ < *tevad < WM töbed). Note that, as in the Kälpin Uyghur examples in Table 6, in Sarïgh Yoghur the operation of this rule resulted in new minimal pairs.[7] *h* in this environment thus reflects both Old Turkic consonant voicing distinctions gone astray: what we are observing is a three-stage process: (1)

[7] Outside of secondary glottalization, the distribution of *h* in these Turkic languages is otherwise extremely limited (phonemically confined virtually to Arabic/Persian loans and onomatopoeic lexemes). Its nondistinctiveness in preconsonantal position allowed the formerly constrained and phonologically motivated rules described above come to be applied to a much broader set of phonological environments.

a historical reanalysis of Old Turkic vowel shortness as preaspiration; (2) the historical lenition of /t/ and liquids to a laryngeal approximate ʰ; and (3) the generalization and reanalysis of consonant lenition as an optional *h*-insertion rule.

4. High vowel consonantalization

Consonantalization, also known as "spirantization", is a process in which consonantal features spread leftwards from a voiceless obstruent to a vowel, and is accompanied by a devoicing of that vowel (e.g. Uyghur /it/ → [ʔi̥ʃtʰ] 'dog'). The process occurs when a high vowel occurs in the environment of voiceless consonants in initial syllables (vowel-initial words have an epenthetic glottal stop initially). It is a feature of the Eastern Turkistan-Gansu corridor-North Amdo region, appearing in Uyghur (cf. Kaisse 1992: 323), Sarïgh Yoghur, and Salar. This consonantalization appears to be the high-vowel form of the historical glottalized-vowel (V ʰ/V ʔ) form observed above in Table 3. In Table 8 below, Common Turkic *high* short vowel + fortis consonant strings have resulted in glottalized forms in Tuva and Tofalar, and in spirantized forms in the easternmost Turkic languages under consideration.

Table 8. High-vowel consonantalization

OT	Tuva	Tofa.	Salar	Sarïgh Yoghur	Kälpin[8] & Std. Uyghur	gloss
it	ɨʔt	ɨʔt	i̥ʃtʰ	ɨʂtʰ	i̥ʃtʰ	'dog'
bit	bɨt	bɨʔt	pʰi̥ʃtʰ	p(ʰ)i̥ʂtʰ	pʰi̥ʃtʰ	'louse'
iki	iji	iʔhi	i̥ʃkkʰi	i̥ʂkɨ	i̥ʃkkʰi	'two'
yʧ	yʃ	yʃ	y̥ᵠʧʰ	yʂ∼yʲʂ∼yʰʂ	y̥ᵠʧʰ	'three'
jyk	ʧyʔk	ʧuʔq	jux	ʂukʰ < uʂkʰ	jyk	'load, burden'

The above data illustrates, however, that high-vowel consonantalization is also no longer entirely tied to Common Turkic distinctions. All of the above examples had short vowels and strong consonants in Old Turkic. In the appropriate environment (after a high vowel between two voiceless consonants), consonantalization occurs, e.g. Salar, SY, Uy. 'louse', 'two'. Only 'dog' shows the expected consonantalization in all of the relevant languages; the other examples show that more recent sound changes in the modern languages determine high-vowel consonantalization. Tuva, Tofalar, SY 'load, burden' illustrates how consonantalization occurs when the sound change to a voiceless onset resulted in the appropriate environment (j > ʧ in Tuva and Tofalar, and j > ∅ in Sarïgh Yoghur).

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[8] Kälpin data from Mirsultan Osmanov (1998, personal communication).

The absence of consonantalization in Tuva 'two' and 'three' is due to the weakening of intervocalic consonants typical of Tuvan numerals; unlike in many other Turkic languages, they are not geminated and are often weakened, and hence not consonantalized (iji 'two', cf. Old Turkic iki, Uyghur /ikki/ 'two'). Although the Common Turkic vowel is short in 'three', consonantalization is likely absent in Tuvan and Tofalar due to the lack of opposition of yʃ with a corresponding weak-consonant lexeme (e.g. *yʒ).

High-vowel consonantalization, which is most widespread in modern standard Uyghur, has also been generalized to non-Turkic lexemes, e.g. /ipadilɛ-/ → [ʔi̯ʃpʰadilɛ-] 'to express' < Ab. ifāde 'expression'. Since spirantization is more widespread (including most Uyghur dialects as well as Salar, Sarïgh Yoghur, and Kälpin Uyghur), diachronic consonantalization may have been reanalyzed *later* as the low counterpart to spirantization. But this reanalysis did not occur in standard Uyghur.

The occurrence of high-vowel consonantalization ("spirantization") in unrelated languages attests to regional convergence; i.e., an areal feature rather than a historical distinction. The articulation of spirants in this environment is likely related to the regional phonetic distinction of obstruents by aspiration (Chinese, Salar, and Sarïgh Yoghur obstruents contrast in aspiration, not voicing): an aspiration distinction has entailed articulation of aspirated obstruents with unusually high stridency, which, coupled with the Turkic devoicing of unstressed high front vowels, lead to a spirantized secondary articulation. It is the following consonant that is relevant, since the prothetic glottal stop in vowel-initial words (e.g. SY [ʔaʰtʰ], [ʔi̯ʂtʰ]) is not aspirated.

5. Obfuscation

Thus a distinction that was largely consonantal (fortis/lenis) in origin has become a largely vocalic (high/non-high) one. The relationship between vowel length and consonant strength became obscured because of the later weakening of consonants to *h* in essentially the same environment (Tables 4 & 5, and Tuva *iji* 'two'), a generalization which was eventually extended to non-Turkic lexemes (Table 6, and standard Uyghur [ʔi̯ʃpʰadilɛ-] 'to express'). The process can be schematized as follows:

(1) VOWEL LENGTH REANALYSIS

CT short vowel + strong consonant > glottalic *h*/ʔ ('preaspiration', 'glottalization')

Old Turkic vowel length oppositions have been preserved in Yakut and Turkmen as *V:* — *V*; in South Siberian Turkic and in the above-mentioned languages on the

Eastern periphery of the Turkic world, the opposition was reanalyzed as ±glottalic; historically long vowels were shortened, and historically short vowel+strong consonant combinations were preceded by a glottalic element *h*/ʔ. Tuva and Tofalar *V* — *ʔV*; Sarïgh Yoghur, Salar, and Kälpin Uyghur *V* — *ʰV*. Historical long vowels were thus shortened, but at this stage were still distinct from historically short vowels since the latter were glottalized.

(2) Generalization/Reanalysis of Consonant Lenition as Optional H-INSERTION

(a) Consonant weakening t,l,r > ʰ /V__C[-voice], liquids

Certain consonants were weakened to *h* before voiceless consonants or liquids.

(b) Optional generalization to all non-high vowels before voiceless anterior obstruents or liquids ∅ > ʰ /V __C[-voice] , liquids

H-INSERTION was then generalized to include environments before *all* voiceless stops (e.g. Salar ɢaʰʧʰa 'talk, language') and sometimes *l* (e.g. SY *aʰldon* 'sixty'). Glottalized ʰ is no longer distinctive; it bears traces of neither an Old Turkic short-vowel+strong-consonant string *nor* of a former plosive. (ɢaʰʧʰa, for example, is derived from Amdo Tibetan [ka tɕa].)

(4) VOWEL CONSONANTALIZATION

[+syll, -rnd, αhi] → [+cons] /[+cons,-voi,-cont]___[+cons, -voi,-cont]
(optional for low vowels synchronically)

Thus vowel aspiration (a.k.a. "consonantal preaspiration") and spirantization are two aspects of the same rule: low vowels preceding coronal obstruents undergo 'Aspiration', while high vowels in this environment undergo 'Spirantization'. Due to this synchronic complementary distribution and also for historical reasons, both rules are treated as primarily vocalic phenomena. Vowel consonantalization must be ordered *after* vowel devoicing (cf. Dwyer 1996, Dwyer forthcoming 1999). It is an *optional* rule for the low vowel *a* because its application varies both according to region and idiolect.

From the data in all three languages — Salar, Sarïgh Yoghur, and Kälpin Uyghur — it is apparent that while Old Turkic consonant strength/vowel length was the starting point for consonantalization, the contact-induced partial or total loss of consonant voicing contrasts in these languages contributed to historical reanalysis and to consonant lenition, which has obscured the original distinction.

6. Conclusions

It is not at all clear that consonantalization is an areal feature: as we have seen, it

occurs only in some isolated Turkic languages and dialects of eastern Central Asia: Tuva, the Kälpin dialect of Uyghur, Salar, and Sarïgh Yoghur. The "major" Turkic languages in the easternmost regions (Standard Uyghur, Qazaq, Özbek) and other regional languages do not have this feature. It is also unclear if this reflects a remnant of some historical distinction, for each of the languages above represents a different branch of the Turkic family.

What these languages all have in common is a surface primary initial consonant distinction on the basis of aspiration rather than voicing. Whereas in most Turkic languages, the Old Turkic fortis(≈usually aspirated)–lenis(≈usually voiced) aspiration has been preserved, in Tuva, Tofalar, Sarïgh Yoghur, and Salar the primary initial consonant distinction is on the basis of aspiration; with current data, it is unclear if Kälpin Uyghur has a basic aspiration rather than voicing contrast. Cross-linguistically, consonantalization "possibly occurs only in languages that have lost voice as a distinguishing feature in consonants." (Ó Murchú 1985: 197).

This would support the hypothesis that the Eurasian continent consists of an aspiration-voicing continuum, with strong aspiration-distinction languages in the east, strong voicing-distinction languages in the west (Dwyer 1996). The eastern Central Asian area would constitute a transition zone, as these data suggest: although the languages investigated here (and Chinese and Tibetan) contrast consonants primarily on the basis of aspiration, most of the area's languages (Qazaq, Özbek, Russian, Tajik) do not. Uyghur and Mongolian likely fall somewhere in between, having historical initial voicing contrasts which are articulated at most with semi-voicing. Acoustic studies are particularly needed to verify such a hypothesis. That most all Uyghur dialects have high-vowel consonantalization, but only Kälpin has the both the low and the high variety, reinforces the notion that modern Uyghur is transitional with respect to sound system contrasts.

If complete (high-low) consonantalization correlates positively with loss of voicing contrasts, at least phonetically, acoustic data on Tuvan, Tofalar, Salar, Sarïgh Yoghur, and Kälpin Uyghur consonants should be similar. In particular, Kälpin Uyghur data should differ substantially from that of other Uyghur dialects in a tendency towards an aspiration rather than a voicing distinction.

But at least two questions remain. We have hypothesized that contact with Chinese and Tibetan (aspiration-distinction languages) contributed to the loss of voicing contrasts. If consonantalization is indeed linked to this shift, why would the geographically isolated Kälpin dialect of Uyghur show complete consonantalization, while the other varieties of Modern Uyghur, some in constant contact with Chinese, do not? Consonantalization cannot be merely the result of extended contact with Chinese and/or Tibetan, however. Consonantalization is entirely absent not only Chinese Qazaq and Qïrghïz, but also in Fuyü Qïrghïz in

northeastern China's Heilongjiang province (Hu and Imart 1987), despite Fuyü speakers' intensive contact with Chinese.

Low consonantalization, as demonstrated above, must be an archaism. Due to relative geographical isolation and other factors, these languages are conservative at all levels of language. Kälpin Uyghur shows archaisms in morphology as well (Osmanov 1990). So-called modern Uyghur is of course a relatively recent ethnonym for the sedentary Turkic-speaking oasis dwellers in the Tarim Basin and Tianshan foothills. It is possible that the Kälpin Uyghurs are of a very different origin than other Uyghurs of the Tarim Basin, yet more must be understood about the history of those Uyghurs living in Kälpin before any conclusions are drawn.

Secondly, why do the eastern languages here —Salar, Sarïgh Yoghur, and Kälpin Uyghur— have two realizations of consonantalization (usually $^{h}/^{ʃ}$) while Tuva and Tofalar have only one (ʔ), regardless of the height of the preceding vowel? We have seen that the primary type of consonantalization described here, where consonantalization reflects Old Turkic vowel/consonant distinctions, is much more consistent in Tuva and Tofalar than in the other three languages. Moreover, Salar, Sarïgh Yoghur, and Kälpin Uyghur have generalized the rule to other environments and to non-Turkic lexemes. The generalization itself was plausibly a natural language-internal consonantal erosion process; the high/non-high split might have arisen out of a need to keep the few remaining high vowels distinct. In Salar and Sarïgh Yoghur at least, originally eight-vowel inventories have been reduced to six with the ever-greater tendency to merge of ü > u and ö > o. (Not enough information is available on Kälpin Uyghur.) Tuva and Tofalar have preserved fuller vowel inventories. As for the consonantalized element, the presence of fricatives (and glottals) in Salar, Sarïgh Yoghur, and Kälpin Uyghur (generally $^{h}/^{ʃ}$ but also ʔ) while Tuva and Tofalar have a stop (ʔ) may have two causes. Language-internally, the loss of initial voicing distinctions resulted in a fortis articulation of the voiceless aspirated consonant series to distinguish them from voiceless non-aspirates, which likely lead to spirantization. Language-externally, language contact could play a role: Northwest Chinese spirantizes all voiceless consonants and *l* before high front vowels (pɸ tɕ kɕ lʒ); Amdo Tibetan has preaspirated *l* (e.g. ^{h}la 'song'). Although the Chinese spirantization environment is mirror-opposite to that of Chinese Turkic spirantization, contact with such spirantization may have been sufficient for Salar, Sarïgh Yoghur, and Kälpin Uyghur to develop $^{h}/^{ʃ}$ as alternates of ʔ.

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