Sino-Khitan Phonology

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1. Introduction

Two functionally distinct scripts, the so-called Greater Script and Lesser Script, were invented by the Khitans in the early part of the Liao Dynasty (907-1125) to write the Khitan language. Scholars in general agree that the Greater Script is logographic, representing morphological units, and the Lesser Script is phonetic, representing phonological units. The texts written in the Lesser Script remain basically unreadable, however, many Chinese proper nouns, such as official titles, place names, and personal names, have been convincingly deciphered with a high degree of confidence. The focus of this paper is on the Chinese transliterations, which actually form a phonological system of Sino-Khitan. In the following analyses we would like to show that the phonology of Sino-Khitan can provide valuable information about the northern Chinese phonology of the 11th and 12th centuries or even earlier.

Various proposals have been raised to decipher the basic graphs, the so-called *yuanzi* 原字 (abbr. YZ), of the Lesser Script. The most influential proposal is Chinggeltai *et al.*'s *Qidan Xiaozi Yanjiu* 契丹小字研究 (*The Studies of the Khitan Lesser Script*, hereafter QXY) of 1985. In this book a table lists the reconstructed phonetic values of 98 YZ graphs[1], all of which are used to transliterate proper nouns in Chinese. This table represents a significant step in the decipherment of Chinese words, but it is unfortunate that the decipherment is done in a rather sporadic way and clearly lacks systematic treatment. The same reconstructed values are used in Chinggeltai's

[1] In the *Qidan Xiaozi Yanjiu*, the YZ graphs used to transliterate Chinese words are basically contained in the first table of the reconstruction of the phonetic values of *yuanzi* (pp. 81-109). Two additional tables, the second table (p. 130) and the third table (p. 146), are provided. In these two tables all the reconstructions are about Khitan words. The contents of these three tables are summarized in a comprehensive table on pages 152 and 153. For the purpose of our study, the first table is most relevant, because it lists all the YZ graphs for transliterating Chinese words.

Qidan Xiaozi Shidu Wenti 契丹小字釋讀問題 (*The Issues of the Decipherment of the Khitan Lesser Script*) of 2002, in which he examines the reconstructions by various scholars. Thus, a better effort has to be made to analyze all the YZ graphs systematically.

In the study of Chinese historical phonology, scholars have not paid much attention to this body of valuable material so far. Its value to the study of Chinese historical phonology in general and the history of Mandarin phonology in particular has not been recognized. The reason is clearly due to the separation of the research fields. The Khitan script experts are busy working on their decipherments but not focusing on the historical phonology of Chinese. In the Khitan study the information of Chinese phonology is merely a useful tool for the decipherments. Chinese historical phonologists, on the other hand, are not paying much attention to the notoriously difficult Khitan materials. This situation is very similar to what happened in the earlier Tangut study as pointed out by Gong Hwang-cherng (1981: 34).

It is also very crucial that since the publication of the QXY in 1985, many epigraphic materials written in the Khitan Lesser Script, complete or fragmental, have been published (Chinggeltai 2002, Liu 2003). The newly discovered materials exceed the previously existing ones by a ratio of sixteen to nine. These new materials have significantly widened the horizon of the decipherment of Chinese words, providing additional and often crucial evidence for the phonetic values of the YZ graphs in question. With the new materials, it becomes possible to reconstruct an entire phonological system of Sino-Khitan.

In this article, for the first time, we would like to carry out a systematic analysis of the YZ graphs involved in the transliteration of Chinese words. As the result, a phonology of Sino-Khitan will be reconstructed. The significance of our study is two-fold. The phonology of Sino-Khitan, on the one hand, can fill a lacuna in our knowledge of the northern Chinese before the Yuan Dynasty; on the other hand, it can provide a solid foundation for further decipherments.

2. The available materials

Below is a list of the source materials to which this article refers. Beside the *Memorial to Lang Jun* all of them are epitaphs. Among them, nine are included in the QXY of 1985 and sixteen were published afterward. The abbreviations for these materials are as follows: one Chinese character for each of the first nine materials, to keep the labeling convention of the QXY (Chinggeltai *et al.* 1985: 675), and two characters for each of the remaining sixteen.

Published before the publication of the QXY.

興	興宗哀册 (1055)	*Epitaph of Xing-zong Emperor*
仁	仁懿哀册 (1076)	*Epitaph of Ren-yi Empress*
道	道宗哀册 (1101)	*Epitaph of Dao-zong Emperor*
宣	宣懿哀册 (1101)	*Epitaph of Xuan-yi Empress*
令	蕭令公墓誌殘石 (1057)	*Epitaph of Xiao Linggong* (fragments)
許	許王墓誌 (1105)	*Epitaph of Xu Wang*
故	故耶律氏銘石 (1115)	*Epitaph of Yelü*
郎	郎君行記 (1134)	*Memorial to Lang Jun*
仲	蕭仲恭墓誌 (1150)	*Epitaph of Xiao Zhonggong*

Published after the publication of the QXY.

仁先	耶律仁先墓誌銘 (1072)	*Epitaph of Yelü Renxian*
宗教	耶律宗教墓誌銘 (1053)	*Epitaph of Yelü Zongjiao*
海棠	海棠山契丹小字墓誌殘石 (?)	*Epitaph found in Haitangshan* (fragments)
博州	金代博州防御使墓誌殘石 (1170)	*Epitaph of Bozhou Fangyushi* (fragments)
澤州	澤州刺史墓誌殘石 (1107)	*Epitaph of Zezhou Cishi* (fragments)
迪烈	耶律迪烈墓誌銘 (1092)	*Epitaph of Yelü Dilie*
永寧	耶律永寧墓誌銘 (1088)	*Epitaph of Yelü Yongning*
弘用	耶律弘用墓誌銘 (1100)	*Epitaph of Yelü Hongyong*
智先	耶律智先墓誌銘 (1094)	*Epitaph of Yelü Zhixian*
敵烈	韓敵烈墓誌銘 (1101)	*Epitaph of Han Dilie*[2]
奴誌	耶律奴墓誌銘 (1099)	*Epitaph of Yelü Nu*
高十	耶律(韓)高十墓誌 (1076+)	*Epitaph of Yelü (Han) Gaoshi*
叔祖	皇太叔祖哀册 (1110)	*Epitaph of Yelü Hongben*
國妃	宋魏國妃墓誌銘 (1110)	*Epitaph of Yelü Hongben's Wife*
大山	蕭大山和永清公主墓誌 (1095)	*Epitaph of Xiao Dashan and His Wife*
韓氏	蕭特每闊哥夫人韓氏墓誌銘 (1078)	*Epitaph of Han Shi*

In this article the transliterations of Chinese words are mainly based on the individual

[2] The name of this epitaph is very easy to be confused with that of another epitaph. In an article by Tang, Liu, and Kang (2002) this epitaph is named 韓敵烈墓誌銘 *Epitaph of Han Dilie*. Later in another article by Liu, Tang, and Gao (2004) the same epitaph is renamed as 耶律(韓)敵烈墓誌銘 *Epitaph of Yelü (Han) Dilie*, which thus becomes similar to a different epitaph titled 耶律迪烈墓誌銘 *Epitaph of Yelü Dilie* (Lu & Zhou 2000). In order to keep these two epitaphs distinct in their abbreviations, in this article the abbreviation 敵烈 is used for 韓敵烈墓誌銘 (Tang, Liu & Kang 2002) or 耶律(韓)迪烈墓誌銘 (Liu, Tang & Gao 2004) and the abbreviation 迪烈 is used for 耶律迪烈墓誌銘 (Lu & Zhou 2000).

decipherments of the epitaphs listed above by Khitan scholars (see the references). However, the decipherments of Chinese loans are used critically and questionable transliterations are excluded. The following abbreviation is used to locate individual Khitan YZ graphs in the original epitaphs.

興 2　　Line 2 of the *Epitaph of Xing-zong Emperor* (興宗哀册).
智先 1　　Line 1 of the *Epitaph of Yelü Zhixian* (耶律智先墓誌銘).
道蓋　　On the cover of the *Epitaph of Dao-zong Emperor* (道宗哀册)

The dates of these materials range from 1053 to 1170. But the phonological information contained in these materials could be earlier, because according to *Liaoshi* the Khitan Lesser Script was invented in the early 10th century and the spelling conventions appear to be rather fixed after its invention.

In this article we use the numbering system in the QXY (see the table of the reconstructed phonetic values of *yuanzi*, pp. 81-109). The table provided below shows the correspondences between the YZ graphs and the numbers. In the following parts only the numbers will be used.

Table 1. The YZ graphs used in the transliteration of Chinese words.

The first column is the index numbers according to the first table of the reconstruction of the phonetic values of the Khitan *yuanzi* graphs in Chinggeltai *et al.*'s the *Qidan Xiaozi Yanjiu* (pp. 81-109. Five YZ graphs, X1-X5, are added.). The second column is the index number according to the table of the deciphered *Yuanzi* graphs (pp. 152-153) in the same book. The third column is the *yuanzi* graphs. The fourth column shows the reconstructed phonetic values according to two tables of the QXY mentioned above. The fifth column contains our reconstructions. The sixth column is the phonological units represented by the YZ graphs (M = morpheme, V = vowel, C = consonant).

1	75	主	ɣuaŋ		M	16	345	火	uŋ	uŋ	VC
2	37	王	ti		M	17	71	点	uaŋ	ɔŋ	VC
3	374	容	t'ɑi/tɑi		M	18	334	元	k	k	C
4	250	介	ɣou		M	19	262	火	uei	uj	VC
5	303	用	iŋ	iŋ	VC	20	106	太	uŋ	= 16	
6	340	兴	x/k^h	k^h	C	21	104	女	tʂ	= 12	
7	339	关	i	i	V	22	229	仍	t'	t^{h}a	CV
8	162	求	tʃ'	tʃ	C	23	163	重	x/k'	k^{h}œ	CV
9	199	急	aŋ	aŋ	VC	24	73	去	en	ɛn	VC
10	28	飞	ʃ	ʃ	C	25	362	号	iɑu	ɛw	VC
11	289	尖	iu	y	V	26	244	个	s	s	C
12	87	左	tʂi	tʃi	CV	27	258	伞	ts	ts	C
13	360	黑	p'aŋ/faŋ	=50 + 17		28	131	及	u	u	V
14	261	竹	l	l	C	29	257	当	uŋ	u:ŋ	VC
15	149	子	tʃ	tʃu	CV	30	119	尺	tɑ	ta	CV
31	161	赴	ɑu	aw	VC	73	314	丹	iaŋ	= 74	
32	19	丙	iou	iw	VC	74	62	並	iaŋ	ɛŋ	VC
33	67	土	ou	əw	VC	75	11	买	ɑn	an	VC
34	283	叔	k'	k^{h}a	CV	76	127	天	ɑn	= 75	
35	122	平	ɑi	aj	VC	77	263	发	uei	= 19	
36	241	分	p'u/fu	p^{h}u	CV	78	186	及	o	ɔ	V
37	264	发	ŋ	ŋ-/-əŋ	C/VC	79	181	凤	uŋ	yŋ	VC
38	202	劳	t'	t^{h}u	CV	80	36	玉	xu	xu	CV
39	189	岁	ɑ	a	V	81	352	本	i	i:	V
40	184	乃	ɑm	am	VC	82	280	並	ɑŋ	= 74	
41	83	女	si	si	CV	83	70	赤	v	ʊ	C
42	82	英	ue	œ	V	84	246	余	ɑi	ɛj	VC
43	324	业	en	œn	VC	85	197	东	ɑi	= 84	
44	150	列	ɣ	x?	C?	86*	102	劳	ue	unclear[3]	
45	273	安	un	un	VC	87	225	付	p	pi	CV
46	329	亦	iun	yn	VC	88	335	刃	iɑ	axa/xa	(V)CV
47	133	丈	m	m-/-im	C/VC	89	226	仲	ue	œ:	V
48	140	为	ən	ən	VC	90	319	内	ko	kɔ	CV
49	130	不	ɣ	xa	CV	91	81	艾	ue	œ	V
50	295	业	p'/f	p^h	C	92	348	发	ue	œj	VC
51	150	升	tʃ	tʃa	CV	93	109	夯	ue	= 92	
52	180	兆	ʂi	ʃi	CV	94	330	戈	z,	ɻ	C
53	18	再	in	in	VC	95	338	洧	i	ji	CV
54	22	有	tʂ'	tʃ^{h}u	CV	96	242	分	p'u/fu	= 36	
55	172	又	u	= 28		97	76	扎	xun	x	C
56	215	欠	ta	= 60		98	107	太	uei	ɔj	VC
57	270	全	em	ɛm	VC	116	154	小	ɔn	ɔn	VC
58	353	谷	i	i	V	X1	--	王	--	əw	VC
59	113	吞	i	= 58		X2	--	全	--	əm	VC
60	214	欠	t	ta	CV	X3	--	力	--	na	CV
61	208	发	lu	lu	CV	X4	--	业	--	x?	C?
62	209	发	lu	= 61		X5	--	庄	--	ɻy	CV
63	20	百	i	j-/-əj	C/VC						
64	375	再	tʂ'a	tʃ^{h}a	CV						
65	311	母	p	p	C						
66	327	交	e	ɛ	V						
67	372	尺	u	uxu/u:	VCV/V						
68	237	力	tu	tu	CV						
69	254	公	t	t	C						
70	247	今	t/t'	t^h	C						
71	245	令	u	u:	V						
72	251	公	n	n-/-n	C/C						

3. The nature of the Khitan Lesser Script

The Khitan Lesser Script is actually a mixture of several different writing principles, ranging from morphemic writing, to syllabic writing, to segmental writing. It is quite

evident that the inventor(s) of the Khitan Lesser Script did not decide on a single and consistent method for transliterating Chinese words. Some are morphemic. Such YZ graphs are used for certain Chinese words, e.g. the YZ for the Chinese syllable *hou* 后 in *taihou* 太后 'empress' is for this syllable only. Some are syllabic. For example, the YZ for the first syllable of the Chinese word *huangdi* 皇帝 'emperor' can be used for a homophonic word *huang* 黄 'yellow'. It is clearly a syllabic graph, because it cannot be further divided into smaller units. Some YZ graphs are sub-syllabic, representing a phonological unit equivalent to an initial, a combination of an initial and a nucleus, a nucleus, or a combination of a nucleus and a coda in Chinese. These sub-syllabic graphs can be combined to represent syllables. For example, the Chinese word *zhou* 州 'state' can be spelled with two YZ graphs, YZ 8 for the initial and YZ 33 for the final.

The Chinese words were transliterated using several different methods. This phenomenon actually suggests a mixed system of (a) word or morphemic writing, (b) syllabic writing, and (c) phonetic writing.

(a) Morphemic writing. Each YZ represents an entire syllable of a certain word, e.g. YZ 2 *ti 帝, YZ 4 *xəw 后.

(b) Syllabic writing. Each YZ represents an entire syllable, but not a certain word, e.g. YZ 38 *tʰu 徒, YZ 12 *tʃi 職.

(c) Sub-syllabic writing. Each YZ represents a sub-syllabic phonetic unit in the phonology. There are four subtypes, C, V, CV and VC, e.g. YZ 10 *ʃ, YZ 39 *a; YZ 15 *tʃu, YZ 64 *ʃa; YZ 25 *ɛw, YZ 9 *aŋ.

The Khitan Greater Script exemplifies step (a). The Khitan Lesser Script, as a transitional system, is a mix of steps (a), (b), and (c). In the following phonological study, we exclude the YZ graphs for method (a), and use only the YZ graphs for methods (b) and (c) to reconstruct the phonology of Sino-Khitan. It should be pointed out that some YZ graphs belong to more than one of the categories listed above.

Thus, five morphemic graphs, namely numbers 1, 2, 3, 4, and 13 in Table 1 and other YZ of the same nature, will be excluded. The numbering system of the YZ graphs is based on the Table of the Reconstructed Phonetic Values of the Khitan YZ (pp. 81-109) of the QXY. The second column of Table 1 is the index number according to the Table of the Deciphered *yuanzi* Graphs (pp. 152-153) in the same book and the Table of the *yuanzi* Graphs of the Khitan Lesser Script in Chinggeltai (2002).

The Khitan writing unit can be formed with one to seven YZ graphs. But in the Chinese transliterations, no more than three basic graphs are used. The relationships between the graphs and the phonological units of Chinese can be summarized as following 20 types.

One YZ graph				
1.	CV:	徒	*tʰu	(YZ 38, 仁先 23)
2.	VCg:	尉	*uj	(YZ 19, 令 6)
3.	VCn:	應	*iŋ	(YZ 5, 郎 5)
Two YZ graphs				
4.	C + V:	書	*ʃ+*y	(YZ 10 + 11, 迪烈 1)
5.	C + VCg:	留	*l+*iw	(YZ 14 + 32, 迪烈 33)
6.	C + VCn:	宋	*s+*uŋ	(YZ 26 + 16, 仁 8)
7.	CV + Cn:	官	*kɔ + n	(YZ 90 + 72, 迪烈 23)
8.	CVx + Vx:	户	*hu + u	(YZ 80 + 28, 高十 22)
9.	CVx + VxCn:	同	*tʰu+*uŋ	(YZ 38 + 16, 国妃 10)
10.	CVx + VyCn:	弘	*hu+*uŋ	(YZ 80 + 37, 弘用 9)
11.	Vx + VxCn:	安	*a+*an	(YZ 39 + 75, 许 6)
12.	Vx + VyCn:	院	*œ+*ɛn	(YZ 42 + 24, 道 2)
13.	VCg + Vg:	尉	*uj+*i	(YZ 77 + 7, 道 2)
Three YZ graphs				
14.	C + Vx + Vx:	部	*p+*u+*u	(YZ 50 + 28 + 28, 奴誌 13)
15.	C + VxCg + Vy:	洛	*l+*aw+*u	(YZ 14 + 31 + 28, 許 1)
16.	C + V + Cn:	元	*ŋ+*œ:+*n	(YZ 37 + 42 + 72, 故 17)
17.	C + Vx + VxCn:	三	*s+*a+*am	(YZ 26 + 39 + 40, 許 1)
18.	C + Vx + VyCn:	宫	*k+*y+*uŋ	(YZ 18 + 11 + 16, 迪烈 13)
19.	C + VxCg + VyCn:	宫	*k+*iw+*uŋ	(YZ 18 + 32 + 16, 仲 8)
20.	C + VCn + Cn	彭	*pʰ + *ɛŋ + *ŋ	(YZ 50 + 74 + 37, 許 47)

C = Initial consonant, V = main vowel, Cn = nasal coda, and Cg = glide coda.

Vx + Vx = the two vowels are identical, and Vx + Vy = the two vowels are different.

In previous studies, e.g. QXY, it is quite often seen that one YZ graph can represent more than one phonetic value and one phonetic value is represented by more than one YZ graph (e.g. Chinggeltai 1985: 149). In the following analyses, we follow a one-to-one principle of interpretation, which means that one YZ graph represents only one phonetic value and one phonetic value is represented by only one YZ graph. In following parts, we will show that the existing problems are usually caused by graphic variations of the same YZ graph, differences between the phonologies of Chinese and Khitan, and a misunderstanding of the phonetic values of the YZ graphs.

4. The spellings of VCn and VCg

A Chinese final is commonly spelled with one YZ graph. But it is quite often seen

in the Khitan script that a final with a coda (VCn or VCg) is transliterated by using two graphs. But the ways of transliterating the finals with a nasal coda (VCn) and the ways of translating the finals with a semi-vowel coda (VCg) are clearly different. These two spellings are described by Khitan scholars as "joggle joint" (Chinggeltai *et al.* 1985: 149), Chinese *fanqie* method (Kara 1987: 21), or "overlapping" (Chinggeltai 2002: 16).

Of the two YZ graphs for transliterating Chinese VCn, the first one is for a monophthong and the second one is for a phonological unit of VCn. But of the YZ graphs for transliterating the Chinese finals with a semi-vowel coda, the first YZ is likely for a diphthong (VCg) and the second YZ is a monophthong (V), which is homorganic with the value of the Chinese semivowel coda, e.g. [u] for [w], [i] for [j]. Below are some examples:

	Chinese word	*hP'ags-pa spelling*		*Khitan Yuanzi number*	*Reconstructed phonetic value*	*Phonological unit*
(a)	三 (許 1)	𗼰𗼎	<sam>	26 + 39 + 40	*s+*a+*am	C + V + VCn
	殿 (叔祖 2)	𗼭𗼎	<den>	69 + 66 + 24	*t+*ɛ+*ɛn	C + V + VCn
	興 (故 8)	𗼮𗼏𗼈	<hʲiŋ>	6 + 7 + 5	*x+*i +*iŋ	C + V + VCn
(b)	大 (仲 4)	𗼭𗼋	<daj>	56 + 35 + 7	*t+*aj +*i	C + VCg + V
	少 (大山 22)	𗼌𗼐	<ʃew>	10 + 25 + 28	*ʃ+*aw+*u	C + VCg + V
	右 (韓氏 2)	𗼏𗼐	<ŋiw>	63 + 33 + 28	*j+*əw+*u	C + VCg + V

These special spelling methods indicate differences in vowel systems between the two languages. The vowel lengths in Chinese and Khitan are different. The lengths of Chinese nuclei are probably longer than the short vowels (V) but shorter than the long vowels (VV) in Khitan as demonstrated in some modern Mongolic languages. So sometimes, but not always, an additional graph is used to indicate the vowel length according to the perception of the Khitans.

But the examples in (b) cannot be explained the same way. Unlike (a), the additional YZ is always attached at the end. There is no example showing that a monophthong YZ is inserted between the YZ for an initial and the YZ for a VCg. If these special spellings were indeed like what some Khitan scholars described as a "joggle joint" or an "overlapping" mechanism, we should expect to see the same spellings for the syllables with VCn.

But based on the tonal category of the words in question, it is quite clear that this special spelling is related to the *qu* tone syllables. So, the function of the second YZ graph is possibly to indicate the *qu* syllables. This argument can be supported by the transliterations of Chinese CV syllables. The nucleus of a Chinese syllable is sometimes transliterated with two repeated YZ graphs, e.g., 騎, *k+*i+*i (仲 19); 部, *p+*u+*u (奴誌 13). All the Chinese words showing this transliteration are *qu* tone syllables. Thus,

type (a) is an indication of long vowel but type (b) is more likely an indication of the *qu* tone syllables.

5. Reconstructing the phonetic values of the YZ graphs

To establish the phonology of Sino-Khitan is a more complicated task than for other Sino-xenic phonologies, such as Sino-Japanese or Sino-Vietnamese, because, the Khitan YZ graphs first need to be deciphered; then, the phonetic value of each YZ graphs needs to be reconstructed, since the YZ graphs only provide us with categorical information.

In order to establish the phonology of Sino-Khitan, the basic phonotactic characteristics of the Khitan language and the Chinese language at the time must be estimated first, because the phonology reflected in the Chinese transliteration is an interaction between the phonologies of the Chinese dialect spoken in the Khitan territory and the Khitan language. Thus the assessments of both phonologies will be the starting point for the reconstruction.

5.1 The Khitan language

Lexical, morphological, and syntactic evidence as found in the Khitan texts all suggest that Khitan has a clear but non-direct connection with Dagur and Mongolian of the Mongolian branch of the Altaic language family (Janhunen 2003). Thus, the phonology of Khitan should share basic characteristics of Mongolic languages in particular and Altaic languages in general.[3] Since Altaic languages are atonal, the Khitan transliteration of the Chinese words does not involve tonal marking. Only the phonetic values of segments, such as consonants and vowels, will be involved. But we would like to point out that certain phonological phenomena are actually caused by the tonal distinctions of Chinese.

The syllable structure of Khitan, a Mongolic or Para-Mongolic language, is not the same as that of Chinese. For example, the syllable structure of many Altaic languages is dominantly CVC (consonant + vowel + consonant). The universal Mongolic features include:

a. Lack of medial slot in the syllable structure

[3] Nie Hongyin's study (1988) touches many important issues of the phonological systems of Chinese and Khitan. However this article only examines the YZ graphs that are relevant to the issues discussed in the article. Also due to the limitation of available materials at the time, the Chinese initials and finals listed in this article are incomplete and inaccurate.

b. Lack of retroflex consonants
c. Lack of labiodental fricatives
d. Lack of alveolar affricates
e. Lack of tonal contrast
f. Contrast of vowel length
g. Contrast of front rounded and unrounded vowels
h. Vowel harmony

All these features will be taken into consideration in the reconstruction of Sino-Khitan phonology.

To specify the difference between the Khitan and the Chinese initial consonants, we focus on the following issues: (a) the phonation types of the stops and affricates, (b) the places of articulation, and (c) the correspondences of the initials between the two languages. The Khitan initials should share the general typological features of the Altaic languages. Thus it should not be surprising to observe that some distinctions in Chinese are not reflected and some are distorted in Khitan.

As a common feature of the Altaic languages, the stops and affricates usually have a two-way distinction. This contrast is better described in terms of tense and lax. The tense one is usually voiceless aspirated and the lax one is unaspirated. In this paper, the IPA symbols for voiceless unaspirated obstruents are used for lax ones, and the IPA symbols for voiceless aspirated obstruents are used for tense ones.

In the following reconstruction, several basic phonological features of the Mongolic languages will be taken into consideration, such as the basic contrast of vowels, the length contrast of vowels, the phonetic constraints on VV (vowel + vowel) sequences, etc. In the following reconstruction we will show that the two glides of Chinese, [j] and [w], are best reinterpreted as phonological features of the nucleus vowels, with [j] as [+front] and [w] as [+round]. Also, through the analyses of genitive suffixes of the Khitan language, the phonetic values of the nucleus can further be confirmed. The reconstructed phonetic values of the YZ are prefixed with a "*".

Based on the common vowel pattern of the Mongolic languages (Janhunen 2003), we can use three features, [front], [high], and [round], to establish four pairs of vowels, a/ä, ï/i, o/ö, and u/ü, phonetically [a/ɛ, ɨ/i, ɔ/œ, u/y]. In each pair the second one is a fronted counterpart of the first one. This eight-vowel system will be strictly followed in the reconstruction of different types of Chinese finals.

The Khitan language also shows evidence of vowel harmony. The genitive case suffixes are the best examples. Five distinct suffixes, –in, -un, -an, -ɔn, and -ən are found in the texts. In Khitan materials Chinese words can have genitive suffixes. Because the vowels of these genitive suffixes are in harmony with the vowels in the

stems, the vowels of these genitive suffixes can provide useful information for the decipherment of the YZ graphs.

The other useful piece of information for the reconstruction can be obtained by checking how a particular YZ is used in spellings. If a YZ is used to spell Chinese loans only, it is likely this YZ represents a sound that is not in the Khitan phonology. For example YZ 27 *ts is only used for transliterating Chinese loans. On the other hand, if a YZ is frequently used in the spellings of native Khitan words, this sound must be reconstructed according to what the Khitan phonology allows. For example, YZ 50 is used to transcribe Chinese [p^h] and [f]. But YZ 50 is frequently used to spell native Khitan words such as the word for 'to appoint' and the word for 'monkey, ninth of *Terrestrial Branch*'. Thus YZ 50 represents [p^h] instead of [f], because [f]is not a native consonant for Mongolic languages. That YZ 50 is used to transcribe Chinese [f] is because there is no labiodental fricative in the Khitan phonology and aspirated bilabial, as the closest approximation, is used.

5.2 The Chinese phonology

The phonology of the northern Chinese dialect spoken in the Liao area during the Liao Dynasty is basically unknown. But the phonological characteristics of Middle Chinese and northern Chinese during the Yuan Dynasty suggest that the syllables of Chinese should have four segmental slots, the initial, the medial, the nucleus vowel, and the coda, or CGVC. Of course, how these four segments are reflected in the Khitan transliterations needs to be carefully examined.

Chinggeltai *et al.* (1985) use three reconstructed phonological systems – the Middle Chinese phonology, the Song phonology, and the phonology of the *Zhongyuan Yinyun* 中原音韻 – to decipher the phonetic values of the YZ graphs.[4] These three systems are reconstructed and with inaccurate spatial and temporal information as criticized by Nie (1988). In this study we opt for the *Menggu Ziyun* 蒙古字韻 (MGZY hereafter) of the 13th century as the starting point of our reconstruction. The advantages of using the MGZY system include: (a) the temporal and geographic proximity; (b) the

[4] In Chinggeltai *et al.*'s QXY, the reconstructed Middle Chinese phonology, the Song phonology, and the phonology of the *Zhongyuan Yinyun* are used in their first table for comparison purposes. But how the phonetic value of each Khitan YZ is established is not detailed. Many reconstructions seem to have nothing to do with the three systems listed. Sometimes the discussion of the phonology of Khitan is based on modern Mandarin. We found it quite problematic to discuss the phonetic values of the Khitan YZ graphs by using modern Mandarin, which appears more than 800 years after the Khitan time and should have no place in the reconstruction of Sino-Khitan phonology.

similar influence of the Mongolic language involved in transliteration; (c) the complete and systematic hP'ags-pa spellings in the MGZY; and (d) most importantly, the phonetic nature of the hP'ags-pa script. There is no better candidate than the hP'ags-pa spellings to serve as the basis for the assessment of the phonology of Sino-Khitan. In the following analyses, a hP'ags-pa spelling and its phonetic value are provided for each Sino-Khitan word.

Sino-Khitan phonology is a loan phonology (Coetsem 1988) and the transliteration of Chinese words is a reproduction or an imitation of the Chinese words in the Khitan language. Thus the phonology of Sino-Khitan must reflect the basic features of the phonology of Khitan. The phonological characteristics of the Chinese words should not be used automatically, because the Chinese phonological features are altered to fit the Khitan phonology. For example, the phonetic value of the Chinese word *wang* 王 is <⊙waŋ> (𘙇𘗪𘗊) according to the hP'ags-pa spelling. But we should not assume that the Khitan spelling has the same syllable structure and phonetic value. In the Khitan materials the phonetic value of the YZ for the genitive suffix of this word is [*ɔn]. According to the vowel harmony the nucleus of the stem must be [ɔ] as well. Thus, the Chinese [wa-] is perceived and rendered as the Khitan [ɔ-], with the Chinese labial glide [-w-] realized as a rounded feature.

Our interest is to understand the phonological characteristics of the Liao Chinese. Thus, it would be ideal if the phonetic values of the Khitan YZ graphs could be reconstructed independently of the Chinese materials. Since the Khitan language still remains unknown, it is inevitable that the decipherment of the Khitan graphs has to rely on the reconstructed values of the relevant Chinese syllables. However, the most significant piece of information we can obtain by studying the Khitan Lesser Script is the categorical information rather than the phonetic details. We shall see that the Khitan YZ graphs used in transliterating Chinese syllables reveal important historical changes that can only be observed in the much later materials. The important categorical changes found in the Khitan materials include the devoicing of voiced obstruents, the labiodentalization of labial stops, the palatalization of velar stops, and the diphthongization of the MC syllables with coda -k. Most Chinese phonologists will immediately recognize that these are the typical phonological features of northern Mandarin and realize that the origin of modern Mandarin can, without question, be traced back to a time at least two hundred years earlier than what has been generally assumed.

6. The transliteration of Chinese initial consonants

First it should be pointed out here that the YZ graphs used to transliterate the

Chinese initials sometimes may not represent initial consonants only, but rather a phonological unit of CV. Sometimes, the same graph could represent an initial consonant and a unit of an initial consonant and a vowel. It is likely that many YZ graphs originally represented either a CV or VC unit in the Khitan language and later they were reduced to single consonants when they were used to transliterate Chinese initials. For example, YZ 65 can be used by itself to transliterate an entire Chinese syllable [paw], or an initial consonant [p].

The Sino-Khitan initials are reconstructed in the following order: labials, alveolars, palatals, and velars.

6.1 The Chinese labial initials

The Chinese labial unaspirated stops are transliterated by two graphically related YZ, 65 and 87.

YZ 65 *p

伯	𘘃	<paj>	(故 2, 博州 22)	保	𘘄	<paw>	(許 29)
驃	𘘅	<bew>	(仲 19)	豳	𘘆	<pin>	(仲 5)
僕	𘘇	<bu>	(叔祖 2)	部	𘘇	<bu>	(仲 27)
步	𘘇	<bu>	(高十 18)				

YZ 87 *pi

兵	𘘆𘗊	<piŋ>	(故 11)	賓	𘘆	<pin>	(國妃 7)
畢	𘘆	<pi>	(敵烈 17)				

All the initials transliterated by these two YZ are MC *p- and *b-. Two phenomena should be noted here. The two Chinese words with MC *b- are non-*ping* tone syllables. Of course it is our interest to connect this phenomenon to the famous devoicing pattern in the Mandarin. The original value of YZ 65 is [pau] or [pɔ] because YZ 65 itself is used to transliterate the Chinese word 保 (敵烈 2). The transliteration of the Chinese word 保 above (*p+*u) also indicates that YZ 65 originally represents [pau] or [pɔ]. YZ 87 represents *pi, there are sufficient evidence to support this reconstruction. In the *Epitaph of Yelü Dilie* the Chinese character 畢 is used to transcribe the phonetic value of YZ 87 and phonetic value of 畢 is [pi] in hP'ags-pa spelling. The other two Chinese words, 兵 and 賓, also have [i] as their main vowel.

YZ 50 is also for labial initials. The phonetic values it transliterates are [p^h], [b], [f], and [v] according to the hP'ags-pa spellings.

YZ 50 *p^h

判	𘘋	<p^hɔn>	(仁先 25)	雱	𘘆𘗊	<p^haŋ>	(敵烈 6)
部	𘘇	<bu>	(奴誌 13)	牌	𘘃	<baj>	(迪烈 27)
帛	𘘃	<baj>	(迪烈 19)	平	𘘅𘗊	<biŋ>	(許 13,' 宗教 15)

妃 <fi> (故 12, 仲 27)　副 <fu> (仁 24, 仁先 9)
富 <fuw> (仁先 6)　傅 <fu> (仲 23, 仁先 37)
鋒 <fuŋ> (仁先 19)　方 <faŋ> (郎 5)
訪 <faŋ> (迪烈 8)　奉 <vuŋ> (故 8, 高十 26)
防 <vaŋ> (叔祖 2)

The labials transliterated by YZ 50 can be divided into two groups. One group contains labiodentals [f] and [v], both voiceless and voiced. The other group contains stops [p^h] and [b]. Since the unaspirated [p] has already been assigned to YZ 65 and 87, the phonetic value for YZ 50 thus should be a voiceless aspirated [p^h]. It should be noted that two words with initial [b], 平 and 牌, are both *ping* tone words and they possibly had already devoiced and became [p^h].

YZ 36 is used to represent syllable [fu] in Chinese. But the Chinese syllable [fu] is likely perceived as an aspirated stop and a homorganic labial vowel [p^hu] in Khitan. YZ 36 is basically used alone to transliterate Chinese syllable [fu], and sometimes used as an initial with other YZ graphs.

YZ 36 * p^hu, used alone

府 <fu> (故 10)　夫 <fu> (道 2, 叔祖 2)
傅 <fu> (許 34)　輔 <fu> (仲 8)
副 <fu> (許 9)　佛 <vu> (智先 14)
父 <vu> (仁先 35)　駙 <vu> (仲 5, 高十 10)

YZ 36 *p^hu, used with another YZ

副 <fu> (故 10, 仁先 25)　傅 <fu> (仲 23)
鄜 <fuŋ> (仲 6)

YZ 96 *p^hu, used alone

府 <fu> (仲 5)

YZ 96 *p^hu, used with another YZ

防 <vaŋ> (博州 23)

YZ 96 is a graphic variation of YZ 36. The examples are both from the Epitaphs of the Jin time (1115-1234), the *Epitaph of Xiao Zhonggong* dated 1150 and the *Epitaph of Bozhou Fangyushi* dated 1170 and seem to transliterate Chinese words only. Thus these two spellings could be a new usage after the Liao time. It has been suggested that YZ 36 could be a labial fricative instead of a stop. Since YZ 36 is used to transliterate MC voiceless unaspirated stop as in words 夫, 府, voiceless aspirated stop as in word 鄜, and voiced stop as in words 父, 輔, there is no question that YZ 36 transliterates labiodental fricatives in Chinese. But on the other hand since YZ 36 is also used to spell Khitan words (興 8, 9, 17, and 27), it is an existing consonant of Khitan phonology. Based on these pieces of information, the best solution is to reconstruct it as *p^hu.

The Chinese labial nasal initial [m] in the hP'ags-pa spellings is exclusively represented by YZ 47.

YZ 47 *m

馬 <ma> (故 11, 仁先 55)　密 <muj> (許 13)
廟 <mew> (興 32)　愍 <min> (奴誌 12)
門 <mun> (許 13, 奴誌 13)　銘 <miŋ> (奴誌 41)
命 <miŋ> (故 16)　孟 <muŋ> (敵烈 34)

The Chinese labial initial [ʋ] in the hP'ags-pa spellings, or the MC *wei* 微 initial, is exclusively represented by YZ 83.

YZ 83 *ʋ

武 <wu> (仲 27)*　武 <wu> (道 2, 迪烈 18)*
文 <wun> (道 1, 智先 3)　*Different spellings

Thus, YZ 83 indicates (a) the MC *wei* initial is no longer a nasal consonant, and (b) it is not a labial glide [w] yet. No Chinese word with the zero initial and a labial glide is transliterated by this YZ. This phenomenon indicates that YZ 83 is a real consonant.[5] Below are the examples.

YZ 17 *ɔŋ

王 <⊙waŋ> (許 2)

YZ 77 *uj

衛 <⊙uj> (仲 20, 迪烈 21)　尉 <⊙uj> (許 49, 迪烈 31)

YZ 19 *uj

衛 <⊙uj> (許 12, 奴誌 13)　尉 <⊙uj> (令 6)

YZ 46 *yn

雲 <⊙win> (叔祖 2)

The YZ graphs for labial initials can be summarized as follows.

*p	*p^h	*m	*ʋ	*p^hu
(65/87)	(50)	(47)	(83)	(36)
部/兵	副	門	文	府

6.2 The Chinese alveolar initials

In this group of initials, the most significant difference is that there is no alveolar

[5] In the modern Dagur, phonetic [ʋ], a labiodental approximant, is transcribed in IPA symbol [w] (Martin 1960, Zhong 1983). According to my informant this sound is unambiguously a labiodental consonant at both initial and final position, e.g. taaw [t^haaʋ] 'five' (the spelling is based on Zhong 1983).

affricate [ts, ts^h] in the Khitan phonology. It is also likely that there is only one voiceless fricative. Thus, the whole series of Chinese alveolar affricates and fricatives, voiced or voiceless, is not very well distinguished. But, on the other hand, the alveolar stops are represented by quite a few YZ graphs.

The unaspirated stop is best represented by YZ 69. Below are some examples.

YZ 69 *t

點		<tem>	(仲 20)	頂		<tiŋ>	(智先 22)
德		<tɨj>	(仲 36, 智先 6)	特		<dɨj>	(仲 21, 迪烈 11)
定		<diŋ>	(智先 12)	大		<daj>	(仲 27)
殿		<den>	(許 3, 叔祖 2)				

No aspirated stop is involved in these words. YZ 69 could represent a CV [tə] as well. In the *Epitaph of Xu Wang*, the Chinese word 德 is spelled with YZ 69 and YZ 7 [i] (故 5). But in other examples, 德 is spelled with YZ 69 and YZ 63 [əj], e.g. in the *Epitaph of Yelü Dilie* (迪烈 6). Historically 特 is a *ru* syllable with a voiced initial [d]. As an exception of sound change, in modern Mandarin the initial of 特 is an aspirated [t^h]. Thus, the Khitan example does not show this irregular change.

The situation of the initials transliterated by YZ 70 is more complicated, and allows of no easy conclusion. In the *Epitaph of Yelü Zhixian* the same Chinese character 頂 in the personal name 佛頂 is transliterated with both YZ 69 (智先 22) and YZ 70 (智先 14). We tentatively reconstruct it as aspirated [t^h], basically based on the fact that this phonetic value is not represented by any other YZ graph. Of course, this reconstruction needs to be further confirmed.

YZ 70 *t^h

德		<tɨj>	(故 5, 迪烈 6)	頂		<tiŋ>	(智先 14)
通		<t^{h}uŋ>	(道 2)	天		<t^{h}en>	(宗教 5, 弘用 12)
大		<daj>	(仲 21, 敵烈 4)	殿		<den>	(道 6)

The difference between YZ graphs 69 and 70 can be summarized as follows.

YZ	t	t^h	d
69	+	-	+
70	+	+	+

The transliteration of 徒 (仁先 23) indicates YZ 38 is syllabic. Other syllables that YZ 38 transliterates also have nucleus [u], as is shown in the hP'ags-pa spellings. The two syllables with the voiced initial also are *ping* tone syllables. According to the Mandarin devoicing pattern, the voiced stop might have already devoiced and changed to the voiceless aspirated stop. Thus, the phonetic value of this syllabic YZ must be [t^{h}u].

YZ 38 *t^{h}u, used alone

徒  <du> (仁先 23, 高十 5)

YZ 38 *t^{h}u, used with YZ graph 16 *uŋ

統  <t^{h}uŋ> (許 18) 通 <t^{h}uŋ> (高十 23)

同  <t^{h}uŋ> (許 2, 國妃 10)

YZ 30, 56 and 60 are graphically related allographs.

YZ 30 *ta				YZ 56 *ta			
道		<daw>	(道 5, 故 10)	大		<daj>	(道 2, 許 11)

YZ 60 *ta

大  <daj> (故 2, 叔祖 2)

YZ 22 *t^{h}a

檀  <dan> (國妃 10) 唐  <daŋ> (郎 2)

YZ 56 and 60 are used to transliterate the same Chinese word 大 and are not used for general transliteration purposes. The YZ 30 is used to transliterate 道 in the *Epitaph of Dao-zong Emperor* and *Epitaph of Yelü*. It is slightly different in shape and considered a different YZ in QXY. But it should be an allograph of YZ 56 and 60. This YZ is used together with YZ 28 *u to transliterate 道, thus its phonetic value must be [ta], the same as YZ 56 and 60. YZ 22 is seen only twice. The initial of both Chinese words is voiced alveolar stop. Since both are *ping* tone syllables, according to the devoicing patter of Mandarin YZ 22 represents a voiceless aspirated stop.

YZ 68 is syllabic and is used to transliterate syllable [tu]. It also spells with YZ 28 [u].

YZ 68 *tu, alone

都  <tu> (許 18, 迪烈 19) 度 <du> (許 11, 迪烈 1)

YZ 68 *tu, in front of YZ 28 *u

都  <tu> (高十 16)

As a general characteristic, the Mongolic languages lack alveolar affricates. The phonological distinctions of Chinese affricates are not accurately represented; some are distorted, and some are completely erased. But on the other hand, it is also true that non-native sounds can appear in the transliterations of foreign words. In modern languages we can observe that non-native sounds are added to the phonology as the result of lexical borrowing. Thus, there is no reason to completely exclude the non-native sounds in the transliterations.

YZ 26 *s

將		<tsɛŋ>	(仲 20, 韓氏 2)	宗		<tsuŋ>	(令 14, 故 8)
漆		<ts^{h}i>	(故 2, 迪烈 1)	採		<ts^{h}aj>	(迪烈 8)

千 <ts^{h}ɛn> (宗教 21, 弘用 8)
青 <ts^{h}iŋ> (宣 2, 叔祖 2)
曹 <dzaw> (仲 23)
秦 <dzin> (宗教 3, 敵烈 3)
仙 <sɛn> (道 6)
宋 <suŋ> (仁 8, 仁先 20)
隋 <zuj> (智先 6)
左 <tso> (許 3, 奴誌 13)

YZ 27 *ts

祭 <tsi> (宣 2, 道 2)
節 <tsɛ> (許 11, 叔祖 2)
左 <tso> (仲 20)
紫 <tsɨ> (故 2)
進 <tsin> (道 2, 仲 21)
宗 <tsuŋ> (仲 2, 道 5)
漆 <ts^{h}i> (許 24)

清 <ts^{h}iŋ> (仁先 14, 大山 1)
錢 <dzen> (迪烈 19)
前 <dzen> (仲 20)
西 <si> (仲 16)
先 <sɛn> (仁先 19)
散 <san> (大山 22)
三 <sam> (令 6, 弘用 4)

祖 <tsu> (故 4, 仁先 2)
子 <tsɨ> (許 3, 叔祖 2)
酒 <tsiw> (道 2, 宣 2)
晉 <tsin> (宗教 3)
將 <tsɛŋ> (許 12)
靜 <dziŋ> (許 11, 大山 32)

The tendency we can observe from the examples above is that YZ 26 is used to transliterate all alveolar affricates and fricatives, but YZ 27 is used to transliterate affricates only; no example is found to transliterate fricatives. The Chinese word 漆 is the only syllable with an aspirated affricate. Otherwise, YZ 27 is not even used to transliterate aspirated affricate.

	ts	ts^{h}	dz	s	z
YZ 26	+	+	+	+	+
YZ 27	+	(+)	+	-	-

The difficult question is whether these two graphically related YZ actually make a phonological contrast. Here we would like to tentatively suggest that YZ 26 stands for aspirated affricates and fricatives, and YZ 27 for unaspirated affricates. The transliterations for Chinese words 秦 and 晉 from the *Epitaph of Yelü Zongjiao* make a clear distinction between these two words. YZ 26 is used to transliterate 秦, and YZ 27 is used to transliterate 晉. If the voiced affricate of 秦 had already changed to a voiceless aspirated [ts^{h}], this pair of words would thus support our suggestion. Other words, 錢, 前 and 曹, with voiced affricate and *ping* tone also indicate the same phenomenon. It is also quite clear that YZ 27 *ts is an initial consonant basically used for transcribing Chinese loan words, so its usage frequency is much lower than that of YZ 26 *s in the Khitan texts. According to QXY, the usage frequency of YZ 26 and YZ 27 is 601 and 42 respectively.

YZ 26 *s, *ping* tone syllables

曹 <dzaw> (仲 23)
前 <dzen> (仲 20)

YZ 27 *ts, non-*ping* syllables

靜 <dziŋ> (許 11)

錢 <dzen> (迪烈 19)
秦 <dzin> (宗教 3, 敵烈 3)

This distinction also suggests that the contrast is between an affricate and a fricative and different from the contrast between the stops, which is aspirated versus unaspirated. This contrast is true for palatal consonants as well.

This possible distinction can also be supported by YZ 41, which is used to transliterate Chinese syllables with a voiceless aspirated affricate or a voiceless fricative and a homorganic apical vowel. The Chinese syllables transliterated by this YZ graph are likely perceived as a fricative with a high central vowel. Below are the examples.

YZ 41 *sɨ

刺 <ts^{h}ɨ> (興 36, 許 48)　　司 <sɨ> (許 1, 仁先 23)

The alveolar nasal and lateral are transliterated by YZ 72 and YZ 14, respectively. The examples below are self-explanatory and need no discussion.

YZ 14 *l

禮 <li> (仲 27, 國妃 7)
祿 <lu> (道 2, 澤州 1)
洛 <law> (許 1)
婁 <liw> (仲 16)
蘭 <lan> (仲 21, 國妃 4)
令 <liŋ> (令 5)

醴 <li> (郎 3)
魯 <lu> (仲 23)
略 <lew> (郎 1)
留 <liw> (仲 5, 迪烈 33)
練 <len> (仲 7, 智先 10)
郎 <laŋ> (仲 27)

YZ 72 *n

奴 <nu> (奴誌 4, 仁先 1)
寧 <niŋ> (許 49, 迪烈 19)

內 <nuj> (令 7)
農 <nuŋ> (大山 22)

In the *Epitaph of Yelü Hongyong* YZ X3 is used with YZ 40 *am to transliterate the Chinese word 男. According to its phonetic value in Khitan (Chen and Yang 1999), the phonetic value of YZ X3 is [na].

YZ X3 *na

男 <nam> (弘用 8)

YZ graph 61 stands for [lu]. Its phonetic value can be determined based on the alternative spelling, (YZ 14 [l] and YZ 55 [u]) for the Chinese word 祿, as seen in the *Epitaph of Dao-zong Emperor* (道 2, 故 2). YZ 62 is an allograph of YZ 61.

YZ 61 *lu, used alone

YZ 61 *lu, in front of YZ 55 *u

祿  <lu> (仲 21) 祿  <lu> (迪烈 1, 叔祖 2)
YZ 62 *lu, used alone
祿  <lu> (QXY, p 103) [6]

The YZ graphs for the alveolar initials and related CV units can be summarized as follows.

*t	*t^{h}	*n	*l	*ts	*s
(69)	(70)	(72)	(14)	(27)	(26)
點	通	奴	禮	祖	先
*ta	*tu	*t^{h}u	*na	*lu	*sɨ
(30/56/60)	(68)	(38)	(X3)	(61/62)	(41)
大/大	都	徒	男	祿	司

6.3 The Chinese palatal initials

It is quite clear that the retroflex and palatal initials in Chinese were not distinguished. Like other Mongolic languages, Khitan probably had only palatal initials. Again, whether there is a distinction between aspirated and unaspirated needs closer examination.

YZ 8 is used to transliterate Chinese retroflex and palatal affricates. Let us take a look of the following examples first.

YZ 8 *tʃ

主		<tʃy>	(仲 4)	涿		<tʃwaw>	(澤州 20)
詔		<tʃew>	(故 16)	州		<tʃiw>	(仲 17, 叔祖 2)
周		<tʃiw>	(叔祖 23)	轉		<tʃwɛn>	(迪烈 17)
政		<tʃiŋ>	(令 6)	張		<tʃaŋ>	(迪烈 27)
章		<tʃaŋ>	(迪烈 1)	彰		<tʃaŋ>	(奴誌 12)
楚		<tʃ^{h}u>	(仁先 2)	册		<tʃ^{h}aj>	(道蓋, 叔祖蓋)
陳		<dʒin>	(敵烈 1, 仁先 27)	臣		<ʒin>	(令 6, 仁先 24)
尚		<ʒaŋ>	(郎 5)	嫦		<ʒaŋ>*	(迪烈 12)
廊		<ʒiŋ>	(仲 22)				

[6] YZ 62 is listed in the Table of Reconstructed Phonetic Values of YZ Graphs in the QXY (pp. 81-109). But this YZ cannot be found in any text. The only usage of this YZ listed in the Standardization List is for the Chinese word 祿 as the 13th character of the 11th line of the *Epitaph of Ren-yi Empress* (p. 739). But this example is not the Chinese character 祿 but a Khitan word.

Except 册 and 楚, all the Chinese words have either voiceless unaspirated or voiced initials according to the hP'ags-pa spellings.

YZ 10 *ʃ

室		<ʃi>	(仲 16)	書		<ʃy>	(仲 22, 迪烈 1)
使		<ʃɨ>	(高十 20)	叔		<ʃy>	(仁先 27, 迪烈 17)
水		<ʃuj>	(故 2, 宋魏 2)	少		<ʃew>	(仲 11, 大山 22)
守		<ʃiw>	(令 11, 迪烈 33)	帥		<ʃwaj>	(仲 18, 仁先 25)
瀋		<ʃim>	(敵烈 21)	山		<ʃan>	(郎 2, 大山 1)
申		<ʃin>	(迪烈 33)	省		<ʃiŋ>	(仲 22)
聖		<ʃiŋ>	(道 13, 宗教 5)	樞		<tʃ^{h}y>	(許 11, 迪烈 20)
神		<dʒin>	(興 2)	順		<dʒyn>	(仲 3)
署		<ʒy>	(許 9, 宗教 12)	蜀		<ʒy>	(仁先 2)
壽		<ʒiw>	(叔祖 1)	承		<ʒiŋ>	(宗教 5)
丞		<ʒiŋ>	(仲 21)	上		<ʒaŋ>	(仲 20, 仁先 62)
尚		<ʒaŋ>	(仲 22, 仁先 1)				

The Chinese initials transliterated by these two YZ graphs can be summarized as follows.

	tʃ	tʃ^{h}	dʒ	ʃ	ʒ
YZ 8	+	+	+	-	+
YZ 10	-	(+)	+	+	+

It is not difficult to observe that TZ 8 is never used for voiceless fricatives and YZ 10 is basically not used for voiceless affricates. Thus, the phonological gaps of YZ 8 and YZ 10 reversely indicate the phonetic values of these two YZ graphs: YZ 8 is [tʃ] and YZ 10 is [ʃ]. The only aspirated initial YZ 10 transliterates is that of 樞, which also has an fricative initial in modern Mandarin and is a well-known exception. The Khitan pronunciation therefore indicates that the exception was already in existence in the 10th century. The distinction between the voiced affricates and fricatives (MC *chuan* 船 and *chan* 禪 initials) is questionable in the MC system. This phenomenon is also reflected in these two YZ graphs. The voiceless aspirated affricate is transliterated by YZ 8. The nucleus of the only two examples, 楚 and 册, is not [a]. The syllables with [tʃ^{h}a] or [tʃ^{h}a-] are transliterated by YZ 64.

It is interesting to observe that there is no aspiration contrast for the affricates at both alveolar and palatal positions. Based on the evidence shown above, both alveolar and palatal affricates are likely to be unaspirated. That YZ 8 represents an unaspirated affricate can also be shown by the Chinese transliteration 直不姑之 (阻卜之) of a Khitan word that uses YZ 8 as the initial consonant (Chinggeltai 2002: 59). Both Chinese syllables 直 and 阻 are unaspirated.

Three YZ graphs represent CV syllables. YZ 12 is used by itself and with other YZ graphs. According to the hP'ags-pa spellings it is quite clear that YZ 12 is a syllabic graph for [tʃi]. YZ 21 is an allograph of YZ 12. It used to transliterate Chinese *xiyin* 細音 syllables.

YZ 12 *tʃi, used alone

知		<tʃi>	(迪烈 16, 仁先 14)	職		<tʃi>	(郎 5)

YZ 12 [tʃi], used with other YZ graphs

鎮		<tʃin>	(博州 5)		政		<tʃiŋ>	(令 6)*
政		<tʃiŋ>	(敵烈 2)**		正		<tʃiŋ>	(迪烈 20)
諸		<tʃy>	(叔祖 2)		鄭		<dʒiŋ>	(仁先 23)

*YZ 5 *iŋ, **YZ 37 *əŋ

YZ 21 *tʃi

主		<tʃy>	(仲 5, 奴誌 22)	詔		<tʃew>	(故 16)
昭		<tʃew>	(許 7, 博州 23)	趙		<dʒew>	(仁先 10)

YZ 15 is used exclusively to transliterate Chinese words 中 and 忠 [tʃuŋ] according to hP'ags-pa spellings. Thus, YZ 15 represents [tʃu].

YZ 15 *tʃu

中		<tʃuŋ>	(令 11, 迪烈 1)	忠		<tʃuŋ>	(迪烈 20)

YZ 51 appears to be a modified form of YZ 15. There are only two examples found in the texts. According to their spellings in the hP'ags-pa, it should be [tʃa].

YZ 51 *tʃa

章		<tʃaŋ>	(許 13)	彰		<tʃaŋ>	(奴誌 12)

Another CV graph is YZ 64. Since all the Chinese words transliterated by YZ graphs have a nucleus [a], YZ 64 should be interpreted as [ʃa] or [tʃʰa], in contrast with YZ 51 [tʃa]. We have pointed out that there is no aspiration contrast in Khitan, thus YZ 64 is reconstructed as *ʃa. It is noteworthy that the Chinese word 長 of 長寧宮 in the *Epitaph of Yelü Dilie* (迪烈 19) and the *Epitaph of Xu Wang* is a *ping* tone word, and its initial should be a voiceless aspirated stop.

YZ 64 *ʃa

察		<tʃʰa>	(故 2)	敞		<tʃʰaŋ>	(令 16)
昌		<tʃʰaŋ>	(國妃 10)	長		<dʒaŋ>	(許 49, 迪烈 19)
尚		<ʒaŋ>	(故 2, 仲 22)				

YZ 54 is exclusively used to transliterate the Chinese word 崇 along with YZ 29 [u:ŋ]. Since it is in contrast with YZ 15, its phonetic value should stand for [ʃu].

YZ 54 *ʃu

崇		<dʒuŋ>	(故 2, 叔祖 2)				

YZ 52 is found to represent voiceless fricative [ʃ]. It can be used alone or along with YZ graphs 58 or 59 [ɨ] to represent syllable [ʃɨ]. The Chinese syllables transliterated by YZ 52 are likely to have an apical vowel.

YZ 52 *ʃɨ, used alone

使		<ʃɨ>	(許 11, 故 2)		史		<ʃɨ>	(興 36, 叔祖 2)
師		<ʃɨ>	(許 35, 高十 10)		事		<dʒɨ>	(許 13, 令 6)
詩		<ʃi>	(許 13)		侍		<ʒi>	(許 7)
氏		<ʒi>	(弘用 2)					

YZ 52 *ʃɨ, used with YZ graphs 58 or 59 for *ɨ

使		<ʃɨ>	(仲 8, 叔祖 2)	侍		<ʒi>	(許 6)
事		<dʒɨ>	(仲 22, 叔祖 2)				

Some hP'ags-pa spellings indicate the vowel is [i], but all these syllables are in the *Zhi-si* 支思 rhyme group of the *Zhongyuan Yinyun*, indicating they have an apical vowel.

As an obvious phenomenon, the palatal consonants sometimes represent not only the initial consonants but the combination of consonant (C) and glide of Chinese syllables (Cj). Thus a Chinese syllable with a palatal glide (CjV-) can be transliterated either as C + jV- or Cj + V-. As shown by the two examples below, the Chinese words 少 and 聖 are transcribed differently. As pointed out earlier, the Chinese palatal glide is realized as a [+front] feature of the following nuclear vowel.

少	C + jV-	10 + 25 + 28	ʃ + ew + u		<ʃew>	(仲 20, 大山 22)
少	Cj + V-	10 + 31 + 28	ʃ + aw + u		<ʃew>	(敵烈 19)
聖	C + jV-	10 + 5	ʃ + iŋ		<ʃiŋ>	(道 13, 宗教 5)
聖	Cj + V-	10 + 37	ʃ + əŋ		<ʃiŋ>	(令 14)

YZ graphs 63 and 94 should be included in the palatal group. YZ 63 represents a palatal glide [j]. Graphically YZ 94 is based on YZ 8 *tʃ, thus the phonetic value of YZ 94 must be perceived similar to that of YZ 8. YZ 94 is basically used for transliterating Chinese words with MC *ri* 日 initial, which is probably a retroflex approximant [ɻ] in Liao times. Here we reconstruct YZ 94, a borrowed consonant in the Khitan phonology, as [ɻ].[7] Below are the examples. YZ X5 is only used to transliterate Chinese syllables with a high front rounded vowel. Thus YZ X5 is a CV graph which contains a high front

[7] In Dagur and Mongolian consonant [r] cannot appear at word initial position (Zhong 1982: 4, Daobu 1983: 7).

rounded vowel.

YZ 63 *j

射		<je>	(故 2, 叔祖 2)	游		<jiw>	(道 6)
姚		<jew>	(仁先 35)	藥		<jew>	(迪烈 31)
右		<ŋiw>	(仲 21)	宥		<ŋiw>	(郎 5)
延		<jen>	(奴誌 12)	燕		<jɛn>	(仁先 5, 叔祖 13)
用		<jyŋ>	(弘用 9)				

YZ 94 *ɻ

仁		<rin>	(仁 1, 叔祖 1)	日		<ri>	(永寧 13)

YZ X5 *ɻy

如		<ry>	(大山 14)	乳		<ry>	(敵烈 17)

YZ 95 is found only once in the *Epitaph of Ren-yi Empress* to transliterate 懿. Since 懿 is also transliterated by two YZ 7 [i] (宣 1, 故 4), the phonetic value of YZ 95 should be similar to [i] and the function of this graph should be an initial similar to [j] in the high tonal register.

YZ 95 *ji, independently

懿		<⊙i>	(仁 1)

The YZ graphs for the palatal initials and related CV units can be summarized as follows.

*tʃ	*ʃ	*j	*ɻ	*ɻy	*ji
(8)	(10)	(63)	(94)	(X4)	(95)
州	水	游	仁	如	懿
*tʃi	*tʃa	*tʃu	*ʃɨ	*ʃa	*ʃu
(12/21)	(51)	(15)	(52)	(64)	(54)
知/主	章	中	使	察	崇

6.4 The Chinese velar initials

The phonetic values of the velar groups are relatively transparent. The phonetic value of YZ graph 18 is clearly an unaspirated stop.

YZ 18 *k

車		<ky>	(博州 22)	國		<kuj>	(許 5, 智先 5)
高		<kaw>	(智先 14, 國妃 4)	九		<kiw>	(智先 14, 國妃 4)
校		<kjaw>	(令 2, 韓氏 2)	郭		<kwaw>	(韓氏 8)
兼		<kɛm>	(許 1, 叔祖 2)	監		<kʲam>	(仲 23, 韓氏 2)
金		<kim>	(故 2, 仲 20)	觀		<kon>	(博州 19)
管		<kon>	(仲 33)	檢		<kem>	(仲 20, 迪烈 1)

軍		<kyn>	(許 11, 迪烈 1)	工		<kuŋ>	(高十 21)
江		<kɛŋ>	(許 11, 大山 32)	景		<kiŋ>	(令 7, 宗教 3)
經		<kʲiŋ>	(郎 1)	京		<kiŋ>	(仲 16, 博州 16)
廣		<kwaŋ>	(宗教 1)	光		<kwaŋ>	(仲 21)
開		<kʰaj>	(大山 22)	騎		<gi>	(仲 19, 道 2)
郡		<gyn>	(許 36, 迪烈 1)	權		<gwɛn>	(大山 22)

According to the hP'ags-pa spellings of the examples, only MC voiced and voiceless unaspirated stops are transliterated by this YZ. The two Chinese words, 郡 and 騎, with voiced initials are both *qu* tone syllables.[8] There are two exceptions, 開 and 權. 開 has an aspirated initial and 權 is a *ping* tone syllable with a voiced initial. It should be noted that both of them are from the *Epitaph of Xiao Dashan and His Wife*.

A syllabic graph, YZ 90, represents [kɔ] for the Chinese word 觀. The fact that YZ 90 spells with YZ 72 [-n] to transliterate the Chinese word 觀, a CVN syllable, indicates that YZ 90 must represent a phonological unit CV.

YZ 90 *kɔ, used alone

郭		<kwaw>	(高十 9)

YZ 90 *kɔ, used in front of YZ 72 *-n

觀		<kon>	(仲 8, 迪烈 18)	官		<kon>	(迪烈 23)

This can be supported by the transliteration in the *Epitaph of Han Gaoshi*, where YZ 90 alone is used in the transliteration of the Chinese surname 郭 (高十 9). The hP'ags-pa spelling indicates that the final is [waw]. But this final appears simply as a monophthong vowel [ɔ].

In the contrast, YZ 6 is used to transliterate a voiceless aspirated stop and voiceless fricative.

YZ 6 *k^h

開		<k^haj>	(故 2, 叔祖 2)	客		<k^{hj}aj>	(許 3)
空		<k^huŋ>	(仲 5, 仁先 23)	輕		<k^{hj}iŋ>	(博州 22)
卿		<k^hiŋ>	(大山 22)	慶		<k^hiŋ>	(奴誌 12, 高十 15)
期		<gi>	(郎 5)	徽		<hyj>	(仲 19, 宗教 13)
許		<hy>	(許 2, 仁先 27)	興		<h^jiŋ>	(故 8, 叔祖 24)
顯		<hɛn>	(敵烈 21)				

The voiced stop initial of the word 期, which is a *ping* tone syllable, can be a voiceless aspirated stop, as the result of devoicing.

YZ 34 is [k^ha], because for transliterating 開, it can appear in front of YZ 35 [aj] as well as YZ 63 [j], as seen in the *Epitaph of Yelü Dilie*.

[8] 騎 has two pronunciations, one with *ping* tone (渠羈切) and one with *qu* tone (奇寄切). According to the meaning of the word it is a *qu* tone syllable.

YZ 34 *k^{h}a, in front of YZ 35 *aj

開  <kaj> (許 1, 仲 5)

YZ 34 *k^{h}a, in front of YZ 63 *j

開 <kaj> (迪烈 1)

The velar nasal initial is transliterated by YZ 37.

YZ 37 *ŋ

儀		<ŋi>	(仲 21, 弘用 2)	魚		<⊙y>	(大山 22)
牛		<ŋiw>	(宗教 21)	銀		<ŋin>	(道 2, 叔祖 2)
御		<⊙y>	(道 2, 宗教 10)	元		<⊙wɛn>	(故 17)
五		<u>	(敵烈 19)	魏		<⊙uj>	(國妃 4)
吴		<u>	(故 17, 仁先 22)	吾		<u>	(許 12)

According to the hP'ags-pa spellings, some syllables have the velar nasal initial and some do not. However, according the MC system all the syllables had a velar nasal initial. The difference indicated by the hP'ags-pa spellings indicates a change from the Liao to the Yuan times.

There are several YZ graphs mainly used to transliterate fricatives. YZ 97 is used to transliterate a voiced fricative or a stop. Since there are graphs for stops, the phonetic value of YZ 97 should be a fricative. In one case (故 18) it is used to transliterate an entire syllable 混 (QXY, p.120). But it is likely to be a mistake in decipherment (Chinggeltai 2002: 41). In the Khitan words this YZ seems often to be used in the intervocalic position. Thus it is more likely to be a fricative because voiced stops are usually weakened to fricatives in intervocalic positions.

YZ 97 *x

翰  <ɣan> (許 32)　　乾 <gen> (宗教 16)

YZ 23 is used to transliterate velar initials and appears in front of nucleus [ɛ]. According to MC 乾 is a *ping* tone syllable with a voiced stop initial. But the initial may have changed to a voiceless aspirated stop in the Liao time as what we have discussed already.

YZ 23 *k^{h}œ

乾 <gen> (郎 2)　　縣 <ɣ^{j}wɛn> (故 2, 叔祖 2)

玄 <ɣ^{j}wɛn> (智先 5, 仁先 2)

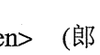
YZ 24 must represent a CV because YZ 24 is used directly after YZ 23 only. If YZ 24 is not used after YZ 23, either after an initial or not, YZ 66 *ɛ YZ 42 *œ must be used in front of it. Below are some examples. Based on the YZ graphs appearing in front of it and the hP'ags-pa spellings, the phonetic value of this YZ should be *k^{h}ɛ or with a rounded vowel as *k^{h}œ. Since it is used to transcribe *hekou* 合口 syllables 縣 and 玄,

we reconstruct it as *k^{h}œ, otherwise the rounded feature of these two *hekou* syllables are not transliterated. In the transliteration of 乾 (郎 2) the rounded feature in the vowel [œ] of YZ 23 is not used.

YZ 24 *ɛn, independently (only after YZ 23 *k^{h}œ)

乾		<gɛn>	(郎 2)	23 + 24	*k^{h}œ+*ɛn
縣		<ɣ^{j}wɛn>	(故 2, 叔祖 2)	23 + 24	*k^{h}œ+*ɛn
玄		<ɣ^{j}wɛn>	(智先 5, 仁先 2)	23 + 24	*k^{h}œ+*ɛn

YZ 24 *ɛn, after YZ 66 *ɛ

殿		<dɛn>	(許 3, 叔祖 2)	69 + 66 + 24	*t+*ɛ+*ɛn
練		<lɛn>	(仲 7, 智先 10)	14 + 66 + 24	*l+*ɛ+*ɛn
千		<ts^{h}ɛn>	(宗教 21, 弘用 8)	26 + 66 + 24	*s+*ɛ+*ɛn
前		<dzɛn>	(仲 20, 仁先 19)	26 + 66 + 24	*s+*ɛ+*ɛn
錢		<dzɛn>	(迪烈 19)	26 + 66 + 24	*s+*ɛ+*ɛn
仙		<sɛn>	(道 6)	26 + 66 + 24	*s+*ɛ+*ɛn
先		<sɛn>	(仁先 19)	26 + 66 + 24	*s+*ɛ+*ɛn
顯		<hɛn>	(敵烈 21)	6 + 66 + 24	*k^{h}+*ɛ+*ɛn
燕		<jɛn>	(仁先 5, 叔祖 13)	63 + 66 + 24	*j+*ɛ+*ɛn
延		<jɛn>	(奴誌 12, 國妃 10)	63 + 66 + 24	*j+*ɛ+*ɛn

YZ 24 *ɛn, after YZ 42 *œ

院		<⊙wɛn>	(道 2)	42 + 24	*œ+*ɛn
遠		<⊙wɛn>	(博州 22)	42 + 24	*œ+*ɛn

YZ 49 is also involved in transliterating the voiced fricative. But it is quite interesting that this YZ is used to transliterate the words 下 and 行, both of which are MC division-Ⅱ syllables. We tentatively transcribe this graph as [xa]. But it is very likely that this graph transliterates a guttural fricative and the special phonetic value of the division-Ⅱ glide at that time.

YZ 49 *xa, used alone

下 <ɣ^{j}a> (許 13)

YZ 49 *xa, used in front of YZ 88 *axa/xa, and YZ 82 *ɛŋ

下   <ɣ^{j}a> (迪烈 1, 國妃 10)　行   <ɣ^{j}iŋ> (仲 22)

YZ 80 is used to transliterate the Chinese word 虎. In the *Epitaph of Han Gaoshi* it is used with YZ 28 [u] to spell the Chinese syllable 户 in 户部. Thus this graph is indeed a phonetic transliteration and its phonetic value is [hu].

YZ 80 *xu, used alone

虎 <hu> (仲 20)

YZ 80 *xu, used in front of YZ 28 *u

户  <ɦu> (迪烈 19, 高十 22)
YZ 80 *xu, used in front of YZ 37 *əŋ
弘 <ɦuŋ> (弘用 9)

YZ 44 and X4 are used for voiced fricatives. But both are used only for one Chinese word, 混 and 韓 resepectively. In the spellings 混 is followed by YZ 45 *un and 韓 is followed by YZ 75 *an. Thus the phonetic values and the phonological units they represent in the Chinese literation cannot be determined. In Chinese 韓 is homophonous to 翰. The different transliteration may suggest that it is a special spelling for this surname 韓.

YZ 44 *x?
混  <ɣun> (許 2, 弘用 4)

YZ X4 *x?
韓  <ɦan> (仲 21, 敵烈 5)

The YZ graphs for the velar and uvular initials and related CV units can be summarized as follows.

*k	*k^h	*ŋ	*x		
(18)	(6)	(37)	(97)		
光	慶	御	翰		
*k^{h}a	*k^{h}œ	*xu	*xa	*x?	*x?
(34)	(23)	(80)	(49)	44	(X4)
開	玄	户	下	韓	混

6.5 The Chinese zero initial

The Chinese zero initial is a true zero form in the Khitan transliteration. No YZ in the Khitan Lesser Script is designated for transliterating the zero initial. The different zero initials as seen in the MGZY (Shen 2005a) are not observed. Below are some examples.

No YZ represents zero initial

懿		<⊙i>	(宣 1, 故 4)	衛		<⊙uj>	(仲 20, 迪烈 21)
尉		<⊙uj>	(許 49, 迪烈 31)	安		<⊙an>	(許 6, 敵烈 16)
院		<⊙wɛn>	(許 11, 奴誌 15)	雲		<⊙win>	(叔祖 2)
應		<⊙iŋ>	(郎 5, 宗教 12)	永		<⊙yŋ>	(迪烈 16)
王		<⊙waŋ>	(許 2, 仲 2)				

From these examples we can observe that no specific YZ graph is used to represent labial glide [w] in the Chinese syllables with a zero initial. But contrarily YZ 63 is always used to represent palatal glide [j] in the Chinese syllables with a zero initial. However, if the Chinese syllables have both the labial glide and the palatal glide according to the MC

system, there will be no YZ graph to represent either glide. Below we show the Khitan transliterations of the four possible combinations of these two glides.

Kaihe	*Kaikou*	*Kaikou*	*Hekou*	*Hekou*
Hongxi	*Hongyin*	*Xiyin*	*Hongyin*	*Xiyin*
Glide	-⊙-	-j-	-w-	-wj-
YZ	no	YZ63	no	no

This phenomenon suggests that in the *hekou/xiyin* syllables, glide [j] was not perceived as an independent segment.

6.6 Summary of initials

The values of initial consonants, based on the analyses above, are listed below. The YZ graphs for CV units are not included. This result is quite similar to the consonants found in the modern Dagur and Mongolian languages. The only significant difference is the inclusion of two alveolar affricates. We have discussed that the transliterations involving these two affricates show a high degree of ambiguity. However, these two alveolar affricates should be included in the phonology of Sino-Khitan because special YZ graphs were used for the Chinese alveolar affricates.

Labial	*p	*p^h	*m	*ʊ
	(65/87)	(50)	(47)	(83)
	部/兵	副	門	文
Alveolar	*t	*t^h	*n	*l
	(69)	(70)	(72)	(14)
	點	通	奴	禮
	*ts	*s		
	(27)	(26)		
	祖	先		
Palatal	*tʃ	*ʃ	*j	*ɻ
	(8)	(10)	(63)	(94)
	州	水	游	仁
Velar/uvular	*k	*k^h	*ŋ	*x
	(18)	(6)	(37)	(97)
	光	慶	御	混

We can compare this system with the Dagur and Mongolian consonant systems. The consonants used for loan words are not included. Several characteristics should be pointed out: (a) no contrast between voiceless and voiced fricatives, (b) a two-way distinction of the stops (but not the affricates), and (c) no retroflex consonant.

Dagur (Zhong 1982)						
b	p	m		w(ʊ)		
d	t	n	s		l	r
dʒ	tʃ		ʃ	j		
g	k	ŋ	x			

Mongolian (Daobu 1983)						
b	p	m	ɸ	w		
d	t	n	s		l	r
dʒ	tʃ		ʃ	j		
g	k	ŋ	x			

7. The transliteration of Chinese finals

In the following sections, the Sino-Khitan finals are reconstructed in the following order: V, the monophthongs; VCg the diphthongs with an off-glide, and VCn with a nasal ending. The finals of the MC *ru* syllables seem to have changed to either V or VCg syllables.

7.1 The transliteration of Chinese monophthongs

The Chinese monophthongs must be monophthongs in Khitan. As a default, the transliteration of the Chinese words with a low vowel can be examined first. All the hP'ags-pa spellings, except one, indicate [a]. According to the phonetic values of the Chinese words transliterated, YZ 39 stands for [a]. No YZ graph for a long [a:] is identified.

YZ 39 *a, independently

馬 <ma> (故 11, 仁先 55) 腊 <la> (仁先 61)

YZ 39 *a, in front of YZ 40 *am or YZ 75 *an

三 <sam> (令 6, 弘用 4) 判 <pʰɔn> (仁先 25)
散 <san> (大山 22) 蘭 <lan> (仲 21, 國妃 4)
山 <ʃan> (郎 2, 大山 1) 乾 <gan> (宗教 16)
翰 <ɣan> (許 32) 安 <⊙an> (許 6, 敵烈 18)

The Chinese words transliterated by YZ 7 all contain a vowel [i].

YZ 7 *i, independently

妃 <fi> (故 12, 仲 27) 積 <tsi> (高十 15)
祭 <tsi> (宣 2, 道 2) 西 <si> (仲 16)
漆 <tsʰi> (故 2, 宣 10) 醴 <li> (郎 3)
禮 <li> (仲 27, 國妃 7) 李 <li> (仁先 14)
吏 <li> (高十 22) 期 <gi> (郎 5)
室 <ʃi> (仲 16) 宜 <ŋi> (宗教 11, 仁先 14)
儀 <ŋi> (仲 21, 弘用 2) 懿 <⊙i> (仁 1)

使 <ʃi> (高十 20) 師 <ʃi> (故 6)
密 <muj> (許 13) 德 <tɨj> (故 5, 許 7)

YZ 7 *i, after YZ 35 *aj and YZ 77 *uj for Chinese Vj

大 <daj> (仲 21, 敵烈 4) 袋 <daj> (大山 22)
尉 <⊙uj> (道 2)

YZ 7 *i, in front of YZ 5 *iŋ

聖 <ʃiŋ> (許 46) 慶 <kʰiŋ> (奴誌 12)
興 <hʲiŋ> (故 8, 叔祖 24)

YZ 7 *i, in front of YZ 47 *im

瀋 <ʃim> (高十 22)

YZ 7 *i, in V1V2 (V1 = V2) as V1 and as V2

帝 <ti> (弘用 7) 齊 <zi> (國妃 4)
騎 <gi> (仲 19) 懿 <⊙i> (宣 1, 故 4)

According to the hP'ags-pa spellings, the phonetic value of YZ 7 is quite clear. It is either used as the nucleus [i] or as the off-glide of a diphthong. But unlike what is indicated in the hP'ags-pa spellings, in the Khitan transliteration YZ 7 in both 尉 (道 2), 大 (仲 21), and 袋 (大山 22) represents a vowel. The duplicated spelling of YZ 7 clearly indicates a long vowel. Thus, on the other hand, this spelling also indicates that YZ 7 itself represents a short vowel. It should be noted here that 密 (許 11,13) appears as a single vowel instead of a diphthong as indicated in hP'ags-pa spellings, thus the *chongniu* contrast as observed in the MGZY (Shen 2005b) is not shown in the Khitan spelling.

YZ 81 is a rarely used graph. It represents a long [i:], because YZ 81 is never duplicated and never used after any vowel YZ or in front of any YZ for VCn (vowel + nasal coda). The alternative spellings of the Chinese word 騎, with one YZ 81 (仲 21) and two of YZ 7 (仲 19), also indicate that YZ 81 must be a long vowel [i:].

YZ 81 *i:, independently

騎 <gi> (道 2, 叔祖 2)

The phonetic value of a pair of graphically related graphs, YZ 28 and YZ 55, can be established as [u] according to the hP'ags-pa spellings. [9]

[9] Because of their graphic and phonetic similarity these two YZ graphs can be misidentified. The YZ for the Chinese word 武 in the 27th line of the *Epitaph of Xiao Zhonggong* is identified differently in the QXY. In the Table of Phonetic Reconstruction (p. 101) and the Table of Decipherment (p. 122) this YZ is identified as YZ 55 but in the YZ index it is identified as YZ 28 (p. 712). Ji Shi (1996: 122) and Chinggeltai (2002: 141) both identify it as YZ 28.

YZ 28 *u, independently

步		<bu>	(高十 18)	部		<bu>	(許 49, 迪烈 19)
副		<fu>	(仁先 9)	武		<ʋu>	(宣 2, 迪烈 18)
富		<fuw>	(仁先 6)	傅		<fu>	(仲 23, 仁先 37)
都		<tu>	(高十 16)	五		<u>	(敵烈 19)
奴		<nu>	(奴誌 4, 仁先 1)	吴		<u>	(故 17, 仁先 22)
吾		<u>	(許 12)	魚		<⊙y>	(大山 22)
户		<ɦu>	(高十 22)	道		<daw>	(道 5, 故 10)
保		<paw>	(許 29)				

YZ 28 *u, after diphthong YZs 33, 32, 31, and 25 for Vw

洛		<law>	(許 1, 奴誌 21)	略		<lew>	(郎 1)
少		<ʃew>	(敵烈 19)*	藥		<jew>	(迪烈 31)
少		<ʃew>	(仲 20, 大山 22)*	壽		<ʒiw>	(許 47, 叔祖 1)
游		<jiw>	(道 6)	右		<ŋiw>	(仲 21, 叔祖 2)

*different spellings

YZ 28 *u, after YZ 28 *u

部		<bu>	(奴誌 13)

YZ 28 *u, in front of YZ 116 *ɔn

觀		<kon>	(博州 19)

YZ 28 *u, in fron of YZ 16 *uŋ

用		<jyŋ>	(弘用 9)

YZ 55 *u, independently

僕		<bu>	(叔祖 2)

祿		<lu>	(道 2, 澤州 1)

YZ 55 *u, after YZ 67 *u:

蜀		<ʒy>	(智先 6)

YZ 28 and 55 appear like allographs, however 28 and 55 are used to transcribe different Chinese words and they are distinct YZ graphs.[10] YZ 55 is used to transcribe Chinese words 僕 and 祿, and is used after YZ 67 to transcribe the Chinese word 蜀. All three are MC *ru* syllables with a –k coda. It is likely that YZ 28 is used to transcribe a phonological feature of these three words. Whether YZ 55 indicates a consonant coda or a tonal feature needs to be further studied.

While all the transliterations are for Chinese [u] or its homorganic off-glide [w],

[10] It should be noted that these two variations can appear in one syllable, with YZ 28 as the nucleus and YZ 55 as the coda for the Chinese character 固. This transliteration requires special attention because it is the given name of 耶律固, who was a member of the imperial Academy of Liao. Many 12th century epitaph essays were composed by him. Since his name appeared consistently in the spelling a number of times, it seems that YZ 28 and YZ 55 are related but distinctive graphs.

the transliterations of words 保 and 道 seem to cause some problems. YZ 28 represents the nucleus [u]. We will show later in the discussion of initial consonants that the YZ graphs involved in these two transliterations actually represent a unit of CV, and the V is a low vowel.

YZ 71 represents a long [u:], because YZ 71, like YZ 81, is never duplicated and never used after any vowel YZ or in front of any YZ for Vn. An important fact is that all the Chinese words transliterated by YZ 71, except the *ru* tone word 蜀, are *shang* tone syllables in the MC system. The *ru* word 蜀 is also a *shang* syllable in modern Mandarin. Thus this tonal category must be the reason a long vowel is used to indicate the longer vowel in the *shang* syllables.

YZ 71 *u:, independently

武		<wu>	(仁先 14)	祖		<tsu>	(故 4, 仁先 2)
魯		<lu>	(仲 23)	楚		<tʃʰu>	(仁先 2)
蜀		<ʒy>	(仁先 2)				

Another YZ used to transliterate vowel [u] is YZ 67. The short [u] and the long [u:] have been assigned to YZs 28/55 and 71 respectively. Like YZ 71, YZ 67 clearly is not a variant of YZ 71. Below are the examples.

YZ 67 *uhu/u:, independently

部		<bu>	(仲 27)	輔		<vu>	(博州 46)
度		<du>	(迪烈 12, 高十 18)	蜀		<ʒy>	(智先 5)
户		<ɦu>	(高十 22, 博州 45)				

YZ 67 *uhu/u:, in front of YZ 55 *u

蜀		<ʒy>	(智先 6)

The phonetic value of YZ 67 can be learned from the Chinese transliterations of the Khitan proper names. In the *Epitaph of Yelü Dilie* a Khitan personal name is transliterated in Chinese characters 蒲古只 (迪烈 4). The first two syllables 蒲古 transliterate the sounds represented by YZ 50 and YZ 67. YZ 50 is [pʰ]. So the phonetic value of YZ 67 must be [uku]. In the intervocalic position the lax stop could reduce to a fricative, so YZ 67 can be [uhu] also. In the *Epitaph of Yelü Yongning*, a Khitanized Chinese word 都護 is spelled with YZ 60 [ta] and YZ 67. Clearly in this case, YZ 67 must represent [uhu]. So, YZ 67 is likely originally [uku]. The intervocalic [k] could reduce to a fricative [h], and further to nothing. As a result it becomes a long [u] (uku > ugu > uɦu > uu). The fact that the Chinese word 蜀 is transliterated by both YZ 71 (仁先 2) and 67 (宗教 5, 智先 5) also indicates the phonetic similarity of these two YZ graphs.

YZ 78 represents vowel [ɔ]. There are four words that are transliterated by this

graph. According to the hP'ags-pa spellings, the nucleus is [o] for 左, [u] for 率, and [waw] for 涿. Graphs 28 and 55 are used to transliterate [u], so this YZ is for [o]. In the MGZY, the Chinese word 率, a *ru* syllable, is homophonous to 縮, which is pronounced as [suo] in modern Mandarin. Thus, it is possible that for this *ru* word the MGZY's spelling reflects a different Chinese dialect. In the Chinese dialect the Khitan script transliterated, 率 and 縮 were pronounced with a lower vowel than [u] as in modern Mandarin. In line 20 of the *Epitaph of Zezhou Cishi* a Chinese word was interpreted as a transliteration of the Chinese word 澤 (Wang 1999). But this is likely to be a mistake. If it were 澤, this word would be transliterated with the YZ for [ɛj], because in the MGZY 澤, a division-Ⅱ *ru* syllable of the *Geng* 梗 rhyme group, is spelled as <dʒaj>. We interpret it as a transliteration for 涿 of the place name 涿州 Zhuozhou, which belongs to the Xijin Fu 析津府 of the Liao capital Nanjing 南京 (nowadays Beijing). The final of word 涿, a division-Ⅱ *ru* syllable of the *Jiang* 江 rhyme group, is [waw] in the hP'ags-pa spelling. In the Khitan script, it is transliterated as [ɔ], a phonetic average of [w], [a], and [w]. This decipherment can be firmly supported by the Chinese word 郭 as seen in the newly published *Epitaph of Hanshi* (Liu and Qinggele 2005). 郭 is a MC division-I *hekou ru* syllable of the *Dang* 宕 rhyme group. The hP'ags-pa spelling of its final is [waw], which is the same as that of 涿. With these three different pronunciations and the reasons presented, there is no other possible way but to interpret this YZ as [ɔ].

YZ 78 *ɔ, independently

左		<tso>	(許 3, 奴誌 13)	率		<ʃu>	(許 3, 奴誌 11)
涿		<tʃwaw>	(澤州 20)	郭		<kwaw>	(韓氏 8)

YZ 78 *ɔ, in front of YZ 116 *ɔn

觀		<kon>	(博州 19)	管		<kon>	(仲 33)

Now the four basic vowels have been established. Each of the vowels, long or short, is represented by a single YZ graph. In the following we examine the fronted vowels [ɛ, y, œ].

YZ 66 is for a front vowel [ɛ] or a fronted [a] according to the Mongolic phonology. This YZ is likely to transliterate the Chinese [jɛ], a glide and a nucleus, which appear as a single vowel in the hP'ags-pa spelling.

YZ 66 *ɛ, independently

節		<tsɛ>	(許 11, 叔祖 2)	射		<je>[11]	(故 2, 叔祖 2)

[11] The Chinese character 射 is in the missing pages of the MGZY. Here we follow the emendation by Ning (1997).

YZ 66 *ɛ, in front of VN YZ 57 *ɛm and ZY 24 *ɛn

點		<tem>	(仁先 9, 敵烈 20)	檢		<kem>	(令 6, 迪烈 1)
兼		<kɛm>	(許 1, 叔祖 2)	殿		<den>	(許 3, 叔祖 2)
練		<len>	(仲 7, 智先 10)	千		<tsʰɛn>	(宗教 21, 弘用 8)
前		<dzen>	(仲 20, 仁先 19)	錢		<dzen>	(迪烈 19)
燕		<jɛn>	(仁先 5, 叔祖 13)	仙		<sɛn>	(道 6)
顯		<hɛn>	(敵烈 21)	延		<jen>	(奴誌 12, 國妃 10)

In the MGZY the contrast between vowels [ɛ] and [e] is not really a phonological distinction (Shen 2000). They can be both transliterated as [ɛ] for the purpose of Khitan reconstruction here.

Based on the phonetic value of the hP'ags-pa spellings, YZ 11 is a rounded high front vowel [y], a front counterpart of [u]. Below are the examples.

YZ 11 *y, independently

主		<tʃy>	(仲 4, 大山 1)	樞		<tʃʰy>	(許 12, 迪烈 20)
書		<ʃy>	(仲 22, 迪烈 1)	署		<ʒy>	(許 9, 宗教 12)
如		<ry>	(大山 14)	乳		<ry>	(敵烈 17)
車		<ky>	(博州 22)	御		<⊙y>	(道 2, 宗教 10)
許		<hy>	(許 2, 仁先 26)	禦		<⊙y>	(叔祖 2, 迪烈 18)

YZ 11 *y, in front of YZ 46 *yn

郡		<gyn>	(博州 5)

YZ 11 *y, in front of YZ 5 *iŋ

永		<⊙yŋ>	(大山 9)

YZ 11 *y, in front of YZ 16 *uŋ

宮		<kyŋ>	(迪烈 13)

YZ 11 *y, in front of YZ 37 *əŋ

永		<⊙yŋ>	(迪烈 16)

Others propose [iu] as the phonetic value for this graph (e.g. Chinggeltai *et al.* 1985). Based on the phonotactics of Khitan, there is no other choice but to interpret it as [y].[12] YZ 11 is a short vowel, because it can be duplicated in spelling as seen in the *Epitaph of Yelü Dilie* (迪烈 28). There is no other YZ used to transcribe the same phonetic value, so the length of this YZ cannot be determined. But it is likely to be a short [y] because it can be used in front of another YZ graph.

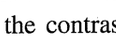
YZ 42 and its graphical variation, YZ 91, represent a short [œ], the front counterpart of [ɔ]. The phonetic value of YZ 89 should be a long [œ:], because it is used to transliterate the same Chinese words but only appears in front of YZ 72, which is a simple nasal consonant [n]. In contrast, YZ 42 can appear in front of YZ graphs for [ɛn] and [œn], as well as YZ 72.

[12] In the *Epitaph of Yelü-dilie*, a syllable spelled with YZ 21 and YZ 11 (迪烈 1) is interpreted as 魯 (Lu and Zhou 2000). But this syllable cannot be 魯, because the initial is [tʃi] and the whole syllable should be [tʃy]. 魯 is a MC division-I word and should not have a high vowel [y].

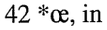
		YZ 24 [ɛn]	YZ 43 [œn]	YZ 72 [n]
YZ 42	[œ]	+	+	+
YZ 89	[œ:]	-	-	+

Since it is not likely that two YZ graphs are used for the exact phonetic value, we interpret the contrast between YZ 42 and YZ 89 as a length contrast. Below are the examples.

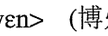
YZ 42 *œ, in front of YZs 24 *ɛn, 43 *œn, and 72 *-n

宣		<swɛn>	(仲 19, 奴誌 26)	權		<gwɛn>	(大山 22)
遠		<⊙wɛn>	(博州 22)	院		<⊙wɛn>	(道 2)
元*		<⊙wɛn>	(故 17)	元*		<⊙wɛn>	(仲 18)
元*		<⊙wɛn>	(仁先 25)				

YZ 91 *œ, independently

月		<⊙wɛ>	(故 7)	越		<⊙wɛ>	(仲 5)

YZ 89 *œ:, in front of YZ 72 *-n

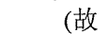
院		<⊙wɛn>	(許 11, 奴誌 15)	元		<⊙wɛn>	(故 12)

*The three transliterations for the Chinese word 元 have different YZ graphs after YZ 42.

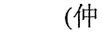
The hP'ags-pa spelling <wɛ> is likely to transliterate a medial and a nucleus in Chinese. However, in the Khitan phonology medial does not exist. The medial [w] should be a rounded feature. A rounded counterpart of [ɛ] is [œ].

YZ 58 and 59 are a pair of allographs, which are used for transliterating Chinese apical vowels only. YZ 59 is basically seen in the *Epitaph of Xiao Zhonggong* and is used to transliterate the same words YZ 58 transliterates, e.g. 子, 事, 侍. As we know, in the hP'ags-pa spellings schwa and apical vowels are actually spelled the same as <hi> and should be interpreted as a central high vowel (Shen 2001). So, here we treat YZ 58 and YZ 59 as a central high vowel [ɨ], a back counterpart of [i], in our reconstruction.

YZ 58 *ɨ, independently

紫		<tsɨ>	(故 2, 澤州 1)	子		<tsɨ>	(許 3, 叔祖 2)
事		<dʒɨ>	(叔祖 2, 國妃 2)	侍		<ʒi>	(許 6)
使		<ʃɨ>	(仲 8, 叔祖 2)	日		<ri>	(永寧 13)

YZ 59 *ɨ, independently

子		<tsɨ>	(仲 20)	侍		<ʒi>	(仲 27)
事		<dʒɨ>	(仲 22)				

The majority of the Chinese words have a central high vowel [ɨ] according to the

hP'ags-pa spellings in the MGZY. The exceptions are the words 侍 and 日. According to the *Zhongyuan Yinyun*, 侍 has changed to the *Zhi-Si* 支思 rhyme group but 日 has not changed yet. Thus, the phonetic value of this pair of YZ graphs represents high central vowel [ɨ] and they are used to transliterate Chinese apical vowels.

These eight monophthong nuclei form a very balanced vowel system, as follows.

	Front		Back				
High	i, y	ɨ	u				
Low	ɛ, œ	a	ɔ				
*a	*i	*u	*ɛ	*ɔ	*œ	*y	*ɨ
(39)	(7)	(28/55)	(66)	(78)	(42/91)	(11)	(58/59)
馬	期	武	節	左	越	許	子

These phonetic values should be quite reliable for several reasons. First, these are the only YZ graphs used to transliterate the monophthongs in Chinese. Second, each vowel is represented by one YZ. YZ 58/59 are simply graphic variations. Third, these eight vowels form a typical Mongolic vowel system.

The contrast of vowel length is clearly present in the Khitan script. YZs 81 and 71 actually indicate long vowels [i:] and [u:] respectively. The spelling behavior of YZ 89 also indicates it is a long vowel [œ:].

a	i	u	ɛ	ɔ	œ	y	ɨ
--	*i:	*u:	--	--	*œ:	--	--
	(81)	(71)			(89)		
	騎	祖			院		

7.2 The transliteration of Chinese diphthongs

The Chinese diphthongs are transliterated in two different ways in the Lesser Script. The diphthongs can be transliterated by one YZ graph or a combination of two YZ graphs. We have shown above that if two YZ graphs are used, the first one represents a diphthong and the second one represents a short vowel that is homorganic to the Chinese coda. For example, 洛 is transliterated by three YZ graphs, 14 + 31 + 28 (*l+*aw+*u).

7.2.1 The Chinese diphthongs with coda -j

A number of YZ graphs are used to interpret Chinese diphthongs with a palatal glide (Vj). The Chinese diphthong [aj] is transliterated by YZ 35.

YZ 35 *aj, independently

牌		<baj>	(迪烈 15, 智先 2)	採		<tsʰaj>	(迪烈 8, 弘用 3)
大		<daj>	(許 11, 叔祖 2)	開		<kaj>	(仲 5, 叔祖 2)

YZ 35 *aj, in front of YZ 7 *i
大  <daj> (仲 21, 敵烈 4)　　袋  <daj> (大山 22)

Based on the hP'ags-pa spellings, YZ 35 is unquestionably used for transliterating Chinese diphthong [aj].

YZ 19 and 77 are allographs. YZ 77 has and YZ 19 does not have a dot. These two YZ are used interchangeably. For example, 衛, 隋, 尉, and 水 are transliterated either with YZ 19 or YZ 77. That these two YZ are used to transliterate diphthong [uj] can also be easily established. Below are the examples.

YZ 19 *uj, independently
内  <nuj> (令 7, 宗教 14)　　隋 <zuj> (智先 6)
水  <ʃuj> (故 2, 國妃 2)　　徽  <hyj> (仲 19, 宗教 13)
圭  <kyj> (郎 5)　　國  <kuj> (許 5, 智先 5)
衛  <Ouj> (許 12, 奴誌 13)　　尉  <Ouj> (令 6)
魏 <Ouj> (弘用 17, 國妃 4)
YZ 77 *uj, independently
隋  <zuj> (智先 5)　　水 <ʃuj> (許 24, 迪烈 1)
徽 <hyj> (仲 19)　　衛 <Ouj> (仲 20, 迪烈 21)
尉  <Ouj> (許 49, 迪烈 31)
YZ 77 *uj, in front of YZ 7 *i
尉  <Ouj> (道 2)　　衛  <Ouj> (宗教 21)
魏  <Ouj> (弘用 17)
YZ 77 *uj, in front of YZ 81 *i:
尉  <Ouj> (道 2)

All the hP'ags-pa spellings are [uj] or [yj], with [u] or [y] as the nucleus and [j] as the coda. According to hP'ags-pa spellings there is no reason to reconstruct [uei] for this YZ in the Khitan phonology.

YZ 98 is used to transliterate Chinese words with final [waj]. But for the Khitan phonology, this YZ should be interpreted as [ɔj] (w > [+back], wa > ɔ) to fit the syllable structure of Khitan. The labial glide [w] becomes the rounded phonological feature of the following vowel.

YZ 98 *ɔj, independently
帥  <ʃwaj> (仲 18, 仁先 25)

This is the only example of YZ 98 found in all the Chinese transliterations. Although this phonetic value fills a phonological gap in the Khitan phonology, it should be further confirmed with new evidence.

There is a pair of graphically related YZ, 84 and 85, for transliterating diphthongs.
YZ 84 *ɛj, independently
册  <tʃʰaj> (道蓋, 叔祖 1)
YZ 85 *ɛj, independently
伯  <paj> (故 2, 博州 22)　　帛  <baj> (迪烈 19)
客 <kʰʲaj> (許 3)

The phonetic value of the hP'ags-pa spellings is unanimously [aj]. However, it should be different from the value [aj] that YZ 35 transliterates. Here are the reasons. YZ 84 and 85 are used to transliterate *ru* syllables only. Furthermore, all these *ru* syllables belong to MC division-Ⅱ rhymes of the *Geng* 梗 rhyme group. Based on the hP'ags-pa transliteration, we argued (Shen 2005c) that the [aj] of these words is the result of a sequence of changes (*ɛk >*ɛj >aj). Thus, the phonetic value of YZ 84 and 85 should be [ɛj] in the Khitan phonology, one step before the MGZY form. However, the phonetic values of these two YZ graphs should be further confirmed.

YZ 63 has two functions. The same YZ is used to represent an initial or to represent a final in the transliteration of Chinese words. Below are the examples for transliterating finals.

YZ 63 *əj, independently
特  <dɨj> (仲 21, 迪烈 11)　　德  <tɨj> (仲 36, 迪烈 6)
開  <kʰaj> (迪烈 1)

When YZ 63 is used to transliterate a Chinese initial, it transliterates a palatal semivowel [j]. According to hP'ags-pa spellings, these two words are both *ru* syllables. This YZ is likely used to approximate the value of [əj]. (Nucleus vowels [ə] and [ɨ] are allophones in Sino-Khitan. [ə] appears in front of a coda (-j, -w, -n, -m, -ŋ) and [ɨ] appears at the end of a syllable.) A parallel case is that the velar nasal initial is transliterated by YZ 37. The same YZ is also used to transliterate final [əŋ]. The additional schwa is added for naming the letters; YZ 63 for [j] was likely pronounced as [əj], and YZ 37 for [ŋ] was likely pronounced [əŋ]. And when these graphs were used to transliterate finals, they were naturally used to transliterate the Chinese finals with schwa [ə] as the nucleus.[13] But this schwa is deleted when the nucleus vowel is already indicated by a preceding YZ graph. The Chinese word 開 in the *Epitaph of Yelü-Dilie* (迪烈 1) is a very good example. It is transliterated with YZ 34 [kʰa] and YZ 63 [əj] and the schwa [ə] is deleted after the vowel [a].

[13] Modern Mandarin speakers pronounce English letter *n* as [ən].

The phonetic values of five diphthongs with coda [j] are reconstructed as follows. These reconstructions can be compared with the monophthongs that have been already reconstructed.

a	i	u	ɛ	ɔ	œ	y	ɨ/ə
*aj	--	*uj	*ɛj	*ɔj	*œj	--	*əj
(35)		(19/77)	(84/85)	(98)	(92/93)		(63)
大		水	册	帥	越		特

There are three phonological gaps. The lack of diphthongs with high front vowels [i] and [y] is easy to understand. Thus, the [œj] is the only gap which requires explanation. This gap can actually be filled with a pair of allographs, although the phonetic value of them is not as certain as other graphs. YZ 92 and 93 are graphically related in the same relationship as pairs 58/59 and 16/20, with two dots in one graph and a horizontal stroke in the other. Both are used along with YZ 91 to transliterate the Chinese word 越 in 越國.

YZ 92 *œj, after graph 91 *œ
越 <jwɛ> (許 50, 仲 5)
YZ 93 *œj, after graph 91 for *œ
越 <jwɛ> (仲 27)

The hP'ags-pa spelling does not indicate that it is a diphthong. But since YZ 91 clearly represents [œ], these two YZ must be similar but different from the phonetic value of YZ 91. The only way to distinguish YZ 92 and 93 from YZ 91 is to render it into a diphthong [œj].

7.2.2 The Chinese diphthongs with coda [w]

The Chinese diphthong [aw] is transliterated by YZ 31. Below are the examples.

YZ 31 *aw, independently

曹		<dzaw>	(仲 23)	誥		<kaw>	(仁先 11)
高		<kaw>	(智先 14, 國妃 4)	姚		<jew>	(仁先 35)
宥		<ŋiw>	(郎 5)				

YZ 31 *aw, in front of YZ 28 *u

洛		<law>	(許 1, 奴誌 21)	藥		<jew>	(迪烈 31)
少		<ʃew>	(敵烈 19)				

Of the examples above, two words need explanations. According to the hP'ags-pa spelling, 少 and 姚 are spelled with [ew]. But it is a common phenomenon in the Khitan transliteration that after palatal initials, but not after other initials, the *hongyin*

洪音 (without glide [j]) and *xiyin* 細音 (with glide [j]) contrast in the Chinese phonology is often not very well distinguished. There are quite a few cases like this one. For example, 聖 is transliterate as both *hongyin* (令 14, 故 4, 8) and *xiyin* (道 13, 宗教 5). This alternation appears only after palatal initials; this confusion is therefore caused by the phonetic nature of the palatals. A palatal initial contains an intrinsic palatal glide. The *hongyin* and *xiyin* distinction in Chinese is thus sometimes not distinguished in the Lesser Script. Further examination shows that this is a cross-board phenomenon for other pairs of *hong/xi* finals. So, this phenomenon should not be explained as the result of sound change, as what is observed in the standard Modern Mandarin today (j > [+front], jaw > ɛw). All the syllables belong to MC *Xiao* 效 rhyme group. The Chinese word 宥, a MC *Liu* 流 rhyme group syllable, is the only exception.

YZ 25 is used to transliterate [jaw] in Chinese. For the reason stated already it should be reconstructed as [ɛw]. The palatal glide [j] is interpreted as a front phonological feature of the following vowel.

YZ 25 *ɛw, independently

驃		<bew>	(仲 19)	廟		<mew>	(興 32)
詔		<tʃew>	(故 16)	昭		<tʃew>	(許 7)
朝		<tʃew>	(大山 22)	小		<sɛw>	(仲 7, 智先 9)
校		<kjaw>	(令 2, 韓氏 2)				

YZ 25 *ɛw, in front of YZ 28 *u

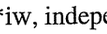
少		<ʃew>	(仲 20, 大山 22)	略		<lew>	(郎 1)
趙		<dʒew>	(國妃 9)	堯		<jew>	(智先 3)

The phonetic values of the hP'ags-pa spellings are [ew] and [ɛw]. Since the difference between these two hP'ags-pa spellings is not really distinctive in the MGZY phonology, both can be interpreted as the same [ɛw]. The hP'ags-pa spelling of the Chinese word 校, a division-II syllable, is <kʲaw>, which is in contrast with division-III and division-IV words with [ɛw] or [ew] in the MGZY. So, this spelling suggests that this contrast is not made in the transliteration of the Khitan Lesser Script. All the syllables are from the non-division-I rhymes of MC *Xiao* 效 rhyme group.

The relationship between YZ 33 [əw] and YZ 32 [iw] is parallel to the one between YZ 31 [aw] and YZ 25 [ɛw]. YZ 33 is used to transliterate the *hongyin* and YZ 32 the *xiyin*. Below are the examples.

YZ 33 *əw, independently

婁		<liw>	(仲 16)	州		<tʃiw>	(仲 17, 叔祖 2)
周		<tʃiw>	(叔祖 23)	守		<ʃiw>	(令 11, 迪烈 33)

吼  <hiw> (迪烈 8) 叔  <ʃy> (仁先 27, 迪烈 17)
YZ 33 *əw, in front of YZ 28 for *u
壽  <ʒiw> (許 47, 叔祖 1) 右  <ŋiw> (故 2, 叔祖 2)
YZ 32 *iw, independently
修  <siw> (仲 23) 酒  <tsiw> (道 2, 宣 2)
留  <liw> (仲 5, 迪烈 33) 九  <kiw> (智先 14, 國妃 4)
牛  <ŋiw> (宗教 21, 弘用 8) 六  <ly> (仁先 27)
YZ 32 *iw, in front of YZ 28 *u
游  <jiw> (道 6)
YZ 32 *iw, in front of YZ 16 *uŋ
宮  <kyŋ> (郎 2, 迪烈 19)

The hP'ags-pa spellings indicate that YZ 33 is used to transliterate [iw] after palatal initials [tʃ, ʃ] and [əw] after lateral initial [l-]. The Chinese word 右 (叔祖 2) is transliterated as initial [j-] plus final [əw], which is followed by YZ 28 [u].

YZ 32 is unambiguously for [iw]. In the word 游, YZ 32 is followed by YZ 28 [u]. An interesting example here is the transliteration for 宮, a diphthong [iw] followed by a YZ for [uŋ]. YZ 32 represents a nucleus and a coda, and this VCo unit in this word is combined with another VCo. So, the GV part, [-ju-], of the word 宮 [kjuŋ] sounded like [iw], a VCo, to the Khitans. It should be noted that the *ru* words 叔 and 六 interestingly appear in a diphthong form. 叔 and 六 are both division-III *ru* syllables of MC *Dong* 東 rhyme. Their transliterations actually indicate the same phonological change as observed in the *Zhongyuan Yinyun* (see Shen 2005 for more details).

YZ X1 *əw
淑  <ʃy> (弘用 2)

YZ X1 is an allograph of YZ 33. It appeared only once in the *Epitaph of Yelü Hongyong*. Another allograph is seen in the *Epitaph of Yelü Hongben* and *Epitaph of Yelü Hongben's Wife* for the Chinese word 叔 (叔祖 1, 4; 國妃 7).

The diphthongs with coda [w] can be summarized as follows.

a	i	u	ɛ	ɔ	œ	y	ɨ/ə
*aw	*iw	--	*ɛw	--	--	--	*əw
(31)	(32)		(25)				(33)
高	酒		小				婁

The phonological gaps are predictable from the Chinese phonology. In Chinese, rounded nuclei do not combine with coda [w].

7.3 The transliteration of Chinese finals with a nasal coda

The three nasal codas in Chinese were clearly distinguished in the transliteration. Distinctive YZ graphs, 40, 75, and 9, are used to transliterate Chinese finals [am], [an], and [aŋ] respectively. According to the hP'ags-pa spellings, they form the following minimal pairs.

YZ 40:	監		<kʲam>	YZ 9:	江		<kʲaŋ>
YZ 75:	蘭		<lan>	YZ 9:	郎		<laŋ>

Below we examine the YZ graphs used to transliterate the Chinese syllables containing these nasal codas.

7.3.1 The Chinese finals with -m

YZ 40, 47, and 57 are all used to transliterate the syllables with coda –m. Here are the examples of YZ 40.

YZ 40 *am, independently
男  <nam> (弘用 8, 大山 32)
YZ40 *am, after YZ 39 *a
三  <sam> (許 1, 弘用 4)
YZ40 *am, after YZ 88 *axa/xa
監  <kʲam> (仲 23)

In one example, YZ 40 is used independently. In the other two examples, YZ 40 is used after graphs representing vowel [a]. The hP'ags-pa spellings of these three examples indicate that YZ 40 represents [am].

YZ 47 is used for initial [m]. But it also represents [im]. Three examples are found. The Chinese phrase "一品 (仲 20)" is included in Liu's article of 2001 (p. 243) as one of the deciphered phrases. The Chinese word "品" is spelled with YZ 50 and 47. The decipherment of "品" can be confirmed by its hP'ags-pa spelling. According to the MGZY, "品" is the only Chinese word that is spelled as  <pʰim>. So the Khitan character spelled with YZ 50 *pʰ and 47 *im must be the spelling of the Chinese word "品".

YZ 47 *im, independently
品 <pʰim> (仲 20) 金 <kim> (故 2, 大山 22)
YZ 47 *im, after YZ 7 *i
瀋  <ʃim> (高十 22)

YZ 57 is used to represent [ɛm] independently or after another YZ. Below are some examples.

YZ 57 *ɛm, independently

點 <tem> (仲 20, 國妃 11) 檢 <kem> (宣 2, 叔祖 2)

YZ 57 *ɛm, after YZ 66 *ɛ

兼 <kɛm> (許 1, 叔祖 2) 點 <tem> (仁先 9, 敵烈 20)

檢 <kem> (仲 20, 迪烈 1) 監 <kʲam> (韓氏 2)

YZ 57 *ɛm, after YZ 88 *aha/ha

監 <kʲam> (故 11, 奴誌 13)

As we have mentioned earlier, the hP'ags-pa letters for [e] and [ɛ] are not phonologically contrastive after non-guttural initials. Here we use [ɛ] to represent the value of YZ 57. In two cases YZ 57 is used alone to represent the final and in three other cases it is used after a nucleus graph. The Chinese word 檢 is transliterated in both ways.

The Chinese word 監 is transliterated with either YZ 40 [am] or YZ 57 [ɛm]. According to the hP'ags-pa spellings, YZ 40 [am] more closely represents division-II syllables with guttural initials. Whether these two transliterations indicate an ongoing change will be interesting to note.

The YZ graph for [əm] is not included in the table of the QXY. But this YZ can be found in the materials published after the QXY. In 敵烈 21, there two place names, 顯州 Xianzhou and 瀋州 Shenzhou. The second one is transliterated with YZ X2.

YZ X2 *əm, independently

瀋 <ʃim> (敵烈 21)

According to the hP'ags-pa spelling, its nucleus is [i]. But we have shown that after palatal initials, [i] and [ə] are interchangeable. YZ 47 must stand for [im] and could not be [əm] because it is used after a velar stop. Also, the final of 瀋 is transliterated by YZ 48 [ən] in the *Epitaph of Xingzong Emperor* (興 36). Thus it suggests that the nucleus should be [ə] though the nasal coda is alveolar. Thus, this YZ should be the one for transliterating [əm].

The finals with coda –m can be summarized as follows.

a	i	u	ɛ	ɔ	œ	y	ɨ/ə
*am	*im	--	*ɛm	--	--	--	*əm
(40)	(47)		(57)				(X2)
監	金		兼				瀋

In comparison with the monophthongs, there are four phonological gaps. Of these four

gaps, none can exist according to the phonotactics of Chinese. Labial glide and rounded vowels do not appear in front of coda –m. Thus, [um, ɔm, œm, ym] should not exist.

7.3.2 The Chinese finals with -n

Unlike the YZ graphs for finals with coda –m, there are more graphs for finals with coda –n. All eight monophthong nuclei can have a coda –n.

The YZ graphs used to transliterate the Chinese syllables with a high vowel are discussed together below. YZ 53, 45, 48, and 46 are used to transliterate [in], [un], [ən], and [yn] respectively.

YZ 53 *in, independently

賓 <pin> (許 3) 幽 <pin> (仲 5)

愍 <min> (奴誌 12) 進 <tsin> (道 2, 仲 21)

晉 <tsin> (宗教 3) 秦 <dzin> (宗教 3, 敵烈 3)

鎮 <tʃin> (博州 5) 陳 <dʒin> (仲 5)

臣 <ʒin> (許 1) 仁 <rin> (仁 1, 叔祖 1)

斤 <kin> (大山 14) 銀 <ŋin> (道 2, 叔祖 2)

YZ 53, after YZ 7 *i

林 <lim> (許 32)

YZ 45 *un, independently

文 <wun> (道 1, 智先 3) 敦 <tun> (奴誌 12)

混 <ɣun> (許 2, 弘用 4)

YZ 48 *ən, independently

門 <mun> (許 13, 奴誌 13) 本 <pun> (叔祖 2)

陳 <dʒin> (仁 32) 臣 <ʒin> (令 6, 仁先 24)

申 <ʃin> (迪烈 33) 神 <dʒin> (興 2)

瀋 <ʃim> (興 36)

YZ 46 *yn, independently

春 <tʃʰyn> (仁先 6) 順 <dʒyn> (仲 3)

舜 <dʒyn> (智先 3) 郡 <gyn> (許 36, 迪烈 1)

軍 <kyn> (許 11, 迪烈 1) 運 <ʘwin> (迪烈 17)

雲 <ʘwin> (叔祖 2)

YZ 46 *yn, after YZ 11 *y

郡 <gyn> (博州 5)

YZ 53, 45, and 46 can be interpreted as [in], [un], and [yn] with certainty. The interpretation of YZ 48 should be discussed. Actually, none of the hP'ags-pa spellings is [ən]; one is for [un] and the other is for [in]. But the hP'ags-pa [un] spelling can be interpreted as a variation of [ən] after labial initials in words 門 and 本. We also have

pointed out above that in the Khitan script after palatals, [in] and [ən] are interchangeable. So, although the hP'ags-pa spellings do not show [ən], the spellings [in] and [un] actually firmly indicate that YZ 48 must be [ən]. Two examples, 林 (許 32) and 瀋 (興 36), show a rare confusion of the nasal coda.

The graphs for transliterating non-high vowels also should be discussed together. A pair of graphically related YZ, 75 and 76, is used to transliterate the following Chinese words.

YZ 75 *an, independently

檀		<dan>	(國妃 10)	韓		<ɦan>	(仲 21, 敵烈 5)

YZ 75 *an, after YZ 39 *a

蘭		<lan>	(仲 21, 國妃 4)	散		<lan>	(大山 22)
山		<ʃan>	(郎 2, 大山 1)	翰		<ɦan>	(許 32)
乾		<gan>	(宗教 16)	安		<⊙an>	(許 6, 迪烈 18)
判		<p^hɔn>	(仁先 25)				

YZ 76 *an, after YZ 39 *a

蘭		<lan>	(許 9)

Both graphs 75 and 76 are used to transliterate the same word, 蘭, so they are just graphic variations. In all the instances YZ 39 appears in front of these two graphs. So, YZ 39 clearly indicates that the nucleus of these two graphs is [a].

YZ 24 clearly stands for [ɛn]. Below are the examples.

YZ 24 *ɛn, independently (only after YZ 23 *xɛ)

乾		<gɛn>	(郎 2)	縣		<γ^jwɛn>	(故 2, 叔祖 2)
玄		<γ^jwɛn>	(智先 5, 仁先 2)				

YZ 24 *ɛn, after YZ 66 *ɛ

殿		<dɛn>	(許 3, 叔祖 2)	練		<lɛn>	(仲 7, 智先 10)
千		<ts^hɛn>	(宗教 21, 弘用 8)	前		<dzɛn>	(仲 20, 仁先 19)
錢		<dzɛn>	(迪烈 19)	仙		<sɛn>	(道 6)
先		<sɛn>	(仁先 19)	顯		<hɛn>	(敵烈 21)
燕		<jɛn>	(仁先 5, 叔祖 13)	延		<jɛn>	(奴誌 12, 國妃 10)

YZ 24 *ɛn, after YZ 42 *œ

院		<⊙wɛn>	(道 2)	遠		<⊙wɛn>	(博州 22)

When YZ 24 is used alone, it always appears after YZ 23 [xɛ]. In fact, YZ 24 often appears after a vowel, either after [ɛ] or [œ]. Thus it seems that Chinese final [jɛ] is strongly perceived as a long vowel. YZ 24 transliterates both *kaikou* and *hekou* words. Since the Chinese labial glide in the *hekou* syllables is not transliterated, finals [wɛn] and [ɛn] are not distinguished. This phenomenon seems to indicate the Khitan

language did not have the labial glide in its sound inventory. When YZ 24 is used after another YZ graph, the *kaihe* is indicated by that YZ graph: YZ 66 [ɛ] for *kaikou* syllables and after YZ 42 [œ] for *hekou* syllables.

Two YZ graphs are used to transliterate the Chinese words with rounded nuclei only. They are YZ 43 and 72. Below are the examples.

YZ 43 *œn, after YZ 42 *œ

宣		<swɛn>	(宣 1, 奴誌 26)	轉		<tʃwɛn>	(迪烈 17)
權		<gwɛn>	(大山 22)	元		<⊙wɛn>	(仲 18)

YZ 72 *-n, independently

觀		<kon>	(仲 8, 迪烈 18)	官		<kon>	(迪烈 23)
院		<⊙wɛn>	(仲 19, 迪烈 20)				

YZ 72 *-n, after YZ 42 *œ:

元		<⊙wɛn>	(故 17)

YZ 72 *-n, after YZ 89 *œ

元		<⊙wɛn>	(故 12)

YZ 43 is likely used to transliterate [œn]. In transliterating the Chinese word 元, YZ 43 and YZ 72 are used interchangeably. But it cannot be concluded that these two graphs have similar phonetic values. It is a clear fact that YZ 72 is also used to transliterate an alveolar nasal initial. So YZ 72 thus only represents the nasal coda.

元 transliterated with YZ 43: *ŋ + *œ + *œn
元 transliterated with YZ 72: *ŋ + *œ + *n

When YZ 72 is used independently, it also only represents the nasal coda, and the nucleus is transliterated by the YZ in front of it.

The possible candidate for [ɔn] is the YZ graph used for the Chinese character 團. In the QXY this YZ graph is not included in the reconstruction table. 團 is spelled as  <dɔn> in the hP'ags-pa script. Its phonetic value can be confirmed with the transliterations of Chinese words 亂 (仁先 62), 觀 (宗教 19), and 管 (仲 33). These transliterations are very valuable examples to validate the phonetic value of YZ 116[14]. In the hP'ags-pa spellings all four words are spelled with the vowel letter for [o].

YZ 116 *ɔn, independently

團		<don>	(仲 7, 智先 10)

YZ 116 *ɔn, after a YZ

團		<don>	(壁畫)*	亂		<lon>	(仁先 62)
觀		<kon>	(博州 19)	管		<kon>	(仲 33)

[14] YZ 116 is included in the Third Table of the Reconstruction of the Phonetic Values of the Khitan *Yuanzi* Graphs (p. 146) instead of the First Table of the QXY.

*團 of the Khitan name *Ton-shi* (團石, *Yelü Tuanshi*) is found in the fresco of the tomb passage in the Qing Ling (Wang 1984).

Many of the YZ graphs in this group, such as YZ 75/76, 53, 45, 43, and 48, are genitive markers of the Khitan language (Chinggeltai *et al.* 1985). Thus, based on the vowel harmony, which is obviously demonstrated in the Khitan materials, the phonetic value of YZ 116 can be further confirmed. When YZ 116 [ɔn] is used as a possessive marker, it appears after YZ 17 in the transliteration for the Chinese word 王. Since the phonetic value of the YZ for 王 is [ɔŋ], the phonetic value of YZ S2, as its suffix, should be [ɔn] too, harmonic to [ɔŋ].

The syllables with coda [–n] can be summarized as follows.

a	i	u	ɛ	ɔ	œ	y	ɨ/ə
*an	*in	*un	*ɛn	*ɔn	*œn	*yn	*ən
(75/76)	(53)	(45)	(24)	(S2)	(43)	(46)	(48)
山	臣	混	先	團	院	軍	門

7. 3. 3 The Chinese finals with -ŋ

An examination of the usage of the YZ graphs (QXY, pp. 677-794) for Chinese finals with -ŋ shows that these YZ graphs are exclusively used for transliterating Chinese words. This phenomenon thus indicates that velar nasal is not a possible coda for Khitan syllables. Here we first discuss the finals with a high nucleus vowel. YZ 5 is used to transliterate Chinese final [iŋ].

YZ 5 *iŋ, independently

兵	<piŋ>	(故 11)		平	<biŋ>	(許 13, 宗教 15)	
命	<miŋ>	(故 16)		銘	<miŋ>	(奴誌 41)	
頂	<tiŋ>	(智先 22)		定	<diŋ>	(智先 12)	
寧	<niŋ>	(許 49, 迪烈 19)		陵	<liŋ>	(郎 2, 宗教 1)	
令	<liŋ>	(令 5, 永寧 5)		領	<liŋ>	(仲 23, 弘用 9)	
清	<tsʰiŋ>	(仁先 14, 大山 1)		青	<tsʰiŋ>	(宣 2, 叔祖 2)	
靜	<dziŋ>	(許 11, 大山 32)		政	<tʃiŋ>	(令 6, 敵烈 2)	
鄭	<dʒiŋ>	(仲 23, 仁先 23)		聖	<ʃiŋ>	(道 13, 宗教 5)	
承	<ʒiŋ>	(宗教 5)		景	<kiŋ>	(令 7, 宗教 3)	
經	<kʲiŋ>	(郎 1)		京	<kiŋ>	(仲 16, 博州 16)	
卿	<kʰiŋ>	(大山 22)		興	<hʲiŋ>	(仁先 10, 迪烈 14)	
輕	<kʰʲiŋ>	(博州 22)		應	<⊙iŋ>	(郎 5, 宗教 11)	

YZ 5 *iŋ, after YZ 7 *i

聖	<ʃiŋ>	(許 46)		慶	<kʰiŋ>	(奴誌 12)	
興	<hʲiŋ>	(故 8, 叔祖 24)					

YZ 5 *iŋ, after YZ 11 *y

永	<⊙yŋ>	(大山 9)

All the hP'ags-pa spellings indicate the phonetic value of the YZ must be [iŋ]. Also, YZ 5 is only used after the YZ for high front vowels.

YZ 37 is also used to transliterate the velar nasal initial [ŋ-]. When it is used for finals it transliterates [əŋ]. Many independent usage of this YZ are for the Chinese syllables with a palatal initial. We have pointed out earlier that in the Khitan transliteration, nuclei [i] and [ə] are not really contrastive after palatal initials. The Chinese word 聖 is transliterated by both YZ 5 [iŋ] and YZ 37 [əŋ]. Since YZ 5 is clearly for [iŋ] and YZ 37 is never used to transliterate [iŋ] after non-palatal initials, YZ 37 is used to transliterate [əŋ]. YZ 37 can be interpreted as [əŋ], parallel to the reasoning for YZ 48 [ən].

YZ 37 *əŋ, independently

聖	<ʃiŋ>	(令 14)		丞	<ʒiŋ>	(仲 21)	
郷	<ʒiŋ>	(仲 22)		弘	<ɦuŋ>	(弘用 9)	
承	<ʒiŋ>	(迪烈 17)					

YZ 37 *əŋ, after YZ 11 *y

永	<⊙yŋ>	(迪烈 16)

YZ 37 *əŋ, used after YZ 74 *ɛŋ

彭	<bəŋ>	(許 47)

The transliteration of the Chinese word 永 (*y + *əŋ) is worth noting. In this rare case, the nucleus vowels of the two graphs are different; the first YZ is [y] and the second is [ə]. Commonly, the vowels represented by the two consecutive graphs show the same vowel quality. For example, 聖 is *ʃ + *I+*iŋ, and 元 is *ŋ + *œ + *œn. The spelling of 彭 is rare and it represents the only example of this spelling type.

The Chinese final [uŋ] is transliterated by more than one graph. It is quite unusual. But graphs 16 and 20 are allographs.

YZ 16 *uŋ, independently

鄧	<fuŋ>	(仲 6)		奉	<vuŋ>	(故 8, 高十 26)	
通	<tuŋ>	(道 2, 高十 23)		統	<tʰuŋ>	(許 18, 仁先 25)	
同	<tʰuŋ>	(許 2, 國妃 10)		宋	<suŋ>	(仁 8, 仁先 20)	
宗	<tsuŋ>	(令 14, 宗教 3)		中	<tʃuŋ>	(令 11, 迪烈 1)	
忠	<tʃuŋ>	(迪烈 20)		公	<kuŋ>	(令 9, 迪烈 1)	
工	<kuŋ>	(弘用 8, 高十 21)		功	<kuŋ>	(許 1, 仁先 23)	
空	<kʰuŋ>	(仁先 23)		防	<vaŋ>	(智先 10)	

YZ 16 *uŋ, after YZ 32 *iw
宮 <kyŋ> (仲 8, 迪烈 19)
YZ 16 *uŋ, after YZ 11 *y
宮 <kyŋ> (迪烈 13)
YZ 16 *uŋ, after YZ 28 *u
農 <nuŋ> (大山 22) 用 <jyŋ> (弘用 9)
YZ 20 *uŋ, independently
鄧 <fuŋ> (仲 6) 中 <tʃuŋ> (仲 22, 仁先 22)
公 <kuŋ> (仲 4) 空 <kʰuŋ> (仲 5, 仁先 23)

The final of the Chinese word 宮 is always transliterated with graphs for [uŋ] and with an additional YZ in front of it for the medial, i.e., *k+*y+*uŋ, or *k+*iw+*uŋ. Both indicate the existence of a medial. It is interesting to observe that 用 is spelled as *j+*u+*uŋ (弘用 9) but 永 is spelled as *y+*əŋ (迪烈 16). Since 用 is a *Dong* 東 rhyme syllable and 永 is a *Geng* 庚 rhyme syllable, these two words show a contrast between MC *Dong* 東 and *Geng* 梗 rhyme groups.

YZ 29 seems to transliterate a similar phonetic value as graphs 16 and 20. But in addition YZ 29 also transliterates syllables with a labial initial and a final [aŋ] as indicated by the hP'ags-pa spellings. Thus the interpretation of this YZ graph is rather difficult.

YZ 29 *u:ŋ, independently
奉 <vuŋ> (故 8) 鋒 <fuŋ> (仁先 19)
宗 <tsuŋ> (仲 2, 道 5) 宋 <suŋ> (奴誌 17, 弘用 17)
崇 <dʒuŋ> (故 2, 迪烈 1) 雱 <pʰaŋ> (敵烈 6)
防 <vaŋ> (迪烈 18)

But YZ 29 is never used after a vowel YZ, though YZ 16 and YZ 20 are. So one possible interpretation is that YZ 29 represents a VCn with a long [u:].

YZ 79 should be [yŋ]. There are only two examples. One is 龍, and the other is 從.

YZ 79 *yŋ, independently
龍 <lyŋ> (仲 20, 叔祖 2) 從 <dzyŋ> (仁先 25)

The hP'ags-pa spellings clearly indicate that the phonetic value of YZ 79 should be [yŋ]. The transliteration of the Chinese word 從 in the *Epitaph of Yelü Renxian* is really valuable. Since both 龍 and 從 are division-III syllables of MC *Zhong* 鍾 rhyme, it can be confirmed that YZ 79 is [yŋ]. Without this example, the phonetic value of YZ 79 could not be confidently decided, just based on one Chinese word 龍.

The finals with a non-high nucleus there include YZ 9, 73/74, and 17. YZ 9 is always used independently to transliterate Chinese [aŋ].

YZ 9 *aŋ, independently
唐 <daŋ> (郎 2) 郎 <laŋ> (仲 43, 博州 42)
廊 <laŋ> (郎 4) 張 <tʃaŋ> (迪烈 27)
彰 <tʃaŋ> (奴誌 12) 章 <tʃaŋ> (迪烈 1)
敞 <tʃʰaŋ> (令 16, 迪烈 12) 昌 <tʃʰaŋ> (國妃 10)
長 <dʒaŋ> (許 49, 迪烈 19) 尚 <ʒaŋ> (仲 22, 弘用 9)
上 <ʒaŋ> (仲 20, 仁先 7) 嫦 <ʒaŋ>* (迪烈 12)
江 <kɐŋ> (許 11, 大山 32)

*The MGZY does not include 嫦. The spelling is based on its homophone 常.

With the Chinese word 江 as an exception, all the hP'ags-pa spellings indicate the same phonetic value [aŋ]. 江 is a division-II word. According to the hP'ags-pa spelling, it has developed a palatal glide and is transliterated the same as division-III words 薑 and 姜 in the hP'ags-pa script. So it is worth noting that in the Khitan script 江 is transliterated without a palatal glide.

YZ 73 and 74 are always used independently to transliterate Chinese finals. They are two graphically related variations. It is likely that they are designed to distinguish different Chinese finals. YZ 73 and 74 are used to transliterate the syllables from MC rhyme groups: division III of the *Dang* 宕 rhyme group (將, 相) and division II of the *Geng* 梗 rhyme group (省, 耿, 行) respectively. However the transliteration of the Chinese syllable 將 in 將軍 blurs the distinction. It is transliterated by YZ 73 in the *Epitaph of Yelü* (故 1, 7) and YZ 74 in the *Epitaph of Xu Wang* (許 12, 46). According to the vowel system of the Khitan phonology, both of YZ 73 and 74 are tentatively reconstructed as *ɛŋ.

YZ 73 *ɛŋ, independently
相 <sɛŋ> (仲 22, 迪烈 4) 將 <tsɛŋ> (仲 27, 弘用 1)
YZ 74 *ɛŋ, independently
梁 <lɛŋ> (郎 1) 將 <tsɛŋ> (許 12)
省 <ʃiŋ> (令 7, 仲 22) 耿 <kʰiŋ> (弘用 2)
行 <ɦʲiŋ> (仲 22)
YZ 74 *ɛŋ, used in front of YZ 37 *əŋ
彭 <bəŋ> (許 47)

The character 行 in the 22nd line of the *Epitaph of Xiao Zhonggong* is the only one spelled with YZ 82. Both QXY (1985: 107, 122, 605, 764) and Chinggeltai (2002: a81, b140) identify this graph as YZ 82. But this identification is likely to be an error.

According to the rubbing (Chinggeltai 2002: 50), this graph can be quite clearly identified as YZ 74. Furthermore, YZ 82 is only used in the Khitan spellings and never used anywhere else for transliterating Chinese words. Thus, the Chinese word 行 in the 22nd line of the *Epitaph of Xiao Zhonggong* is spelled with YZ 74 instead. The character 行 has multiple readings in MC as well as in the MGZY. It is also spelled as 𘖚𘖵 <ɦaŋ> in the MGZY for its alternative division-I reading, which is used in Table 1 of the QXY. Based on the phonetic value of the YZ for the final and the meaning in the text, the character 行 should have a division-II reading.

Beside 省, 耿, and 行, the hP'ags-pa spellings of other examples, 將 and 梁 are [ɛŋ]. But it is quite interesting to note that 省, 耿, and 行 are transliterated by YZ 74. The Chinese words 省, 耿, and 行 are division-II syllables of the *Geng* 梗 rhyme group. So the transliterations of these two words indicate that division-II syllables have not yet merged into the *Zeng* 曾 rhyme group as shown in the MGZY. In this merging process the division-II syllables (省, 耿, 行) were one step behind their division-III and division-IV counterparts (聖, 景; 銘, 經). In the phonology of the MGZY, all division-II syllables merged into the *Zeng* 曾 rhyme group and this eventually become one of the characteristics of standard Mandarin.

		Rhyme Group		Khitan		MGZY
僧		曾	Division-I	--	--	[ɨŋ]
省	(仲 22)	梗	Division-II	YZ 74	*ɛŋ	[ɨŋ]
耿	(弘用 2)	梗	Division-II	YZ 74	*ɛŋ	[iŋ]
行	(仲 22)	梗	Division-II	YZ 74	*ɛŋ	[iŋ]
承	(宗教 1)	曾	Division-III	YZ 5	*iŋ	[iŋ]
聖	(宗教 5)	梗	Division-III	YZ 5	*iŋ	[iŋ]
景	(令 7)	梗	Division-III	YZ 5	*iŋ	[iŋ]
銘	(奴誌 41)	梗	Division-IV	YZ 5	*iŋ	[iŋ]
經	(道 2)	梗	Division-IV	YZ 5	*iŋ	[ʲiŋ]

YZ 17 is used to transliterate Chinese words with [waŋ] in Chinese. The hP'ags-pa spellings show that the finals of these Chinese words are [waŋ], or [aŋ] after labial initials. But this YZ should be reconstructed as [ɔŋ] in the Khitan phonology. 王 is actually transliterated as *ong* in the 14th century Mongolian written in the Uighur script (Cleaves 1949, 1950).

YZ 17 *ɔŋ, independently

防	𘖚𘖵	<vaŋ>	(叔祖 2)	訪	𘖚𘖵	<faŋ>	(迪烈 8)
方	𘖚𘖵	<faŋ>	(郎 5)	光	𘖵𘖵	<kwaŋ>	(仲 21)
廣	𘖵𘖵	<kwaŋ>	(宗教 1, 迪烈 12)	王	𘖷𘖵	<ʘwaŋ>	(許 2)

The hP'ags-pa spelling for the final of 防, 訪, and 方 is [aŋ]. In the Khitan script this final is transliterated as [ɔŋ] after labial initials. The Chinese word 防 is also transliterated by YZ 16 [uŋ] (智先 10) and YZ 29 [u:ŋ] (迪烈 18). These two alternative transliterations indicate that the phonetic value of YZ 17 must be a back rounded vowel.

The Chinese word 防 is spelled with YZ 50 [p^h] and YZ 17 [ɔŋ]. But unlike common horizontal way of arrangement, these two YZ, 50 and 17, can be arranged either horizontally (叔祖 2) or vertically (國妃 2). Also, the Chinese word 方 (郎 5) is spelled with YZ 50 on the top and YZ 17 on the bottom. Because of this exceptional arrangement, in the QXY the vertical spelling of these two YZ graphs are mistakenly recognized as a single YZ graph, as YZ 13 (Chinggeltai *et al.* 1985: 87).

The graphs for the Chinese finals with a velar nasal coda can be summarized as follows:

a	i	u	ɛ	ɔ	œ	y	ɨ/ə
*aŋ	*iŋ	*uŋ	*ɛŋ	*ɔŋ	--	*yŋ	*əŋ
(9)	(5)	(16/20)	(73/74)	(17)		(79)	(37)
江	京	公	相	光		龍	聖
		*u:ŋ					
		(29)					
		宗					

These graphs are used to transliterate the seven finals with a velar nasal coda. One possible combination [œŋ] is not found. According to Chinese phonology only the *hekou* syllables of the division-III *Yang* 陽 rhyme would need a YZ for [œŋ]. But the words in this category are rare and are not likely to appear in the Khitan transliterations.

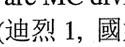
7.4 Summary of the finals

From the analyses in the previous sections, we propose the following system for the graphs that are used to transliterate Chinese words. We have already explained the phonotactic reasons of this system. In the discussions we also explained the phonological gaps in this system and showed that the gaps do not happen randomly. These VC units in general are each represented by a single graph, including some pairs of variations. The VC unit [uŋ] transliterated by YZ 16/20, 29 is the only one that is not transliterated by a single graph. But YZ 29 could be [u:ŋ] with a long vowel nucleus [u:].

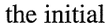
V	*a	*i	*u	*ɛ	*ɔ	*œ	*y	*ɨ
8	(39)	(7)	(28/55)	(66)	(78)	(42/91)	(11)	(58/59)
	馬	期	武	節	左	月	許	子

V:	--	*i:	*u:	--	--	*œ:	--	--
3	--	(81)	(71)			(89)		
		騎	祖			院		
Vj	*aj	--	*uj	*ɛj	*ɔj	*œj	--	*əj
6	(35)		(19/77)	(84/85)	(98)	(92/93)		(63)
	大		水	册	帥	越		特
Vw	*aw	*iw	--	*ɛw	--	--	--	*əw
4	(31)	(32)		(25)				(33)
	高	酒		小				婁
Vm	*am	*im	--	*ɛm	--	--	--	*əm
4	(40)	(47)		(57)				(X2)
	監	金		兼				瀋
Vn	*an	*in	*un	*ɛn	*ɔn	*œn	*yn	*ən
8	(75/76)	(53)	(45)	(24)	(116)	(43)	(46)	(48)
	山	臣	混	先	團	院	軍	門
Vŋ	*aŋ	*iŋ	*uŋ	*ɛŋ	*ɔŋ	--	*yŋ	*əŋ
7	(9)	(5)	(16/20)	(73/74)	(17)		(79)	(37)
	江	京	公	相	光		龍	聖

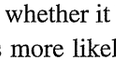
As listed in the table above, 40 YZ graphs are phonetically reconstructed and each has a distinctive value.

The phonetic value of YZ 88 is rather difficult to determine. All the Chinese words transliterated by ZY 88 are MC division-II words, e.g. 監  kjam (仲 23, 故 11, 迪烈 21) and 下  ɦja (迪烈 1, 國妃 10). It only appears after a guttural consonant and never in the initial position. The hP'ags-pa spellings indicate ZY 88 can be [ja], but it is not clear whether it had the same phonetic value in the Liao time. The phonetic value of YZ 88 is more likely to be [axa] or [xa] according to Khitan. In Khitan YZ 88 is used alone for the meaning of 'elder brother'. The word for 'elder brother' is *aqa* in modern Mongolian (Daobu 1982), and *ax* in modern Dagur (Zhong 1982). Thus, YZ 88 is tentatively reconstructed as [xa] with the [x] functioning as a glide in the transliteration of Chinese words.

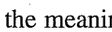
YZ 88 *xa, used alone

家  <kʲa> (許 46, 仁先 63) 下  <ɣʲa> (迪烈 1)

YZ 88 *xa, after YZ 18 *k, in front of YZ40 *am

監  <kʲam> (仲 23)

YZ 88 *xa, after YZ 18 *k, in front of YZ 57 *ɛm

監  <kʲam> (故 11, 奴誌 13)

8. Conclusion

It is hoped by Khitan scholars that the Chinese transliterations can be a breakthrough point in the decipherment of the Khitan Lesser Script. Thus it is crucial to provide a more accurate reconstruction for the phonology of Sino-Khitan. We hope that the reconstruction of Sino-Khitan phonology provided in this study is a step toward this direction.

From the perspective of historical phonology, the reconstruction of Sino-Khitan phonology can provide invaluable information about the northern Chinese in Liao times. Many phonological characteristics actually indicate a prototype of Mandarin. But I would like to list four obvious Mandarin characteristics.

(a) The devoicing of voiced obstruents can be detected. It is quite likely that the aspiration of the devoiced obstruents is tonally determined and its pattern is similar to the pattern of the *Zhongyuan Yinyun.*
(b) The *ru* syllables had lost their consonant codas. Many MC syllables with a –k coda underwent diphthongization.
(c) The existence of the labiodental initials.
(d) The existence of the apical vowels after alveolar and retroflex initials.

The details of these characteristics have been addressed in other articles (Shen 2006a, 2006b).

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漢-契丹語音系

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儘管契丹小字材料仍然基本無法解讀，但是其中的眾多的漢語專用名詞，像官銜、地名和人名都已經得到令人滿意的釋讀。本文對用來音譯漢語的原字作一個系統性分析。分析的結果是對漢-契丹語音系的一個構擬。本研究有兩個作用，一是漢-契丹語的構擬可以彌補我們對元代以前的北方漢語認識上的空白，二是漢-契丹語的構擬可以爲契丹小字的進一步釋讀提供一個更可靠的語音基礎。

關鍵詞：漢-契丹語　遼代北方方言　歷史音韻　契丹小字釋讀

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