

PHONETIC EVIDENCE FOR THE GREAT MONGOLIAN VOWEL SHIFT

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ABSTRACT

This paper presents acoustic phonetic evidence for the phonological shift that restructured the vowel and vowel harmony systems of East Mongolian.

BACKGROUND

In previous work [1] I have shown that East Mongolian (Khalkha and various Inner Mongolian dialects) has gone through a vowel shift resulting in a change of the vowel harmony system: while Old Mongolian had palatal (front-back) harmony, East Mongolian has pharyngeal (ATR) harmony.

The evidence in [1] for this vowel shift was acoustic data on the vowels of Khalkha and some other Mongolian dialects, as well as available descriptions of other Mongolian languages. Some uncertainty remains about the exact quality of the Old Mongolian vowels, however. The modern language whose vowel system is closest to Old Mongolian is Kalmuck (West Mongolian), but acoustic evidence for the Kalmuck vowel qualities was not available in [1].

PROCEDURE

During a visit to the Kalmuck republic in 1992 I recorded speakers of the two main Kalmuck dialects, Dörbed and Torgud, and I have also made further recordings of Khalkha and other East Mongolian dialects. Here I will present formant measurements for two Dörbed (Elst, Ovata) and two Torgud (Jaškul', Astraxan') speakers as well as for four Khalkha speakers (two from Ulaanbaatar, one from Bajanjongor and one from Zawxan), and for one speaker each of the Cahar and Baarin dialects, spoken in Inner Mongolia in China.

Each speaker read a list of words illustrating the vowels of his dialect (only male speakers were recorded). The words were read five times in isolation. The recordings were made on an analogue cassette recorder with fairly high quality. There is contrasting vowel length in Mongolian, but only long vowels were analyzed (except for Cahar and Baarin [1]

which only occurs short). The relevant words are given in Table 1. The first three formants were measured using the automatic formant tracking facility of the Soundscape program. The results are shown in Table 2, and F1-F2 diagrams for some of the speakers are given in Figure 2.

Table 1. Wordlists (the vowel in the initial syllable was analyzed).

Kalmuck	Khalkha	Cahar	Baarin
bir	bi:ɾte	pi:ɾ	pi:ɾ
y:l		bi:ɾ	y:l bi:ɾ ɾ:ləx ʊ:l
e:ɾx	de:lte		e:l sɑ:l
ø:ɾ			œ:ɾ ʃil
e:ɾg			
ba:lɿx	ba:ltaɪ	dʒa:l dɑ:l	dʒa:l dɑ:l
u:l	su:lte dʒu:ɾtaɪ	su:l u:l	su:l u:l
bo:dɿg	bo:ɾte bo:ltoɪ	o:lɿd bo:l	o:lɿd bo:l

THE VOWEL SHIFT

The Mongolian vowel shift is illustrated in Figure 1, an F1-F2 diagram showing simultaneously the vowels of (Dörbed) Kalmuck and Cahar. The Kalmuck vowels are encircled, and arrows point towards the etymologically corresponding Cahar vowels. The Kalmuck vowel system is unchanged compared to Old Mongolian, except that a vowel phoneme /e/ has developed by palatalization. Figure 1 thus illustrates the diachronic change from Old Mongolian to East Mongolian. Two different processes have reshaped the vowel system, backing ($y > u$, $\phi > o$, $e > \text{ə}$) and pharyngealization ($u > \text{ɔ}$, $o > \text{ɔ}$), exemplified by:

Old M	Kalm	Khalkha	Inner M	
yge	yg	ug	ug	'word'
køl	køl	xol	xol	'foot'
degere	dɛ:ɾ	dɛ:ɾ	dɛ:ɾ	'top'
ula	ul	ul	ul	'sole'
tomo	tom	tɔm	tɔm	'great'

The main acoustic effects are F2 decrease and F1 increase, respectively. These processes are less consistent in Khalkha, where backing has not affected e. Vowel harmony in Old Mongolian and Kalmuck is manifested by the vowel alternation pairs $y \sim u$, $\phi \sim o$, $e \sim a$, which differ in the front-back (palatal) dimension. In Inner Mongolian, these vowel pairs have become $u \sim \text{ɔ}$, $o \sim \text{ɔ}$, $\text{ə} \sim a$, still alternating in the same way in vowel harmony, which has thus become based on the feature pharyngeal (or ATR), which distinguishes the vowels of these pairs in East Mongolian [1].

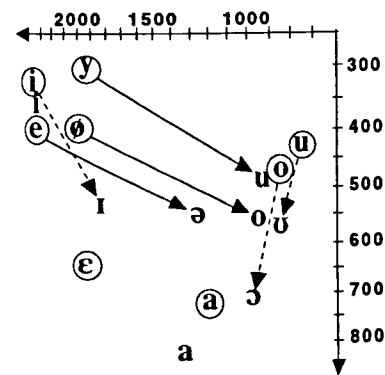


Figure 1. The Mongolian vowel shift.

The vowel *i* was neutral in Old Mongolian, in the sense that it could cooccur more or less freely with both front and back vowels in the same word. It has remained neutral in Kalmuck and Khalkha, but in Inner Mongolian it has split into two phonemes: it became *i* in words containing a back vowel (which may have been lost, as in *bir* < *bi:ra* 'strength'), and has remained *i* elsewhere. In this way, a fourth alternation pair *i*-*ɪ* was created and the neutral vowel was eliminated.

PALATALIZATION

East Mongolian lost the front rounded vowels by the vowel shift, but some dialects, including Baarin, have reintroduced them through palatalization [2]. Two different palatalization processes have affected the vowels in East Mongolian. One is due to old *i*-diphthongs (written *Vji* in the Classical Mongolian script), and the second is the result of the development of old *VCi* groups:

Old M	Khalkha	Baarin	
ajil	ail	e:l	'family'
ujila	uil	ɾ:l	'cry'
ojira	o:ɾ	œ:ɾ	'near'
yjile	uil	ɾ:l	'act'
sagali	sɑ:lɿ	sɑ:l	'milk'
uguli	ʊ:lɿ	ʊ:l	'owl'
ogoli	ʊ:lɿ	ʊ:l	'adze'

The two palatalization processes produced different results in Khalkha: the first one resulted in diphthongs, and in the second one, the original *i* palatalized the consonant and disappeared, resulting in a number of palatalized consonant phonemes contrasting with plain consonants (e.g. *b'ar* 'strength'; *bar* 'tiger'). The palatalized consonant affected the preceding vowel phonetically, indicated by an umlaut in the table above (see [2] for phonetic data), but because of the contrasting consonants, the palatalized vowels *ä*, *ü*, *ö* can be regarded as allophones of *a*, *u*, *ɔ*.

The situation is different in Baarin, where consonant palatalization was lost, creating a contrast between umlauted and plain vowel phonemes. It also appears that the umlauted vowels merged with the vowels which developed from old diphthongs in this dialect so that, for instance, *ü:l* 'owl' and *ɾ:l* 'cry' became homophones. This was tested by comparing F1 and F2 simultaneously using Mahalanobis' D^2 test with the formant frequencies converted to the mel scale. This test was performed for the three pairs $e \sim \text{ä}$, $\text{œ} \sim \text{ö}$ and $y \sim \text{ü}$ with the result that there was no significant difference for the first two pairs ($F(2,7)=2.06$ and 0.74), while there was a significant difference between y and ü ($F(2,7)=19.29$, $p < 0.001$). It is necessary to investigate this question further before a final analysis can be made, but it is clear that at least four new vowel phonemes, */e/, /œ/, /y/ and /y/*, have appeared in Baarin as a consequence of the palatalization processes (cf. Figure 2).

REFERENCES

- [1] Svantesson, Jan-Olof (1985), "Vowel harmony shift in Mongolian", *Lingua*, vol. 67, pp. 283-327.
- [2] Svantesson, Jan-Olof (1991), "Vowel palatalization in Mongolian". *Actes du XIIème Congrès International des Sciences Phonétiques*, Vol. 5, 102-105. Aix-en-Provence: Université de Provence.

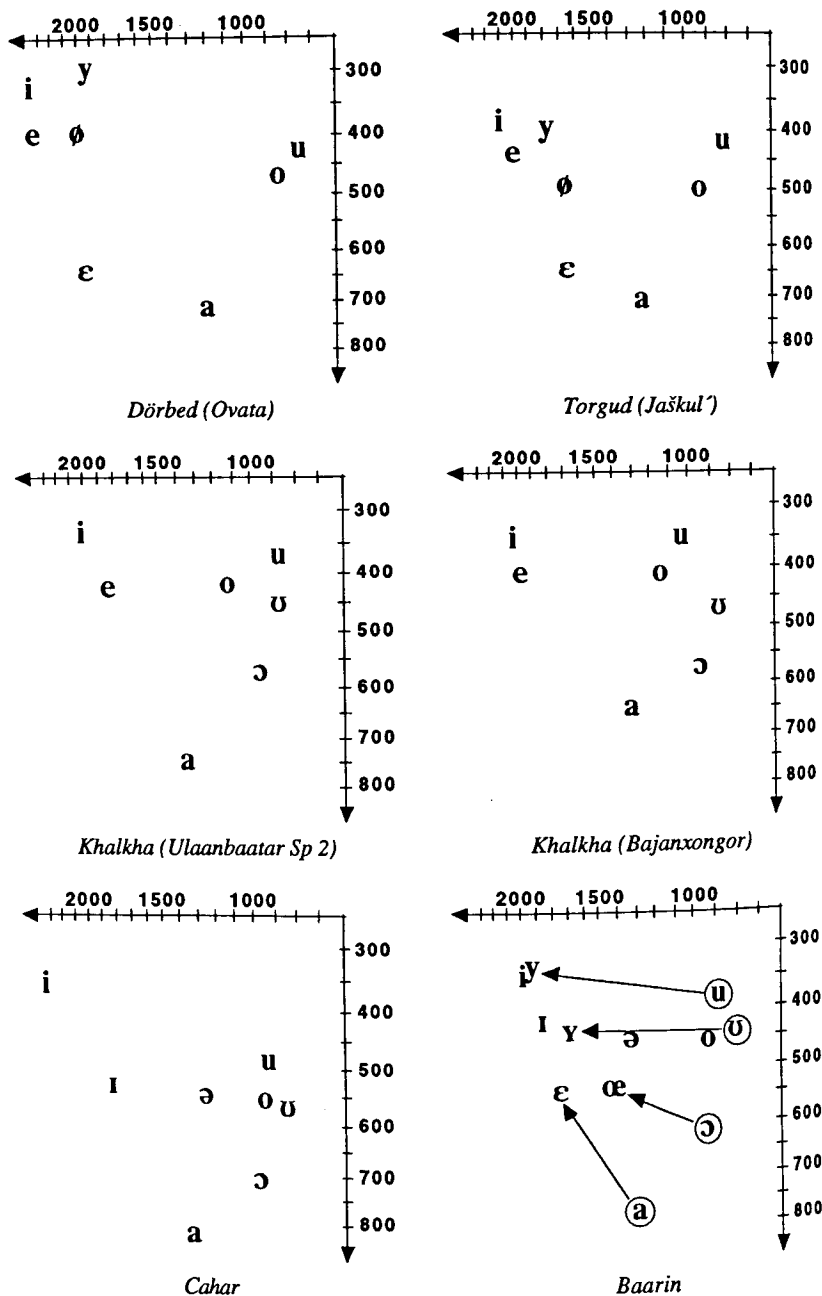


Figure 2. F1-F2 diagrams. Each vowel symbol represents the mean of five tokens.

Table 1. Formant values. For each vowel, the mean and standard deviation of F1, F2 and F3 are given, based on 5 tokens of each vowel.

Dörbed (Elst):					Dörbed (Ovata):								
	F1		F2	F3		F1		F2	F3				
i	347	0	2016	24	2711	39	i	321	24	2381	22	2972	39
y	347	0	1686	155	2242	66	y	295	20	1921	78	2503	24
e	434	31	1790	71	2503	129	e	400	19	2347	31	2938	73
ø	478	0	1460	24	2112	66	ø	391	31	1992	78	2659	36
ε	642	19	1660	20	2373	39	ε	642	19	1947	71	2973	109
a	669	24	1217	31	2486	36	a	717	25	1195	25	2846	202
u	349	26	661	38	2588	129	u	426	48	751	62	2694	61
o	504	24	773	36	2625	132	o	469	20	860	71	2834	48
Torgud (Jaškul'):					Torgud (Astraxan'):								
i	382	20	2103	50	2634	79	i	347	0	1921	40	2755	39
y	400	19	1790	71	2329	79	y	313	19	1521	97	2147	24
e	434	31	1999	0	2521	31	e	434	0	1756	39	2382	36
ø	495	24	1677	24	2443	19	ø	443	20	1512	36	2216	31
ε	651	31	1660	36	2390	97	ε	591	24	1512	20	2225	78
a	712	39	122	19	2008	128	a	625	24	1130	44	2356	19
u	417	24	825	31	2607	126	u	340	16	618	31	2378	47
o	495	24	930	24	2164	78	o	452	24	851	73	2155	100
Khalkha (Ulaanbaatar Sp 1):					Khalkha (Ulaanbaatar Sp 2):								
i	382	23	2112	50	3042	82	i	338	19	2016	50	2920	84
e	460	24	1973	121	3008	64	e	425	19	1825	134	2694	69
a	782	0	1295	57	2668	95	a	747	20	1347	31	2642	191
u	391	0	1156	129	2503	66	u	373	24	886	39	2356	158
u	512	19	1017	24	2934	128	u	452	24	878	48	2069	175
o	487	19	947	48	2625	109	o	417	24	1121	142	2407	314
ɔ	617	19	964	36	2216	53	ɔ	573	47	973	39	2190	117
Khalkha (Bajanxongor):					Khalkha (Zawxan):								
i	347	36	2010	22	2379	182	i	313	19	2129	0	3268	84
e	417	24	1973	50	2616	57	e	443	20	2008	19	2877	57
a	651	0	1303	31	2625	50	a	695	31	1225	36	2295	155
u	347	0	1020	41	2312	94	u	330	24	799	24	2329	39
u	469	20	869	69	2495	109	u	460	24	790	48	2094	84
o	408	24	1147	24	2338	36	o	426	36	956	31	2312	57
ɔ	574	19	938	24	2329	113	ɔ	547	39	930	59	2094	113
Cahar:					Baarin:								
i	356	20	2347	81	3016	73	i	347	0	1981	39	2746	36
ɪ	539	39	1842	66	2755	24	y	338	19	1938	73	2295	57
a	825	0	1329	24	2851	90	ɪ	425	19	1869	44	2651	31
ə	547	24	1269	36	2738	43	ɪ	443	20	1686	37	2329	39
u	486	36	930	50	2712	58	ɪ	425	48	1808	24	2408	66
u	573	36	842	39	2886	143	ü	425	48	1808	50	2582	90
o	556	48	947	78	2929	133	ε	548	39	1764	54	2686	56
ɔ	704	19	982	24	2268	57	ä	582	24	1719	69	2686	56
							œ	539	39	1425	128	2443	99
							ɔ	513	36	1434	0	2416	58
							ä	573	36	1295	47	3068	58
							a	773	36	1321	58	2295	36
							ə	452	24	895	50	2399	78
							u	382	20	808	66	2416	117
							u	443	20	930	24	2295	178
							o	452	24	930	24	2295	178
							ɔ	617	19	940	10	2129	107