

VOWEL PALATALIZATION IN MONGOLIAN

Jan-Olof Svantesson

Lund University, Sweden

ABSTRACT

Most Mongolian languages have gone through a process of palatalization which has affected the vowel and consonant systems in different ways in different languages. In this paper, phonetic data are given from the Khalkha dialect where consonant palatalization is contrastive, and where vowels preceding palatalized consonants have been umlauted. The umlauted vowels are realized as diphthongs, and at least for some speakers they contrast with original diphthongs with *i* as the second element. The contrast is realized as differences in spectral timing.

1. BACKGROUND

1.1 The vowel system

Classical Mongolian had seven vowels (shown below) and a vowel harmony system based on palatality with three front vowels *e*, *ø*, *y*, three back vowels *a*, *ɔ*, *u*, and one neutral vowel *i*. It is believed that the oldest stages of the language had a back unrounded vowel *i* as well. There has been a vowel shift in East Mongolian languages (Mongolian proper and Buriat), by which the vowel *u* became a pharyngeal ([-ATR]) vowel *ω*, and the front vowels *y* and *ø* became *u* and *ø*, respectively [3][4] (in Southern Mongolian dialects, e.g. Baarin, *e* became *ə*, as well). At the same time, the phonetic basis of vowel harmony shifted from palatality to pharyngeality ([ATR]), the vowels *a*, *ɔ*, *ω* being pharyngeal ([-ATR]), *e*, *ø*, *u* non-pharyngeal ([+ATR]) and *i* neutral [4].

i	y	u		i	u		i	u
e	ø	a	ɔ	e	ø		ə	ω
				a	ɔ		a	ɔ
Classical				Khalkha			Baarin	

Vowel length is contrastive in modern Mongolian, but only in the first syllable of a word.

1.2 Palatalized consonants

The vowel *i* caused palatalization of both consonants and vowels. Consonants preceding *i* were palatalized, and in many cases the conditioning vowel disappeared (especially when word final) or became assimilated to a following vowel, in particular when that vowel was *a*: *ama* > *am* 'mouth', *ami* > *am* 'life'; *bara* > *bar* 'to finish'; *bira* > *b'ar* 'strength'. Palatalization did not always take place when an *i* followed, however: *miqa* > *max* 'meat'.

In this way a whole class of palatalized consonant phonemes appeared in Khalkha (*b'*, *p'*, *m'*, *w'*, *d'*, *t'*, *n'*, *l'*, *r'*, *g'*, *x'*), contrasting with the corresponding plain consonants. (In Khalkha, *l* is realized as a lateral fricative [ʃ].)

The palatalized consonant phonemes in Khalkha have a limited distribution, occurring only in words with pharyngeal vowels. In non-pharyngeal words there is no contrast between palatalized and plain consonants, a fact that indicates that palatalization of consonants took place before the vowel shift that converted the front vowels *y* and *ø* to *u* and *ø*.

1.3 Palatalized vowels

The palatalized consonants in pharyngeal words have in their turn palatalized (umlauted) preceding vowels. Thus, *ω*, *ɔ*, *a* have umlauted allophones, here written as *ə*, *ɔ̄*, *ä*, before palatalized consonants

In some Southern Mongolian dialects, e.g. Baarin, the umlauted vowels are realized as monophthongs *ɻ*, *æ*, *ǣ*, but in Khalkha they are diphthongic. Both short and long vowels were umlauted in a similar way.

Another source of palatalized vowels is original diphthongs with *i* as the second element, *oi*, *ɔi*, *ai*. In Khalkha they are retained as diphthongs, but in Baarin they became monophthongs, merging with the unlauded vowels. There is also a non-pharyngeal diphthong *ui* in Khalkha (*y* in Baarin). Instead of expected **ei* or **oi*, *e* is found both in Khalkha and Baarin.

2. PHONETIC INVESTIGATION

2.1 Method

The data presented here are based on recordings of three male speakers of Khalkha Mongolian, XB, DD and BB. They were born, grew up and are still living in Ulaanbaatar. Their age was 36, 26 and 21 years, respectively. A word-list illustrating various phonetic phenomena, including palatalization, was recorded. Each word was read in isolation 3-5 times by each informant. The recording was made in Ulaanbaatar using a cassette recorder of fairly high quality. The recordings were analyzed using the MacSpeech-Lab II digitizer and analysis programs.

2.2 Results and discussion

2.2.1 Umlauded vowels vs. *i*-diphthongs

The unlauded vowels *ɔ*, *ɛ*, *ə* and the *i*-diphthongs *ai*, *ɔi*, *oi* were compared by measuring F_1 and F_2 at the beginning and end of the vowel, and at three intermediate equidistant points. The words *ai*'₁, *ai*,

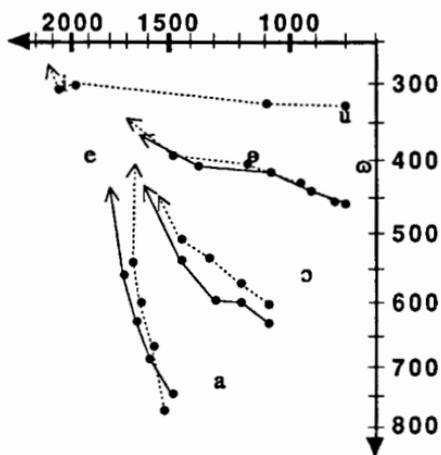


Figure 1. F_1 - F_2 plot for all vowels of speaker BB. The *i*-diphthongs *ui*, *oi*, *ɔi*, *ai* are shown as dotted lines and unlauded vowels *ɔ*, *ɛ*, *ə* as solid lines. The average formant values (of 5 tokens) of monophthongic vowels are also shown.

ɔi'₁, *ɔi*'₂, *oi*'₁, *oi*'₂ were used. The results are shown in Figures 1-3 and in Table 1. The simultaneous equality of F_1 and F_2 was tested with Mahalanobis' D^2 test [2, p. 480] after converting the formant frequencies to the mel scale.

The unlauded vowels and the corres-

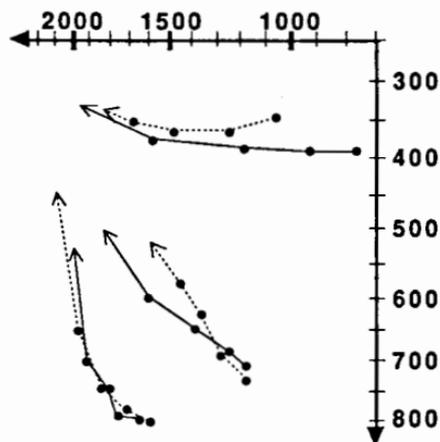


Figure 2. F_1 - F_2 plots for speaker DD. Umlauded vowels *ɔ*, *ɛ*, *ə* are shown as solid lines and *i*-diphthongs *oi*, *ɔi*, *ai* as dotted lines.

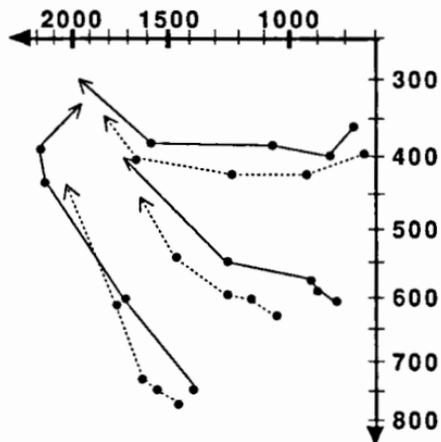


Figure 2. F_1 - F_2 plots for speaker XB. Umlauded vowels *ɔ*, *ɛ*, *ə* are shown as solid lines and *i*-diphthongs *oi*, *ɔi*, *ai* as dotted lines.

ponding *i*-diphthongs have similar paths in the F₁-F₂ plane, starting at a point in the neighbourhood of the corresponding non-umlauted vowel and ending in the *e-i* area. According to the test results (see Table 1), *ä* and *ai* are significantly different for speaker XB and also for DD, *ɔ* and *ɔi* are different for BB and DD, and *ø* and *øi* are different for DD and XB. Some of the differences are perceptually very salient. Although it is difficult to find invariant features which differentiate umlauted vowels and *i*-diphthongs for all speakers, the three pairs differ in similar ways for each speaker. The difference lies in the timing structure of the diphthongs rather than in the starting point, end point or direction of the diphthong path.

The spectral timing of diphthongs often differs between different languages [1], but it is an unusual feature for a language to have diphthongs with the same general start and end points but which nevertheless contrast because of their spectral timing.

2.2.2 Palatalization of consonants following *i*-diphthongs

Palatalized and plain consonants do not contrast after *i*-diphthongs. The quality of a consonant in this position was checked by measuring F₁ and F₂ at the beginning of the second vowel *a* in the word *ailar* and palatalized *l'* in *äil'ar*.

The results were (means of 5 tokens):

	BB		DD	
	F ₁	F ₂	F ₁	F ₂
<i>bailar</i>	501	1202	669	1387
<i>ailar</i>	505	1452	438	2002
<i>äil'ar</i>	438	1594	365	2138
tests:				
<i>bailar</i> ~ <i>ailar</i>	p<.01		p<.001	
<i>bailar</i> ~ <i>äil'ar</i>	p<.001		p<.001	
<i>ailar</i> ~ <i>äil'ar</i>	p<.05		p<.05	

As these results show, *l* in *ailar* is palatalized, but slightly less than the contrastively palatalized *l'* in *äil'ar*.

This seems to be the only case of progressive palatalization in Khalkha.

2.2.3 Influence of *i* on preceding consonants

Both plain and palatalized consonants can occur before *i* in pharyngeal words, as in *bailig* and *äil'ig*. The possible influence of

i on a preceding plain consonant was checked by measuring F₁ and F₂ at the end of the first vowel *a*: in the words *bailar* and *bailig*, with the following results (5 tokens of each vowel for BB and DD, 4 for XB):

	BB		DD		XB	
	F ₁	F ₂	F ₁	F ₂	F ₁	F ₂
<i>bailar</i>	593	1246	647	1213	672	1275
<i>bailig</i>	652	1321	645	1311	642	1418
test:	ns		ns		ns	

F₂ is slightly higher at the end of *a*: in *bailig* than in *bailar*, no doubt because of coarticulation effects, but this difference is not significant in my material according to Mahalanobis' test. Since the vowel *i* is the historical source of palatalization in Mongolian, it is somewhat paradoxical that *i* does not palatalize preceding consonants in Khalkha.

2.2.4 The quality of *i*

The vowel *i* is neutral in vowel harmony, but only in a restricted sense. Words with only this vowel are always non-pharyngeal, and in pharyngeal words, *i* occurs only in suffixes. The quality of *i* in pharyngeal words is influenced by the preceding consonant. In order to check this, F₁ and F₂ were measured at the beginning and middle of the *i* vowel in the words *bailig*, *äil'ig* and *ailig*, i.e. following a plain, palatalized and non-contrastively palatalized consonant. The results are shown below where the first row for each word shows the beginning of the *i* vowel and the second row the centre:

	BB		DD		XB	
	F ₁	F ₂	F ₁	F ₂	F ₁	F ₂
<i>bailig</i>	473	1572	370	1949	445	1887
	465	1768	381	2083	449	2128
<i>ailig</i>	354	1820	246	2135	354	2044
	370	1896	367	2211	363	2194
<i>äil'ig</i>	353	1871	348	2083	—	—
	351	1958	359	2181	—	—
tests:						
<i>bailig</i> ~ <i>ailig</i>	p<.001		p<.01		p<.05	
	p<.05		p<.05		p<.05	
<i>bailig</i> ~ <i>äil'ig</i>	p<.001		p<.01		—	
	p<.05		p<.01		—	
<i>ailig</i> ~ <i>äil'ig</i>	p<.05		ns		—	
	ns		ns		—	

(5 tokens of all words for BB and DD; 4 tokens of *bailig* and 3 of *ailig* for XB.)

There is a large difference between *i* following plain and palatalized consonants (as is the case for the other vowels as well). The difference is still present at the middle of the vowel but is smaller there. Thus, coarticulation between a plain consonant and a following *i* does not lead to palatalization of the consonant, as is the case in many languages, including Old Mongolian, but rather to "de-palatalization" of *i*, resulting in lower F₂ and higher F₁, a relation which is characteristic within each pair of non-pharyngeal vs. pharyngeal vowels (*e~a*, *ø~ɔ*, *u~ø*; cf. Figure 1).

In Baarin and other South Mongolian dialects, the contrast between plain and palatalized consonants seems to have disappeared, and *i* has split into two phonemes, non-pharyngeal ([+ATR]) *i* and pharyngeal ([-ATR]) *i*, thereby repairing the asymmetry of the harmony system which resulted from the loss of *i* in Old Mongolian.

3. CONCLUSION

Mongolian has gone through a palatalization cycle. First *i* palatalized preceding consonants and was then lost in many cases. The contrastive function of the lost vowels was transferred to a palatalized/plain contrast in the consonant system, supplemented by the appearance of umlauted vowels, realized as diphthongs,

before palatalized consonants. This is the stage found in Khalkha. In Baarin and other Southern Mongolian dialects, umlauted vowels have become monophthongs and carry the contrast, contrastive palatalization having disappeared, at least partly, from the consonant system.

In Khalkha, there is a contrast between umlauted vowels and original *i*-diphthongs, both being realized as diphthongs, but differing in their spectral timing. In Baarin these two sets of vowels have merged.

REFERENCES

- [1] LINDAU, Mona, Kjell NORLIN & Jan-Olof SVANTESSON (1990), "Some cross-linguistic differences in diphthongs", *Journal of the International Phonetic Association*, 20:1, 10-14.
- [2] RAO, Radhakrishna (1965), "Linear statistical inference and its applications", New York: Wiley.
- [3] RIALLAND, Annie & Redouane DJAMOURI (1984), "Harmonie vocale, consonantique et structures de dépendance dans le mot en mongol khalkha", *Bulletin de la Société de Linguistique de Paris* 79, 333-83.
- [4] SVANTESSON, Jan-Olof (1985), "Vowel harmony shift in Mongolian", *Lingua* 67, 283-327.

Table 1. Mean values of F₁ and F₂ at five equidistant points in the umlauted vowels and *i*-diphthongs. The number of tokens of each vowel is given as well as test results for Mahalanobis' test, for each point testing whether the two vowels have the same F₁ and F₂ values.

	BB					DD					XB							
	F ₁	F ₂																
<i>äil'</i>	743	683	623	563	435	5	802	795	759	698	528	5	748	603	435	390	340	3
	1482	1591	1654	1708	1716		1697	1784	1828	1923	2016		1401	1722	2144	2188	1958	
<i>ail</i>	772	669	598	536	405	5	802	778	753	647	457	5	780	761	735	617	440	3
	1531	1580	1645	1691	1672		1621	1776	1842	2013	2092		1478	1573	1709	1877	2013	
test:	ns	ns	ns	ns	ns		ns	ns	ns	ns	<.05		<.05	ns	<.01	<.01	ns	
<i>ɔil'</i>	628	598	596	533	421	5	707	680	650	592	500	4	612	585	571	558	408	1
	1091	1172	1308	1450	1605		1187	1248	1394	1615	1853		857	911	938	1265	1713	
<i>ɔir</i>	601	569	539	506	449	5	735	688	620	582	519	5	630	607	594	544	460	3
	1104	1200	1330	1461	1594		1192	1289	1363	1471	1596		1052	1160	1260	1478	1623	
test:	ns	<.05	<.01	ns	ns		ns	ns	ns	<.001	<.01		ns	ns	ns	ns	ns	
<i>øil'</i>	466	441	416	408	362	5	395	398	387	377	333	4	367	405	381	385	295	3
	816	925	1081	1368	1678		765	932	1194	1608	1965		789	879	1077	1605	1985	
<i>øil</i>	451	424	402	389	348	5	354	372	376	358	340	3	395	426	431	413	354	3
	865	984	1178	1496	1713		1088	1265	1491	1695	1854		757	943	1265	1700	1831	
test:	ns	ns	ns	ns	ns		<.05	<.05	ns	ns	ns		ns	ns	ns	ns	<.05	