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“Turkic Languages”

Extract from:

**THE TYPOLOGY OF ROUNDING HARMONY:
AN OPTIMALITY THEORETIC APPROACH**

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by

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Chapter 2 Rounding Harmony in Turkic, Mongolian and Tungusic

In this chapter, I lay out the rounding harmony patterns which are found among languages of the Altaic group. In subsequent chapters I will show that the range of variation observed in the attested systems is best conceptualized as an optimization problem (Prince & Smolensky (1993), McCarthy & Prince (1993a)) in which the observed harmony effects are driven by a small set of general principles, some of which are potentially in conflict with one another. The content of these principles will be shown to be constant across languages, while cross-linguistic variation is characterized in terms of the relative weight or importance each of these principles has in determining the overall system.

In 2.1-2.6 I lay out the patterns observed among languages of the Turkic sub-branch, focusing on the nature of the conditions which are imposed on the application of rounding harmony from language to language. Following the section on Turkic, analogous data from the other branches of Altaic, namely Mongolian (2.7) and Tungusic (2.8), will be presented.

2.1 Turkic

The Turkic languages are distributed from Turkey throughout regions in the former Soviet Union and into parts of China and Mongolia. In Comrie's *Languages of the Soviet Union* (1981) the classification system given in (1) is proposed for Turkic:

(1) Genetic Classification of Modern Turkic Languages (From Comrie 1981, p. 46)

- I Chuvash
- II Southern Turkic, South-western Turkic, Oguz
 - Turkish (Osmanli)
 - Azerbaydzhan (Azeri Turkic)
 - Khaladzh
 - Gagauz
 - Balkan Gagauz (Balkan Turkic)
 - Turkmen (including Trukhmen)
- III Kipchak
- IIIa Ponto-Caspian, Kipchak-Cuman
 - Karaim
 - Kumyk
 - Karachay-Balkar
 - Crimean Tatar (also assigned to II)
- IIIb Uralian, Kipchak-Bulgar
 - Tatar
 - Bashkir
- IIIc Central Turkic, Kipchak-Nogay
 - Nogay
 - Karakalpak
 - Kazakh
- IV Eastern Turkic, Karluk
 - Uzbek
 - Uygur
 - Khoton (has also some features of V)
 - Yellow Uygur (Sarı Uygur) (also assigned to V)
- V Northern Turkic, Eastern Hunnic
 - Tuva (Uryankhay)
 - Tofa (Tofalar, Karagas)
 - Yellow Uygur (Sarı Uygur) (also assigned to IV)
 - Salar (also assigned to IV)
 - Yakut (Sakha) (including Dolgan)
 - Khakas (Abakan Tatar, Yenisey Tatar) (including Kamas)
 - Shor
 - Chulym (Melet) Tatar
 - Kirgiz
 - Altay (Oyrot)

A striking property of nearly all Turkic languages is the presence of backness harmony (sometimes referred to as palatal harmony), whereby all vowels within a word agree with respect to backness. Also typical of the Turkic languages, though less pervasive, is the presence of some degree of rounding harmony (sometimes referred to as labial harmony or labial attraction), whereby vowels within a word agree with respect to roundness. The manifestation of rounding harmony is considerably more varied

among the Turkic languages, and it is the specific nature of this variation that will be addressed in this chapter.

The dialect of Kirgiz described by Comrie (1981) may be used to demonstrate both types of vowel harmony observed in Turkic. Kirgiz possesses the canonical Turkic vowel inventory in which vowels are opposed along three dimensions: height, backness and rounding, as shown in (2). In addition to height, backness and rounding, length is also contrastive among vowels in Kirgiz:

(2) Kirgiz Vowel Inventory

	Front		Back	
	Unround	Round	Unround	Round
High	i, i:	ü, ü:	ɨ, ɨ:	u, u:
Non-high	e, e:	ö, ö:	a, a:	o, o:

In the dialect of Kirgiz described by Comrie, the quality of vowels in non-initial syllables is to a large extent predictable on the basis of the quality of the vowel occurring in the first syllable. All non-initial syllables must agree with the initial syllable in terms of both backness and rounding. The effects of backness and rounding harmony can be observed most vividly in suffixal vowel alternations, although the vowels of native polysyllabic roots display the same distributional patterns. Let us consider first the ordinaive suffix which has the surface variants $\{-(i)nčɨ, -(ɨ)nčɨ, -(u)nču, -(ü)nčü\}$. Note that the vowels of this suffix are in all instances high. Their rounding and backness, however, is variable. When the root contains front unrounded vowels, as in (3a-b), the alternant $-(i)nčɨ$ surfaces. Following back unrounded vowels, as in (3c-d), the suffix contains back unrounded vowels and the alternant $-(ɨ)nčɨ$ surfaces.:

(3) Unrounded Root Vowels (Comrie, p. 61)

a.	bir	'one'	bir-inčɨ	'first'
b.	beš	'five'	beš-inčɨ	'fifth'
c.	altɨ	'six'	altɨ-nčɨ	'sixth'
d.	žijırma	'twenty'	žijırma-nčɨ	'twentieth'

The vowels of this suffix are rounded following roots containing rounded vowels, as shown in (4a-d):

(4) Rounded Root Vowels (Comrie, p. 61)

a.	üč	'three'	üč-ünčü	'third'
b.	tört	'four'	tört-ünčü	'fourth'
c.	toguz	'nine'	toguz-unču	'ninth'
d.	on	'ten'	on-unču	'tenth'

To demonstrate the effects of backness and rounding harmony in non-high vowels, consider the ablative suffix which has the surface variants $\{-t/den, -t/dan, -t/dön, -t/don\}$. As shown in (5), the non-high suffix vowel also agrees in both backness and rounding with the vowels of the root (consonants also agree in voicing with the preceding sound, as shown):

(5) Low Vowel Suffix (Comrie, p. 61)

a.	iš	'work'	iš-ten	'work-ABL'
b.	et	'meat'	et-ten	'meat-ABL'
c.	zıl	'year'	zıl-dan	'year-ABL'
d.	alma	'apple'	alma-dan	'apple-ABL'
e.	üj	'house'	üj-dön	'house-ABL'
f.	köl	'lake'	köl-dön	'lake-ABL'
g.	tuz	'salt'	tuz-don	'salt-ABL'
h.	tokoj	'forest'	tokoj-don	'forest-ABL'

This effect is pervasive across sequences of suffixes, as illustrated in the polymorphemic words given in (6). These words contain the possessive suffix $\{-(s)in, -(s)ın, -(s)ün, -(s)un\}$ followed by the locative suffix which has surface variants $\{-t/da, -t/de, -t/dö, -t/do\}$:

(6) Harmony Effects with Multiple Suffixes

a.	ata-sın-da	'at his father'
b.	ene-sın-de	'at his mother'
c.	köz-ün-dö	'in his eye'
d.	tuz-un-do	'in his salt'

The Kirgiz pattern, while simple and symmetric, is in fact very unusual. In particular, while backness harmony is nearly always pervasive and unrestricted, the great majority of Turkic languages impose restrictions on the application of rounding harmony. Korn (1969) points out the asymmetry between these two harmony phenomena within Turkic and catalogues a range of rounding harmony types. His typology is the subject of §2.2.

2.2 Korn's Typology (1969)

On the basis of a survey of over twenty Turkic languages, Korn identifies six distinct rounding harmony systems. These systems vary with respect to the range of vowels which trigger rounding harmony and the segment types which function as targets. In nearly all Turkic languages, the vowel system can be characterized in terms of two phonologically distinctive degrees of height, contrastive backness and contrastive rounding and harmony operates from left-to-right. To illustrate the nature of Korn's typology, consider the schematic configuration in (7). The potential triggers of rounding harmony, which are listed vertically, include the non-high and high rounded vowels *o*, *ö*, *u*, *ü*. Potential targets are listed horizontally. The symbol I represents any high vowel, and A represents any non-high vowel:

(7) Rounding Harmony Scheme

		<i>Potential Target</i>	
		A	I
<i>Potential Trigger</i>	o	+/-/~	+/-/~
	ö	+/-/~	+/-/~
	u	+/-/~	+/-/~
	ü	+/-/~	+/-/~

A plus sign indicates that rounding harmony is observed in the relevant configuration; a minus sign indicates that rounding harmony does not take place in that context, and the symbol "~" indicates that rounding harmony is optional. The six types identified by Korn are listed in (8)-(13):

(8) Korn's Type I

Languages: Kirgiz, Altai

		<i>Potential Target</i>	
		A	I
<i>Potential Trigger</i>	o	+	+
	ö	+	+
	u	~	+
	ü	+	+

This table is to be read as follows. The vowels *o*, *ö*, and *ü* obligatorily trigger harmony in a following non-high vowel (A) and a following high vowel (I). The vowel *u* obligatorily triggers harmony in a following high vowel (I), but only optionally triggers harmony when the following vowel is non-high (A).

(9) Korn's Type II

Languages: Shor

		<i>Potential Target</i>	
		A	I
<i>Potential Trigger</i>	<i>o</i>	+	~
	<i>ö</i>	+	+
	<i>u</i>	-	+
	<i>ü</i>	+	+

(10) Korn's Type III

Languages: Kazakh, Chulym Tatar

		<i>Potential Target</i>	
		A	I
<i>Potential Trigger</i>	<i>o</i>	-	+
	<i>ö</i>	+	+
	<i>u</i>	-	+
	<i>ü</i>	+	+

(11) Korn's Type IV

Languages: Kyzyl

		<i>Potential Target</i>	
		I	A
<i>Potential Trigger</i>	o	-	-
	ö	+	+
	u	-	+
	ü	+	+

(12) Korn's Type V

Languages: Kachin Khakass

		<i>Potential Target</i>	
		A	I
<i>Potential Trigger</i>	o	-	-
	ö	-	-
	u	-	+
	ü	-	+

(13) Korn's Type VI¹

Languages: Turkish, Karagass, Tuvin, Uygur, Uzbek

		<i>Potential Target</i>	
		A	I
<i>Potential Trigger</i>	o	-	+
	ö	-	+
	u	-	+
	ü	-	+

From this typology, Korn concludes that certain trigger-target combinations are more or less likely to give rise to rounding harmony. His conclusions are summarized in (14):

(14) Summary of Korn's conclusions (Korn 1969, p. 105)

a. If the *target* vowel is non-high:

- Rounding harmony is more likely to be observed when the trigger is [-back] as opposed to [+back].
- Rounding harmony is less likely to be observed if the trigger is high.

b. If the *target* vowel is high:

- Rounding harmony is more likely to be observed when the trigger is [-back] as opposed to [+back].
- Rounding harmony is less likely to be observed if the trigger is non-high.

Stated differently, rounding harmony is more likely to be triggered by front vowels than by back vowels, and harmony is favored when the trigger and target agree in height.

2.3 Rounding Harmony and [+high]

In traditional Turkic grammar, particularly in the works of Menges (1947, 1968), a distinction is drawn between assimilation in rounding which targets a high vowel, referred to as *labial harmony*, and assimilation in rounding which targets a non-high vowel, referred to as *labial attraction*. Historical

¹ This in fact represents Korn's type VIII. For the purposes of this discussion, Korn's Types V-VII, which distinguish sets of historically merged vowels, are equivalent.

records indicate that labial harmony began appearing as a phonological pattern earlier than labial attraction. Here the term “labial vowel” refers to any rounded vowel:

All the suffixes of Turkic can be divided on the basis of their vocalism into those having a/ö and those having y/i [ý/i -AK]. In time -- and this is as early as the earliest Turkic texts -- the suffixes with y/i after a preceding syllable with a labial vowel could occasionally have u/ü. This type of assimilation is generally called Labial Harmony... Vowel assimilation after labials is carried still further to Labial Attraction, demanding a labial vowel also in the case of the stem syllables or suffixes having a/ö. Menges (1968, p. 76)

Indeed, based upon the types discovered in Korn's survey, a distinction between rounding harmony which targets high vowels on the one hand, and rounding harmony which targets non-high vowels on the other, is clearly attested in the synchronic grammars of Turkic languages. In the languages of Korn's Types V and VI, for example, only high vowels are targeted by rounding assimilation.

Korn's Type VI (given as (13) above) is widely represented, languages of this type coming from the Western, Southern, Northern and Eastern branches of Turkic. In languages of this type, high vowels consistently undergo rounding harmony when they follow rounded vowels, whereas in non-initial syllables, non-high vowels are always unrounded. Relevant data from languages representing each of these branches are given in 2.3.1-2.3.4.

2.3.1 *Western Turkic:*² *Karačay*

Karačay is a Caucasian Turkic language very closely related to Balkar. The two are so closely related, in fact, that they share a common literary language developed during the Soviet period (Grimes, 1988). My primary source for this language is an article by Herbert (1962).

Karačay has the canonical Turkic vowel inventory listed in (15):

(15) Karačay Vowel Inventory (Herbert, p. 97)

	Front		Back	
	Unround	Round	Unround	Round
High	i	ü	ɨ	u
Non-high	e	ö	a	o

High suffixal vowels surface as rounded following rounded root vowels, as shown below in (16e-h). These forms contain the first person possessive suffix {-im, -im, -üm, -um}:

² The classification "Western" is used in Grimes (1988) but for some reason is avoided in Comrie (1981).

(16) High Suffixal Vowels

a.	iyt	'dog'	iyt-im	'my dog'
b.	et	'meat'	et-im	'my meat'
c.	sirt	'back'	sirt-im	'my back'
d.	at	'horse'	at-im	'my horse'
e.	süt	'milk'	süt-üm	'my milk'
f.	öt	'bile'	öt-üm	'my bile'
g.	but	'hind leg'	but-um	'my hind leg'
h.	ot	'grass'	ot-um	'my grass'

Low suffix vowels are consistently unrounded, as shown in (17e-f). These data contain the plural suffix */-le, -la/*:

(17) Low Suffixal Vowels

a.	iyt	'dog'	iyt-le	'dog-PL'
b.	et	'meat'	et-le	'meat-PL'
c.	sirt	'back'	sirt-la	'back-PL'
d.	at	'horse'	at-la	'horse-PL'
e.	süt	'milk'	süt-le	'milk-PL'
f.	öt	'bile'	öt-le	'bile-PL'
g.	but	'hind leg'	but-la	'hind leg-PL'
h.	öt	'grass'	ot-la	'grass-PL'

The familiar rounding harmony pattern of Standard Turkish is also of this type.

2.3.2 *Southern Turkic: Azerbaydzhan (Comrie, 1981) & Turkish*

The vowel inventory of Azerbaydzhan is given in (18). Comrie states that while the language has on the surface two non-high front rounded vowels, namely *æ* and *e*, only *æ* occurs in suffixes:

(18) Azerbaydzhan Vowel Inventory

	Front		Back	
	Unround	Round	Unround	Round
High	i	ü	ɨ	u
Mid	e	ö		o
Low	æ		a	

As in Karaçay, high suffixal vowels are rounded following rounded vowels, whereas non-high suffix vowels are consistently unrounded. Consider the suffixed forms in (19) and (20):

(19) High Vowel Suffixes

a.	jarpag 'leaf'	jarpaV-ın	'leaf-GEN'
b.	külæk 'wind'	külæj-in	'wind-GEN'
c.	ox 'arrow'	ox-un	'arrow-GEN'
d.	söz 'word'	söz-ün	'word-GEN'

(20) Low Vowel Suffixes

a.	jarpag 'leaf'	jarpay-da	'leaf-LOC'
b.	külæk 'wind'	külæk-dæ	'wind-LOC'
c.	ox 'arrow'	ox-da	'arrow-LOC'
		(*ox-do)	
d.	söz 'word'	söz-dæ	'word-LOC'
		(*söz-dö)	

The pattern found in Karaçay and Azerbaydzhan is also found in standard Turkish. In Turkish, however, only eight vowel qualities are contrastive:

(21) Turkish Vowel Inventory

	Front		Back	
	Unround	Round	Unround	Round
High	i	ü	ɨ	u
Non-high	e	ö	a	o

Words with suffixes containing high vowels are given in (22). The high vowel of the suffix undergoes rounding harmony, as indicated. The suffixes shown in (23), which contain non-high vowels, do not undergo rounding harmony:

(22) High Vowel Suffixes

a.	ip	‘rope’	ip-im	‘my rope’
b.	süt	‘milk’	süt-üm	‘my milk’
c.	ev	‘house’	ev-im	‘my house’
d.	çöp	‘garbage’	çöp-üm	‘my garbage’
e.	kız	‘girl’	kız-ım	‘my girl’
f.	buz	‘ice’	buz-um	‘my ice’
g.	at	‘horse’	at-ım	‘my horse’
h.	gol	‘(football) goal’	gol-um	‘my (football) goal’

(23) Low Vowel Suffixes

a.	ip	‘rope’	ip-e	‘rope-DAT’
b.	süt	‘milk’	süt-e	‘milk-DAT’
			*süt-ö	
c.	ev	‘house’	ev-e	‘house-DAT’
d.	çöp	‘garbage’	çöp-e	‘garbage-DAT’
			*çöp-ö	
e.	kız	‘girl’	kız-a	‘girl-DAT’
f.	buz	‘ice’	buz-a	‘ice-DAT’
			*buz-o	
g.	at	‘horse’	at-a	‘horse-DAT’
h.	gol	‘(football) goal’	gol-a	‘(football) goal-DAT’
			*gol-o	

Although high suffixal vowels undergo rounding harmony in the examples in (22) above, it is important to note that in the same forms, an intervening non-high rounded vowel would serve to block harmony. For instance, the interrogative clitic *{mi, mü, mi, mu}* is subject to rounding harmony. Thus, the words in (22) can all be made into questions by adding the interrogative clitic:³

(24) The Interrogative Clitic

a.	ip mi?	‘is it rope?’	ip-im mi?	‘my rope?’
b.	süt mü?	‘is it milk?’	süt-üm?	‘my milk’
c.	ev mi?	‘is it a house?’	ev-im mi?	‘my house’
d.	çöp mü?	‘is it garbage?’	çöp-üm mü?	‘my garbage?’
e.	kız mı?	‘is it a girl?’	kız-ım mı?	‘my girl?’
f.	buz mu?	‘is it ice?’	buz-um mu?	‘my ice?’
g.	at mı?	‘is it a horse?’	at-ım mı?	‘my horse?’
h.	gol mu?	‘is it a goal?’	gol-um mu?	‘my goal?’

However, when the suffixed words from (23) occur with the interrogative clitic, the vowel of the clitic is invariably unrounded. That is, the unrounded suffix *[-e, -a]* blocks rounding harmony from the final vowel of the root onto the clitic. This blocking effect is shown in (25):

(25) The Blocking Effect

a.	ip-e mi?	‘rope-DAT?’
b.	süt-e mi?	‘milk-DAT?’
	*süt-e mü?	
c.	ev-e mi?	‘house-DAT?’
d.	çöp-e mi?	‘garbage-DAT?’
	*çöp-d mü?	
e.	kız-a mı?	‘girl-DAT?’
f.	buz-a mı?	‘ice-DAT?’
	*buz-a mu?	
g.	at-a mı?	‘horse-DAT?’
h.	gol-a mı?	‘(football) goal-DAT?’
	*gol-a mu?	

³ Although this morpheme is written as an independent word in Turkish orthography, the fact that it is subject to both rounding harmony and backness harmony shows that it is not a free root but rather an affix or a clitic. Stress patterns suggest that it should be treated as a clitic, though the stress facts themselves are not relevant to the issue under discussion here.

2.3.3 Northern Turkic: Tuva (Krueger, 1977)⁴

Tuva is spoken in the former Soviet Union, in Mongolia and in China. The vowel inventory given in (26) is identical to that of Turkish. The non-high vowels other than *a* are described as "semi-wide" or "slightly raised from a completely low position" (Krueger, p. 95). The vowel *a* is described as low and back (p. 94):

(26) Tuva Vowel Inventory⁵

	Front		Back	
	Unround	Round	Unround	Round
High	i, i:	ü, ü:	ɨ, ɨ:	u, u:
Non-high	ɛ, ɛ:	œ, œ:	a, a:	ɔ, ɔ:

Just as in Turkish, high suffix vowels are rounded when preceded by a rounded vowel, regardless of the height of the trigger. Examples are given in (27) and (28). The words in (27) contain the ordinal suffix {-*k/gi*, -*k/gü*, -*k/gɨ*, -*k/gu*}:

(27) High Vowel Suffixes: (Krueger, p. 122)

a.	bir-gi	‘first’
b.	sɛs-ki	‘eighth’
c.	üš-kü	‘third’
d.	dœrt-kü	‘fourth’
e.	aldɨ-gɨ	‘sixth’
f.	tɔzan-gɨ	‘ninetieth’
g.	muŋ-gu	‘thousandth’
h.	ɔn-gu	‘tenth’

The words in (28) contain the genitive suffix {-*t/d/nɨŋ*, -*t/d/nüŋ*, -*t/d/nɨŋ*, -*t/d/nuŋ*}:

⁴ Krueger refers to this language as Tuvianian.

⁵ According to Krueger’s description, a third series of vowels, namely a glottalized series, exists in addition to the long and short pairs listed in (24).

(28) Additional High Vowel Suffixes: (Krueger, p. 112)

- a. inək-tiŋ ‘cow-GEN’
- b. xün-nüŋ ‘day/sun-GEN’
- c. sæl-düŋ ‘square-GEN’

- d. kım-niŋ ‘who-GEN’
- e. xar-niŋ ‘snow-GEN’
- f. nəm-nuŋ ‘book-GEN’
- g. xəl-nuŋ ‘arm-GEN’

And again, as in Turkish, non-high suffix vowels are not rounded following rounded vowels. The words in (29) contain the locative suffix {-t/da, -t/də}:

(29) Non-high Vowel Suffixes: Locative (Krueger, p. 114)

- a. ežik-te ‘door-LOC’
- b. inək-te ‘cow-LOC’
- c. xün-de ‘sun/day-LOC’
*xün-də
- d. xæl-de ‘lake-LOC’
*xæl-də

- e. kır-da ‘ridge-LOC’
- f. dag-da ‘mountain-LOC’
- g. xovu-da ‘steppe-LOC’
*xovu-də

- h. dǝš-ta ‘ice-LOC’
*dǝš-tə

The words in (30) contain the ablative suffix {-t/dan, -t/dən}:

(30) Non-high Vowel Suffixes: Ablative (Krueger, p. 115)

- a. ežik-tən ‘door-ABL’
b. inək-tən ‘cow-ABL’
c. xün-den ‘sun/day-ABL’
 *xün-dœn
d. pœš-ten ‘cedar-ABL’
 *pœš-tœn

e. kir-dan ‘ridge-ABL’
f. mal-dan ‘cattle-ABL’
g. ulus-tan ‘people-ABL’
 *ulus-tan
h. ɔt-tan ‘fire-ABL’
 *ɔt-tɔn

And finally, just as in Turkish, when a non-high vowel intervenes between a high suffixal vowel and a preceding rounded vowel, rounding harmony is prevented from occurring. In the examples in (31e and g), the high vowel of the past tense suffix {-*d/ti*, -*d/tü*, -*d/ti*, -*d/tu*} undergoes rounding harmony triggered by a rounded vowel in the root. In the examples in (31f and h) however, the low vowel suffix {-*p/ba*, -*p/bɛ*},⁶ ‘negative’, precedes the high vowel of the past tense suffix, and rounding harmony is blocked:

(31) The Blocking Effect

- | | | | |
|-----------|-----------|--------------|------------------------------|
| a. kəl-di | ‘He came’ | b. kəl-bɛ-di | ‘He didn’t come’ |
| c. al-dɪ | ‘He took’ | d. al-ba-dɪ | ‘He didn’t take’ |
| e. œs-tü | ‘He grew’ | f. œs-pɛ-di | ‘He didn’t grow’ (*ös-pɛ-dü) |
| g. uš-tu | ‘He flew’ | h. uš-pa-di | ‘He didn’t fly’ (*uš-pa-du) |

⁶ The negative suffix in fact has the following variants (Krueger, p. 129-30):

- ba/-be: After the sonants l, r, y, V
- pa/-pe: After voiceless consonants
- va/-ve: After vowels
- ma/-me: After nasals

2.3.4 Eastern Turkic: Uygur

Uygur (Hahn (1991), Lindblad (1990)), classified by Comrie as belonging to the Eastern Turkic branch, is spoken in the former Soviet Union, China and by small groups as far west as Turkey and Iran. This language presents an interesting case of Korn's Type VI because in this language, certain suffixal vowels are targeted by rounding harmony while others are not. Those suffix vowels which do undergo rounding harmony are all high. The underlying vowel inventory, as analyzed by Hahn (1991), is as shown in (32):

(32) Uygur Vowel Phonemes (Hahn's analysis, pp. 33-44)

	Front		Back	
	Unround	Round	Unround	Round
High	i	ü	ɨ ⁷	u
Mid	(e)	ö		o
Non-high		ö	a	

The phoneme *e* is enclosed in parentheses because this vowel occurs only in loanwords such as *uniwersitet* (< Russ. *universitet*), *Xebey* 'Hebei' (< Chin. *HŽbe**), *rentgen* 'radiography'.⁸

On the surface, Uygur has only one unrounded high vowel, *i*. Certain roots containing *i* in the final syllable take [-back] suffixes, in conformity with the typical Turkic backness harmony pattern. However, in the majority of cases, vowels following *i* are [+back]. As a further complication, certain stems in *i* are followed by the [-back] variant of one set of suffixes, while it is the [+back] variant of a second set of suffixes which surfaces following those same stems (Lindblad 1990).

With respect to rounding harmony in suffixal vowels, Uygur has a class of suffixes which contain alternating high vowels. The vowels of such suffixes surface with rounded vowels when a rounded vowel occurs in the preceding syllable; otherwise, they occur with unrounded vowels. This is the familiar pattern. The words in (33) contain the first person singular possessive suffix {-*im*, -*um*, -*üm*}, the rounded variants occurring when the preceding vowel is rounded:

⁷ Under Hahn's analysis, underlying /ɨ/ and /i/ merge on the surface as [i]. The motivation for positing underlying /ɨ/ is the existence of a large class of roots containing a final-syllable [i] which take back vocalic suffixes.

⁸ Hahn points out that the vowel /e/ is in certain cases followed by back vowel suffixes as in *uniwersitetta* (**uniwersitetö*), 'at a/the university' and *Xebeyda* (**Xebeyde*) 'in Hebei'.

(33) Alternating High Suffix Vowel: -Im '1.POSS' (Lindblad, p. 17)

a.	yol	'road'	yol-um	'my road'
b.	pul	'money'	pul-um	'my money'
c.	at	'horse'	et-im ⁹	'my horse'
d.	qiz	'girl'	qiz-imiz	'my girl'
	(qiz under Hahn's analysis)			
e.	köl	'lake'	köl-üm	'my lake'
f.	yüz	'face'	yüz-üm	'my face'
g.	xöt	'letter'	xöt-im	'my letter'
h.	pikir	'opinion'	pikir-im	'my opinion'

At the same time, however, Uygur has a number of suffixes which contain non-alternating high vowels. For example, another set of suffixes contains vowels which are invariably rounded, regardless of the quality of the preceding vowel. One such suffix is the gerundive, represented as /-GU/ in Lindblad's analysis. Examples containing /-GU/ are shown in (34):

(34) Non-alternating Rounded Suffix Vowel: -GU 'Gerundive' (Lindblad, p. 17)

a.	bol-	'become'	bol-g#u-	'become-GER'
b.	oqut-	'teach'	oqut-qu-	'teach-GER'
c.	yaz-	'write'	yaz-g#u-	'write-GER'
d.	tiq-	'insert'	tiq-qu-	'insert-GER'
	(tiq- under Hahn's analysis)			
e.	kör-	'see'	kör-gü-	'see-GER'
f.	küt-	'wait'	küt-kü-	'wait-GER'
g.	köl-	'come'	köl-gü-	'come-GER'
h.	tik-	'sew'	tik-kü-	'sew-GER'

The words in (35) contain the first person plural possessive suffix /-imiz/, a suffix which contains the unrounded vowel *i* regardless of the quality of the preceding vowel:¹⁰

⁹ The a/e alternation observed here is, according to Lindblad (p. 10) the result of a raising rule. This rule raises certain low vowels in initial open syllables to mid, when the following vowel is *i*.

(35) Non Alternating Unrounded Suffix Vowel: -imiz ' (Lindblad, p. 17)

a.	yol	'road'	yol-imiz	'our road'
b.	pul	'money'	pul-imiz	'our money'
c.	at	'horse'	et-imiz	'our horse'
d.	qiz	'girl'	qiz-imiz	'our girl'
e.	köl	'lake'	köl-imiz	'our lake'
f.	yüz	'face'	yüz-imiz	'our face'
g.	xöt	'letter'	xöt-imiz	'our letter'
h.	pikir	'opinion'	pikir-imiz	'our opinion'

Despite the morpheme-specific nature of rounding harmony effects in Uygur, the language is arguably a Type VI language in that rounding harmony, when observed, targets only high vowels and is triggered by both high and non-high vowels. The system is clearly quite complex, however, and a phonological treatment of the alternating and non-alternating suffixes is not offered in this thesis, however it is clear that this language would also prove to be a testing ground for the theory of the content and structure of lexical representations.

2.4 Rounding Harmony and [α high]

In addition to the tendency for languages to impose a height condition on the target of rounding harmony (namely that it must be [+high]), in certain Turkic languages rounding harmony in some or all configurations is observed only when the trigger and target agree in height. As a consequence, in systems in which such a constraint is operative, sequences of distinct rounded vowels are prevented from surfacing. Some examples of this phenomenon are presented here.

¹⁰To eliminate the hypothesis that the suffix *-imiz* resists rounding harmony due to its polysyllabicity (e.g. because harmony is a strictly local, close-range effect), consider the monosyllabic agentive suffix *-çi*, which, like *-imiz*, is not subject to rounding harmony:

a.	bol-	'become'	bol-ğ̃u-çi	'become-GER-AGT'
b.	oqut-	'teach'	oqut-qu-çi	'teach-GER-AGT'
c.	yaz-	'write'	yaz-ğ̃u-çi	'write-GER-AGT'
d.	tiq-	'insert'	tiq-qu-çi	'insert-GER-AGT'
e.	kör-	'see'	kör-g̃Y-çi	'see-GER-AGT'
f.	küt-	'wait'	k̃Yt-k̃Y-çi	'wait-GER-AGT'
g.	köl-	'come'	köl-g̃Y-çi	'come-GER-AGT'
h.	tik-	'sow/sew'	tik-k̃Y-çi	'sow/sew-GER-AGT'

2.4.1 *Kachin Khakass (Korn, 1969)*

Khakass is a Northern Turkic language spoken in the former Soviet Union and in China. The Kachin (or Kacha) dialect is cited by Korn as exemplifying his Type V in which the trigger and target of rounding harmony must both be [+high]. This type represents a more restrictive system than Korn's Type VI in which a height condition is placed only on the target of rounding harmony. In Type V, not only must the target be [+high], but the trigger and target must also agree with respect to height; therefore, rounding harmony generates only the sequences *uCu* and *üCü*. The data cited in Korn's article are reproduced in (36) and (37). The only cases in which a suffixal vowel is rounded are in (37c and d), where the trigger and target are both [+high]:

(36) Kachin Khakass: Low Vowel Suffixes

- | | | |
|----|----------------------|--------------|
| a. | pol-za (*pol-zo) | 'if he is' |
| b. | čör-gön (*čör-gön) | 'who went' |
| c. | kuzuk-ta (*kuzuk-to) | 'in the nut' |
| d. | kün-gö (*kün-gö) | 'to the day' |

(37) Kachin Khakass: High Vowel Suffixes

- | | | |
|----|--------------------|----------------|
| a. | ok-tiŋ (*ok-tuŋ) | 'of the arrow' |
| b. | čör-zip (*čör-züp) | 'having gone' |
| c. | kuš-tuŋ | 'of the bird' |
| d. | kün-nü | 'day-ACC' |

2.4.2 *Yakut (Krueger, 1962)*

Yakut is a Northern Turkic language spoken in the former Soviet Union. I rely exclusively on the descriptions, data and generalizations provided in Krueger's (1962) grammar of this language. According to Krueger, Yakut has the vowel inventory given in (38). In addition to the canonical three-dimensional Turkic system, vowel length is contrastive for all qualities other than *ö*, and the falling diphthongs listed below (each containing a single value for backness and rounding) occur:

(38) Yakut Vowel Inventory

	Front		Back	
	Unround	Round	Unround	Round
High	i, i:	ü, ü:	ɨ, ɨ:	u, u:
Non-high	e, e:	ö	a, a:	o, o:
Falling Diphthongs	ie	üö	ɨa	uo

Krueger lists the following minimal pairs, demonstrating that vowel length is contrastive:

(39) Minimal Pairs for Vowel Length

tas	‘exterior’	ta:s	‘stone’
at	‘horse’	a:t	‘name, renown’
keler	‘he is coming’	kele:r	‘he is going to come’
eter	‘he talks’	ete:r	‘he is going to talk’
bis	‘to grease, oil’	bi:s	‘sort, type’
is	‘to drink’	i:s	‘sewing’
kir	‘to gnaw, chew’	ki:r	‘to enter’
tolon	‘degree’	tolo:n	‘valley’
solo	‘rank, position’	solo:	‘to clean up, clear off’
tur	‘to stand’	tu:r	‘to handle, heft’
kur	‘belt, strap’	ku:r	‘to dry’
mus	‘to gather’	mu:s	‘ice’
üt	‘to strike, hit’	ü:t	‘milk’
sül	‘to skin, peel’	sü:l	‘to be in heat (of animals)’

In Yakut, high vowels are always subject to rounding harmony. Non-high vowels, by contrast, are only subject to rounding harmony if the potential trigger is itself a non-high vowel. Thus, we see that Yakut shares with Korn’s Type VI languages the tendency to single out high vowels as targets (or, put another way, to avoid targeting non-high vowels). In addition, Yakut shares with Kachin Khakass the tendency for rounding harmony to be observed in configurations in which the trigger and target agree with respect to height. In Kachin Khakass both trigger and target must be high, whereas in Yakut, trigger and target must either agree in height (yielding the sequences *uCu*, *üCü*, *oCo*, *öCö*), or the target must be high (thus allowing the sequences *oCu* and *öCü* as well). The patterning of diphthongs is discussed below.

Krueger’s summary of the vowel harmony phenomena of Yakut (including both backness and rounding harmony) is paraphrased here in (40):

(40) Summary: Vowel Harmony in Yakut (Krueger, p. 49)

- a. After a front vowel, only a front vowel may occur.
- b. After a back vowel, only a back vowel may occur.
- c. After an unrounded vowel, only an unrounded vowel may occur.
- d. After a rounded vowel, only a rounded vowel may occur (except that unrounded *a* or *e* occur after *u* and *ü* respectively).

Examples from suffixal alternations show these patterns most vividly, though the generalizations in (40) hold for vowels within native roots as well. Let us begin with high vowel suffixes which, as stated above, exhibit rounding harmony regardless of the height of the trigger. In (41), high vowel suffixes are shown occurring following unrounded root vowels:

(41) High Vowel Suffixes, Unrounded Root Vowels

- a. aya-ni 'father-ACC'
- b. pa:rta-ni 'desk-ACC'
- c. iška:p-ti:n 'cabinet-SOC'

- d. kinige-ni 'book-PL'
- e. kihi-li:n 'man-SOC'
- f. et-im 'meat-my'
- g. iye-γit 'mother-1.PL.GEN'

Following rounded root vowels, the high suffixal vowels are rounded:

(42) High Vowel Suffixes, Rounded Root Vowels

- a. oyo-nu 'child-ACC'
- b. oyo-lu:n 'child-SOC'
- c. oχ-u 'arrow-ACC'
- d. murun-u 'nose-ACC'
- e. tobug-u 'knee-ACC'

f.	bör-nü	‘wolf-ACC’
g.	öy-ü	‘sense-ACC’
h.	kötör-dün	‘bird-SOC’
i.	doğor-uη	‘friend-2.SG.GEN’
j.	tünnüg-ü	‘window-ACC’
k.	ü:- üη	‘milk-2.SG.GEN’

In (43), low vowel suffixes are shown following roots in which the final vowel is unrounded. As expected, in this context low suffixal vowels are themselves unrounded as well:

(43) Non-high Vowel Suffixes, Unrounded Root Vowels

a.	aya-lar	‘horse-PL’
b.	balık-lar	‘fish-PL’
c.	aya-ya	‘father-DAT’
d.	et-ter	‘meat-PL’
e.	kini-ler	‘he-PL’ (‘they’)

When the final vowel of the root is non-high and rounded, a non-high suffixal vowel surfaces as rounded, as shown in (44):

(44) Non-high Vowel Suffixes, Rounded Non-high Root Vowels

a.	öttöχ-tor	‘farm-PL’
b.	ohoχ-tor	‘stoves-PL’
c.	torbos-tor	‘heifer-PL’
d.	börö-ttön	‘wolf-ABL’
e.	son-ton	‘jacket-ABL’

Rounding harmony fails to apply, however, when the potential trigger is [+high], as shown here in (45):

(45) Non-high Vowel Suffixes, Rounded, High Root Vowels

- a. tnnük-ter ‘window-PL’
*tünnük-tör
- b. tobuk-ka ‘knee-DAT’
*tobuk-ko
- c. kömüs-te:yer ‘silver-COMP’
*kömüs-tö:γör

The rounded diphthongs *uo*, *üö* pattern as if they were high vowels, perhaps indicating that the first half of the diphthong occupies the syllable nucleus while the second half occupies the syllable margin. The diphthongs may occur following either high or non-high rounded vowels (although in Krueger’s grammar no suffixal diphthongs are listed), and they fail to trigger rounding of a following non-high vowel. Examples of the rounded diphthongs in non-initial position are given in (46):

(46) Non-initial Rounded Diphthongs (Krueger, p. 38, 53)¹¹

- a. öyüö ‘provisions’
- b. söpsüö ‘to approve’ (< Mong. *jöbšiye*)
- c. kürüö ‘fence’
- d. boppurous ‘question, problem’ (< Russ. *vopros*)
- e. borokuot ‘steamship’ (< Russ. *paraxod*)

Examples demonstrating that rounded diphthongs fail to trigger rounding of a following non-high suffixal vowel are given in (47). Given the falling nature of these diphthongs (i.e. that the first half is [+high] and the latter half is [-high]), one might expect them to pattern as low vowels with respect to vowels which follow. More specifically, the fact that the rounded diphthongs do not trigger rounding of a following non-high vowel requires an explanation, since as we saw above, non-high rounded monophthongs do trigger rounding of a following non-high vowel:¹²

¹¹There are relatively few examples demonstrating this point. On pp. 49-50, however, Krueger states that the diphthongs (unrounded as well as rounded) are all capable of occurring in non-initial position. The rounded diphthongs occur just as long as the vowel in the preceding syllable is rounded (regardless of its height).

¹²The behavior of Yakut diphthongs in the rounding harmony system suggests that they pattern as high vowels with respect to the assessment of constraint violations. This is discussed in more detail in Chapter 6.

(47) Diphthongs as Rounding Harmony Triggers (and *Non-triggers*)¹³

a.	üör-ü	‘herd-ACC
b.	üör-ge (*üör-gö)	‘herd-DAT’
c.	küöl-ü	‘lake-ACC’
d.	küöl-ge (*küöl-gö)	‘lake-DAT’
e.	muos-u	‘horn-ACC’
f.	muos-ka (*muos-ko)	‘horn-DAT’

2.5 Rounding Harmony & [back]

Just as certain rounding harmony systems discovered by Korn are subject to height conditions (requiring that the target be [+high] or that the trigger and target agree in height), certain harmony systems also refer to the backness of the trigger and target. What one finds is that rounding harmony is observed in certain configurations in which the the trigger is [-back] when, in analogous configurations in which the trigger is [+back], rounding harmony does not occur.

2.5.1 Kazakh (Korn, 1969)

In Kazakh (Korn 1969) as well as in Karakalpak (Menges 1947), rounding harmony is invariably observed when the potential trigger is [+high]. In this regard, these languages resemble Korn's Type VI languages. In addition, however, rounding harmony is also observed just in case the trigger and target are both [-back]. That is, not only are the sequences *uCu*, *üCü*, *oCu*, *öCü* observed, but the sequences *öCö* and *üCö* surface as well. The relevant data from Korn's article are shown in (48), where the suffixes contain high vowels and consistently undergo rounding harmony regardless of whether the sequence involves front vowels or back vowels. In (49), rounding harmony is shown to target non-high suffixal vowels only if the vowels in question are front:

(48) High Suffixal Vowels

a.	köl-dü	‘lake-ACC’
b.	üy-dü	‘house-ACC’
c.	koy-du	‘sheep-ACC’
d.	kul-du	‘servant-ACC’

¹³To anticipate the analysis which will be proposed further on, the relevant constraints are *ROLO and UNIFORM [RD]. Evidently, the creation of rounded diphthongs does not violate the constraint dictating against rounded non-high vowels (*ROLO). Furthermore, rounded diphthongs and non-high rounded vowels involve non-uniform lip-rounding. A harmonic sequence involving a rounded diphthong and a rounded non-high vowel thus will incur a violation of UNIFORM [RD]. These constraints are discussed in detail in Chapters 5 and 6.

(49) Non-high Suffixal Vowels

- a. köI-dö 'lake-LOC'
- b. üy-dö 'house-LOC'
- c. son-dan (*son-don) 'rubble-ABL'
- d. kul-da (*kul-do) 'at the servant'

2.5.2 *Kirgiz (Herbert & Poppe's (1963) Dialect)*

In the description of Kirgiz given in Herbert & Poppe (1963) the only configuration in which rounding harmony is *not* observed is when the trigger is high, the target disagrees with the trigger in height, and the vowels in question are back. Specifically, the sequence *u-a* surfaces in preference to the sequence *u-o*. The vowel inventory provided by Herbert and Poppe is the standard three-dimensional Turkic system, repeated in (50):

(50) Kirgiz Vowel Inventory (Herbert & Poppe, pp. 3-7)

	Front		Back	
	Unround	Round	Unround	Round
High	i	ü	ɨ	u
Non-high	e	ö	a	o

To demonstrate the pattern described above, consider the surface realizations of vowels in the ordinal suffix, which contains [+high] vowels, as compared with those of the ablative suffix, which contains low vowels. In the forms containing the ordinal {-inči, -ünčü, -inči, -unču}, shown in (51), the rounded variants surface when the final vowel of the root is rounded, regardless of the height of the potential target or the backness of the vowel sequence as a whole:

(51) The Ordinal Suffix (Herbert & Poppe, pp. 7-8)

- a. biri-inči 'one-ORD, *first*'
- b. beš-inči 'five-ORD, *fifth*'
- c. üç-ünčü 'three-ORD, *third*'
- d. tört-ünčü 'four-ORD, *fourth*'

- e. alti-nci ‘six-ORD, *sixth*’
- f. jiyirma-nči ‘twenty-ORD, *twentieth*’
- g. toguz-unču ‘nine-ORD, *ninth*’
- h. on-unču ‘ten-ORD, *tenth*’

In the forms containing the ablative suffix {-t/den, -t/dön, -t/dan, -t/don}, the rounded variants surface just in case the vowels agree in height (i.e. the final vowel of the root is itself non-high) or the vowels in question are [-back]:

(52) The Ablative Suffix (Herbert & Poppe, p. 8)

- a. iš-ten ‘job-ABL’
- b. et-ten ‘meat-ABL’
- c. üy-dön ‘house-ABL’
- d. köl-dön ‘lake-ABL’

- e. jil-dan ‘year-ABL’
- f. asan-dan ‘Hasan-ABL’
- g. turmuš-tan ‘life-ABL’
(*turmuš-ton)
- h. tokoy-don ‘forest-ABL’

Thus, from the examples above, the only instance in which a rounded root vowel fails to trigger rounding of a suffixal vowel is given in (52g). In this example, the potential trigger and target disagree in height, and the target is non-high.

2.5.3 *Shor* (Korn, 1969)

Shor is of particular interest because it exemplifies each restriction discussed thus far in this section. Rounding harmony in *Shor* is observed when the target is [+high], as long as the trigger is [+high] as well. When the potential trigger is [-high], rounding of a [+high] vowel is apparently optional. The situation is somewhat different when the potential target is [-high]. Rounding harmony is consistently observed when the vowels in question are front. If the vowels are back, then harmony is observed only when the trigger and target agree in height. This pattern is summarized in (53):

(53) Rounding Harmony in Shor (Korn 1969)

- a. If trigger and target are front, rounding harmony is observed regardless of height.
- b. If trigger and target are back, rounding harmony is observed when trigger and target agree in height.
- c. If trigger and target are back but disagree in height, rounding harmony is *optionally* observed if the target is [+high].
- d. If trigger and target are back but disagree in height, rounding harmony is never observed if the target is [-high].

Examples illustrating the statements in (53) are given in (54):

(54) Examples from Shor (Korn, 1969)

- | | | |
|----|-------------------|----------------------|
| a. | mün-üp | ‘having mounted’ |
| | sös-töy | ‘from the word’ |
| | kör-zö | ‘if (he) sees’ |
| | külük-tö | ‘at the brave man’s’ |
| | kök-tüŋ | ‘of the sky’ |
| b. | kuš-tun | ‘of the bird’ |
| | kol-doŋ | ‘from the hand’ |
| | pol-zo | ‘if (he) is’ |
| c. | coñ-niŋ / coñ-nuŋ | ‘of the people’ |
| d. | ug-ar | ‘which will grasp’ |

2.6 Conclusions: Turkic

We have seen that the Turkic languages typically impose conditions on the application of rounding harmony and that those conditions are of two basic types: They refer either to the height of the participating vowels, or to their backness. With respect to height, we saw that rounding harmony systems frequently avoid generating non-high rounded vowels. Such is the case in the languages discussed in 2.3, where rounding harmony targets only high vowels. In addition, in some systems rounding harmony fails to occur when the output of the rule would be a sequence of distinct rounded vowels, that is a sequence of rounded vowels which disagree in height. We saw this type of harmony in Kachin Khakass, where the trigger and target must agree in height and the vowels in question must be [+high], as well as in Yakut, where the trigger and target must agree in height *or* the target must be high. With respect to backness, we

saw that in some languages rounding harmony fails to apply within certain back vocalic contexts where, in the analogous front vocalic contexts, harmony is observed. In Kazakh, Kirgiz and Shor, we saw instances in which rounding harmony is observed across-the-board when the vowels in question are front, while harmony among back vowels occurs only in restricted contexts.

In the remainder of this chapter, I present the rounding harmony patterns found in the Mongolian and Tungusic languages.