CHAPTER 7

Comparative consequences of the tongue root harmony analysis for proto-Tungusic, proto-Mongolic, and proto-Korean

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This paper examines the role of retracted tongue root ([RTR]) harmony in Northeast Asian areal and genetic relationships. Recent research has suggested that at least three of the families grouped together as Altaic by Poppe (1960) – Korean, Mongolic, and Tungusic (KMT) – should be reconstructed with [RTR] vowel harmony. In this paper we reinforce this conclusion, arguing specifically against proposals that [RTR] harmony is secondary, or that [ATR] is the dominant feature. We also argue against the proposal of Starostin et al. (2003) that specific proto-families such as proto-Tungusic should be reconstructed without vowel harmony. We then compare the status of [RTR] harmony in Northeast Asia to the status of tongue root harmony in the Central Sudanic Zone, extending our discussion to the vowel harmony found in Chukchi, Yukaghir, Nivkh, and Ainu. We discuss whether KMT-style [RTR] harmony should be viewed as an innovation or a retention, and examine the particular issue of the Korean vowel inventory.

Keywords: Altaic, proto-Korean, proto-Mongolic, proto-Tungusic, tongue root harmony

1. Introduction

This paper examines a type of paradigmatic relationship that has long played an important role in thinking about languages across northern Eurasia – the paradigmatic relationships established or influenced by vowel harmony. Vowel harmony systems have the powerful paradigmatic effect of classifying every word in a language as belonging to one, or another, or no harmony class. The breakdown of harmony systems often has an effect on other paradigms in the conventional sense, and harmony class membership has played a role in comparative work on the languages of the region. Our specific focus is on the role of retracted tongue root ([RTR]) harmony in Northeast Asia. Recent research suggests that at least three of the families grouped together in Altaic by Poppe (1960) – Korean, Mongolic, and Tungusic (below KMT) – should be reconstructed as having vowel harmony with [RTR] as the dominant feature.[1] (Vaux 2009; Ko 2010, 2011, 2012, 2013a, b). In this paper we reinforce this conclusion, arguing specifically against proposals that [RTR] harmony is secondary (e.g. Svantesson 1985 for Mongolic), or that [ATR] is the dominant feature (Zhang & Dresher 2004 for Written Manchu). We also argue against the proposal of Starostin et al. (2003) that specific proto-families such as proto-Tungusic should be reconstructed without vowel harmony (Joseph & Whitman 2013). We then compare the status of [RTR] harmony – as product of inheritance or contact – to the status of tongue root (TR) harmony in the Central Sudanic Zone of Clements & Rialland (2008). In this region, it is obvious that [ATR] harmony is in part a contact-induced phenomenon, as it is distributed across language phyla (Niger-Congo, Nilo-Saharan, Afroasiatic). It has been argued that in Niger-Congo languages in this zone that [ATR] harmony is an innovation (Hyman 2011). Outside Korean, Mongolic, and Tungusic, [RTR] or [low]-dominant harmony is found in Chukchi and arguably in Yukaghir, height-sensitive vowel co-occurrence restrictions in Nivkh (Shiraishi & Botma 2013), and a limited type of height or "periphery-sensitive" harmony in Ainu (Shibatani 1990). Within and outside Altaic, [RTR] or height harmony appears to be an "eastern" trait, while palatal harmony (PH) appears to be a "western" trait in the region (cf. Janhunen 1981). We discuss whether KMT-style [RTR] harmony should be viewed as an innovation or a retention, and examine the particular issue of the Korean vowel inventory.

2. The argument for reconstructing [RTR] harmony in KMT

2.1 Vowel harmony in languages deemed Altaic

The majority of the languages grouped together by Poppe (1960) as Altaic have been characterized as having some kind of vowel harmony, generally falling into the four types in Table 1.

In many, if not all, cases, height harmony can be reanalyzed as tongue root harmony (TRH) (e.g. Udihe, Ko 2012, 2013b; see van der Hulst & van de Weijer 1995 for more examples). In this paper we focus on TRH, often in opposition to more traditional PH analyses. Table 2 shows representative examples of PH and TRH selected from each of the main branches of "core" Altaic as defined by Poppe (1960).[4]

Turkish exemplifies PH, operating on the contrast between front vs. back vowels. Although many Tungusic and Mongolic languages (as well as Old Korean as reconstructed by Lee 1972) have long been held to have PH, a growing body of evidence suggests that the non-Turkic families in the group are best described as having TRH based on a contrast of advanced vs. retracted position of the tongue root. For proto-languages in the three families, reconstruction of TRH is supported by the comparative method. We list previous research supporting the TRH for languages and families deemed Altaic in Table 3.

The TR analysis of modern varieties in the group is supported by the various pieces of phonetic and phonological evidence listed in Table 4.

We will assume that [ATR] and [RTR] are phonologically distinct features, following Goad (1992). Our position is that TR harmony in KMT is based on the feature [RTR] rather than [ATR], for reasons we touch on below.[5] It follows from this

1. Poppe (1960) discusses the relationship of Korean with the "core" Altaic families, Turkic, Mongolic, and Tungusic, and proposes some Korean cognates. In this paper we use the traditional term "Altaic" to include the four families related by Poppe, without making a commitment as to the validity of the genetic grouping, or ruling out the possibility of broader groupings.

Table 1. Four types of vowel harmony in Altaic.

Vowel harmony	Harmonic feature
a. Palatal harmony PH	[back] or [front]
b. Labial harmony[2]	[labial (round)]
c. Height harmony	[high] or [low]
d. Tongue root harmony TRH	[Advanced or Retracted Tongue Root][3]

2. Labial harmony is widespread in the Altaic group. Typically it is superimposed on some other type of harmony (and thus labeled "parasitic"). See Kaun (1995, 2004) for a general discussion.

3. The fundamental articulatory basis of this phonological opposition is unresolved; in particular, several studies have suggested that active expansion or active contraction of the pharyngeal cavity is the more basic gesture.

4. We follow in this paper the widespread convention of using lax vowel symbols for most RTR vowels. The matter is relevant to the issue of comparing /ʊ/, in e.g. Tungusic, to Middle Korean and subsequent /o/, because unlike the official IPA lax [ʊ], "RTR /ʊ/" is not centralized, but rather maximally back, occupying a position close to IPA cardinal [o]. Across the region it is the ATR vowels /u/ and /o/ that are most likely to be slightly centralized.

5. The question whether the two are "two distinct features or two opposing values of a single feature" (Steriade 1995) is still somewhat controversial. See for example the discussion of the features [ATR] and [pharyngeal] in Ladefoged & Maddieson (1996). Based on Novikova's (1960) X-ray tracings and Catford's (1994: 59) findings on Caucasian languages, Ladefoged and Maddieson conclude that, unlike the [+ATR] : [–ATR] contrast, which is distinguishable by F1, [+RTR] : [–RTR] (for them "pharyngealized" and "plain") vowels are distinguished by

Table 2. Harmonic vowel sets from representative Turkic, Tungusic, Mongolic, and Korean languages.

a. Turkish (PH)				
Set A	i	ü	e	ö
Set B	ɨ	u	a	o

b. Even (Northern Tungusic; TRH) (Novikova 1960; J Kim 2011; Kang & Ko 2011)				
Set A	i	ə	u	o
Set B	ɪ	a	ʊ	ɔ

c. Khalkha (Eastern Mongolic; TRH) (Svantesson 1985; Svantesson et al. 2005)			
Neutral	i		
Set A	e	u	o
Set B	a	ʊ	ɔ

d. Middle Korean[6] (K-M Lee 1972)				Cf. The *Hwunmincengum* (1446)	
Neutral	i			*selpwulchwuk*	'no tongue retraction'
Set A	ə	ɨ	u	*selsochwuk*	'slight tongue retraction'
Set B	a	ʌ	o	*selchwuk*	'tongue retraction'

Table 3. TR analyses of the vowel systems of Tungusic, Mongolic, and Korean languages.

a. Tungusic: Novikova 1960; Ard 1981, 1984; Hattori 1982; J Kim 1989, 1993, 2011; Zhang 1996; Zhang & Dresher 2004; Dresher & Zhang 2005; Li 1996; Kang & Ko 2011; Aralova et al. 2011; Lulich & Whaley 2012; Ko 2012, 2013b; cf. Hayata 1980 for a height harmony analysis
b. Proto-Tungusic: Li 1996; Joseph & Whitman 2013; Ko 2012
c. (Eastern) Mongolic: Čenggeltei 1959, 1963; Svantesson 1985; Svantesson et al. 2005; Kang & Ko 2011
d. Proto-Mongolic: Ko 2011, 2012, 2013a
e. (Middle) Korean: J-H Park 1983; B-G Lee 1985; J Kim 1988, 1993, 1999; J-S Lee 1992; Y Lee 1993; M-H Cho 1994; D-Y Lee 1994; J-K Kim 2000; Park & Kwon 2009; Ko 2010, 2012, 2013a
f. Across languages deemed Altaic: Vaux 2009; Ko 2012

F3. However, this generalization is not borne out in acoustic studies of Altaic vowels (e.g. Kang & Ko 2011).

6. Korean lost regular VH in Early Modern Korean along with the loss of /ʌ/.

Table 4. Evidence in favor of the TRH analysis for non-Turkic languages.

a. TR position in X-ray tracings: the Set B vowels are produced with more tongue root retraction (Čenggeltei & Sinedke 1959; Buraev 1959; Novikova 1960)
b. Size of pharyngeal cavity (Möömöö 1977, as cited in Svantesson et al. 2005; Novikova 1960; Li 1996)
c. Greater muscular effort or tension associated with the active feature (Möömöö 1977)
d. Impressionistic "voice quality" phenomena
e. Formant frequency (Kang & Ko 2011 for Even and Buriat; Aralova et al. 2011 for Even; Svantesson 1985 for Khalkha and other eastern Mongolic; Svantesson et al. 2005; Lulich & Whaley 2012 for Oroqen) (i) relatively lower F1 (first formant) values for Set A vowels; (ii) no correlation with F2 (second formant)
f. Phonemic distinction between velar vs. uvular consonants historically conditioned by the two sets of vowels (following Nevins's generalization that velar-uvular alternation is conditioned by [±ATR(RTR)], [±high], or [±low], but not by [±back] (Nevins 2010: 92–93)

Table 5. Three tongue root positions.

	Full feature specifications
Advanced	[+ATR, −RTR]
Neutral	[−ATR, −RTR]
Retracted	[−ATR, +RTR]

Table 6. Three gestural mechanisms (Hall & Hall 1980: 207).

	Set 1 (larger pharynx)		Set 2 (smaller pharynx)
a.	advanced tongue root	vs.	retracted tongue root
b.	advanced tongue root	vs.	neutral tongue root
c.	neutral tongue root	vs.	retracted tongue root

assumption that, like [high] and [low], [ATR] and [RTR] are two different features on the same dimension, potentially defining three tongue root positions as in Table 5.

This view has actually been proposed in the literature as in Table 6 and supported by the survey of previous descriptions of a number of African and Mon-Khmer languages in Li (1996: 108–109).

Whether a TRH language exploits [ATR] or [RTR] as the "active" feature is then determined according to the notion of phonological markedness as in Table 7.

Table 7. Phonological markedness (Rice 2007: 80).

Marked	Unmarked
subject to neutralization	result of neutralization
unlikely to be epenthetic	likely to be epenthetic
trigger of assimilation	target of assimilation
remains in coalescence	lost in coalescence
retained in deletion	lost in deletion

Table 8. Evidence from the behavior of neutral vowels in harmony.

a. Neutral vowels do not trigger harmony: the class of vowels found in suffixes attached to neutral roots – i.e. the default class – does not bear the active feature.
b. Neutral vowels may block harmony: the feature that fails to propagate over neutral vowels is the active feature.
c. The inactive feature surfaces when a harmonic contrast is neutralized.

Table 9. The direction of merger/neutralization.

a. Merger: /*i, *ɪ/ > /i/
b. Neutralization: /u, ʊ/→ [u]/[non-dorsal C] ___

Generally speaking, the behavior of neutral vowels in the languages grouped together as Altaic, as summarized in Table 8, indicates that [RTR], rather than [ATR], is the phonologically active feature (Li 1996; Ko 2012; Joseph & Whitman 2013).

Manchu has been analyzed, e.g. by Zhang & Dresher (2004), as an [ATR] harmony language. However, the result of the assumed merger between *i and *ɪ and the result of the neutralization between /u/ and /ʊ/ together indicate that [RTR] is the active/dominant feature value since it is neutralized diachronically and synchronically (Li 1996; Ko 2012, 2013b; Joseph & Whitman 2013), see Table 9.

An additional piece of evidence comes from the contrast between velars and uvulars, which is widespread in Tungusic and Mongolic. The general pattern is that velars become uvulars when adjacent to [RTR] vowels. When adjacent to the neutral vowel /i/ (/i/ does not trigger or block vowel harmony), velars surface as velars. This is as expected under the [RTR] analysis. However, if we assume that [ATR] is the active feature and the uvulars are the default, we face a contradiction regarding the feature specification of the neutral vowel /i/: it must be specified [+ATR] in order to trigger velarization of uvulars, while it cannot be specified [+ATR] if it is to be neutral/transparent to ATR harmony, see Table 10.

Table 10. Velar ~ uvular alternation.

a. /k, x, g/ → [q, χ, ɢ] when adjacent to a tautosyllabic [+RTR] vowel
b. /k, x, g/ → [k, x, g] when adjacent to a neutral vowel (e.g. /i/)

In Goad's (1992) system, the feature [RTR] may be borne by consonants as well as vowels, while [ATR] may not. On this approach, consonant alternations like the velar/uvular alternation in Tungusic and Mongolic are expected in languages where [RTR] is the active feature, but not in languages with active [ATR]. On different grounds, it has been argued that Middle Korean VH is better accounted as [RTR] rather than [ATR] harmony (J. Kim 1988, 1993, 1999; J-K Kim 2000; Ko 2010, 2012, 2013a). See Ko (2012) for a comprehensive discussion and [RTR] analyses of all "Altaic" languages asserted in the literature to have TR or height harmony.

2.2 Basic vowel correspondences in Tungusic, Mongolic, and Korean

The following tables show the basic family-internal vowel correspondences for Tungusic (Table 11), Mongolic (Table 12) and Korean (Table 13), respectively.

None of the correspondences in these three families reveal any trace of PH, except for Kalmyk (and Oirat) in Mongolic; outside of Kalmyk/Oirat, all rounded vowels in languages with a regular vowel harmony are realized as back vowels. Were we to reconstruct proto-Altaic on the basis of the proto-Korean, proto--Mongolic, and proto-Tungusic facts – regardless of how we reconstruct proto-Turkic – a simple-minded application of the "majority-wins" principle will favor: (i) reconstruction of VH and (ii) reconstruction of RTRH. But much more important, there is a clear phonological route from RTRH to PH, but none in the opposite direction (Vaux 2009; Ko 2012, 2013a).

Table 11. Vowel correspondences in Tungusic (Joseph & Whitman 2013).

RTR	*i	*ɪ	*ə	*a	*u	*ʊ	*o	*ɔ
Benzing (1955)	*i	*ï	*ä	*a	*ü	*u	*ö	*o
Even	i	ɪ	ə	a	i/u	ʊ	u/o	ɔ
Oroqen	i	ɪ	ə	a	i/u	ʊ	u/o	ɔ
Oroch	i	i	ə	a	i/u	ʊ	u	ɔ
Udihe	i	i	ə	a	i/u	u	u	ɔ
Nanai	i	ɪ	ə	a	u	ɔ	u	ɔ
Orok	i	ɪ	ə	a	u	ʊ	u/o	ɔ
Manchu	i	i	ə	a	u	ʊ/u	u (~ ə)	ɔ

Table 12. Vowel correspondences in Mongolic (Modified from Svantesson et al. 2005).

RTR (Ko 2011, 2012)		*i	*ə	*a	*u	*ʊ	*o	*ɔ
Poppe (1955)		*i[7]	*e	*a	*ü	*u	*ö	*o
Mongolian Proper	Khalkha	i	e	a	u	ʊ	o	ɔ
	Chakhar	i, ɪ	ə	a	u	ʊ	o	ɔ
	Baarin	i	ə	a	u	ʊ	o	ɔ
Kangjia		i	e	a	u	ʊ	o, u	ʊ, ɔ
Monguor		i	i, e	a	u	u, o	o, u	o
Bonan		i, ɯ	ə	a	u	u	o	o
Santa		i	ie, ə	a	u	u	o	o
Moghol		i	e	a, o	u	u	o	o
Buriat		i	e	a	u	ʊ	u	ɔ
Khamnigan		i	e	a	u	ʊ	u	ɔ
Dagur		i	ə	a	u	ɔ, wa	u	ɔ
Kalmyk		i	e	a	y	u	ø	o

Table 13. Vowel correspondences in Korean (Ko 2012, based on Kwak 2003).

RTR	*i[8]	*ə	*a	*ɨ	*ʌ	*u	*o[9]
OK (K-M Lee 1972)	*i	*ä	*a	*ɔ̈	*ɔ	*ü	*u
MK (K-M Lee 1972)	*i	*ə	*a	*ɨ	*ʌ	*u	*o
NW Korean	i	o[10]	a	u[11]	a	u	o
NE Korean	i	ə	a	ɨ	a	u	o
Central Korean	i	ə	a	ɨ	a	u	o
SE Korean	i	ɨ[12]	a	ɨ	a	u	o
SW Korean	i	ə	a	ɨ	a	u	o
Jeju Korean	i	ə	a	ɨ	ɔ[13]	u	o

7. Poppe (1955) and Janhunen (2003: 5) reconstruct two high unrounded vowels, front *i and back *ï in (pre)-proto-Mongolic. Under our TRH analysis of proto-Mongolic, the harmonic counterpart of *i will be *ɪ, not *ï. This vowel is not included in the table, as Svantesson et al. (2005) do not reconstruct *ɪ for OM

8. It is widely thought that proto-Korean also had two high front vowels *i and *ɪ (J-H Park 1994, 2002; cf. Janhunen 1981).

9. This vowel is the [+RTR] counterpart of *u, which is phonologically comparable to Tungusic and Mongolic *ʊ. We follow the conventional notation for Korean vowels here.

10. This is the result of merger of *ə with *o (Kwak 2003).

11. This is the result of merger of *ɨ with *u (Kwak 2003).

12. This is the result of merger of *ə with *ɨ (Kwak 2003).

13. This is viewed as a result of a later development.

Nevertheless, the conventional view in the literature remains that vowel harmony in the proto-languages (or the oldest attested stage of the languages like Old Mongolian) operated on a palatal contrast, and that the attested RTRH in later varieties is the result of a shift of harmonic contrast from a palatal to an [RTR] contrast. Accounts of this type include Svantesson's Mongolic Vowel Shift hypothesis (1985) and K-M Lee's Korean Vowel Shift hypothesis (1964 et seq.).[14] We briefly discuss each of them below.

2.3 PH to- RTRH Shifts in Mongolic and Korean?

It has long been assumed by most Mongolists that all pre-modern Mongolic varieties had a 7-vowel system with palatal harmony as exemplified by Old Mongolian in Figure 1.

On the other hand, modern Mongolic varieties include both RTRH (e.g. Khalkha) and PH (e.g. Kalmyk/Oirat) systems (see Table 12). Following the orthodox view, Svantesson (1985) argues for a Mongolic Vowel Shift (MVS), positing a shift from a palatal contrast in Old Mongolian (OM) to a TR contrast in modern varieties. Under this hypothesis, the PH system in Kalmyk/Oirat is taken to be a retention.

This view is challenged by Ko (2011, 2012, 2013a) who argues for a RTRH analysis for pre-modern Mongolic and a shift from RTRH to PH in Kalmyk/Oirat; the PH system is thus understood as an innovation. Ko provides a number of comparative arguments. For example, from the standpoint of parsimony, the MVS hypothesis requires an independent shift for each modern variety of Mongolic with regular or remnant [RTR] harmony. In contrast, the RTRH -to- PH hypothesis assumes only a single shift in Kalmyk/Oirat.

Phonetic and phonological "naturalness" also favors RTRH -to- PH; as Vaux (2009) points out, the development PH -to- RTRH posited under the MVS is supported by no clear examples in other language groups. In contrast, the reverse RTRH-to-PH shift is phonetically grounded (Lindau 1979; Archangeli & Pulleyblank 1994) and empirically attested in a number of genetically-unrelated languages (Vaux 2009). See Ko (2012, 2013a) for further details.

	Front		Back	
High	i	y		u
Nonhigh	e	ø	a	o

Figure 1. Palatal analysis of the OM vowel system (Svantesson et al. 2005: 111).

14. See also Janhunen (1981).

Formal analyses of individual "Altaic" vowel systems also favor the idea that Kalmyk/Oirat is the innovator in Mongolic. Based on Dresher's (2009) contrastive hierarchy framework assuming only contrastive features are active in phonology, Ko (2011, 2013c) analyzes Kalmyk/Oirat as having four contrastive vowel features hierarchically ordered [coronal] > [low] > [labial] > [dorsal]. Comparing the typical Mongolic feature hierarchy [coronal] > [low] > [labial] > [dorsal] found in Khalkha and the typical three-feature Turkic hierarchy, i.e. [low] ≈ [labial] > [dorsal] in Uyghur, the Kalmyk/Oirat hierarchy is better understood as closer to Khalkha than Uyghur in terms of the number of contrastive features and the changes necessary to relate it to either language.

Finally, historical data have also been cited in support of the RTRH-to-PH shift. For instance, Hattori (1975) argues that "Middle Mongolian had a vowel harmony of 'open-narrow' type" (the pre-Ladefoged term for TRH) based on the Chinese transcriptions of *The Secret History of the Mongols*, where Mongolic <ü> is transcribed as Chinese [u], not [y]. All these types of evidence converge to indicate that OM had a RTRH system, not a PH system.

The conclusion regarding Middle Mongolian motivates a reassessment of the so-called Korean Vowel Shift (KVS) hypothesis originally due to K-M Lee (1964 et seq.).

The KVS, as shown in Figure 3, holds that the VH pattern with the harmonic pairing of /ɨ/~/ʌ/, /u/~/o/, and /ə/~/a/ in Late Middle Korean (Figure 3c) is the "historical vestige of earlier ideal palatal harmony" (C-W Kim 1978) in Old Korean (Figure 3a), obscured by an exceptionally complicated series of chain shifts of vowels (steps in these hypothesized shifts are indicated by superscripts).

	Front	Back		
High	i		u	NonRTR
			ʊ	RTR
Low		ə	o	NonRTR
		a	ɔ	RTR

Figure 2. An [RTR] analysis of the OM vowel system (Ko 2011, 2012, 2013a).

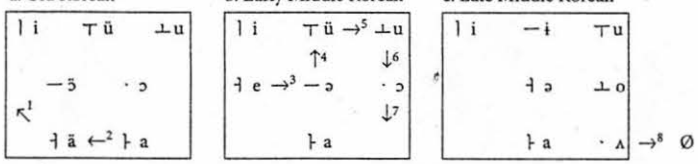

Figure 3. The Korean Vowel Shift Hypothesis (K.-M. Lee 1972 as diagrammed in Ko 2013a).

Despite numerous theoretical and empirical problems (See Ko 2013a for more details), the KVS has been widely accepted by many Korean phonologists and historical linguists (Ahn 2002; Kim-Renaud 2008; K-M Lee & Ramsey 2011, among others). Others, such as Martin (2000) and Vovin (2000) have expressed skepticism about major premises in the hypothesis.

Ko (2013a) demonstrates that the primary documentary evidence cited in its favor, the correspondences between Middle Mongolian and Middle Korean vowels in Mongolian loans summarized in Table 14 below, in fact fails to support the hypothesis.

This follows if K-M Lee's basic assumption that Middle (= Old) Mongolian had a PH system is incorrect, as shown above. On the RTRH analysis of OM, the Mongolic-Korean vowel correspondences are the straightforward set between Figure 2 and Figure 3 (c), interpreted more precisely as an RTRH system in Figure 4 below.

Ko's conclusion that there was no vowel shift in Old Korean is consistent with Itō's reconstruction of 9th-century Korean based on reconstructed Sino-Korean, see Figure 5.

Table 14. MK transcription of the 13th century Mongolian vowels (K-M Lee 1964).

OM	i	e	a	ü	ö	u	o
MK	ㅣ	ㅓ	ㅏ	ㅜ	ㅝ	ㅗ	

	Front	Back		
High	i	ɨ	u	NonRTR
		ʌ	o	RTR
Low		ə		NonRTR
		a		RTR

Figure 4. RTR analysis of the MK vowel system (J. Kim 1999; J.-K. Kim 2000; Ko 2010, 2012, 2013a).

i [i]	ɨ [ɨ]	u [u]
ə [ɛ]	ʌ [ə]	o [o]
	a [a]	

Figure 5. The Old Korean vowel system (Itō 2007: 267).

2.4 Reconstructing a harmonic contrast for proto-Altaic

It has long been assumed that proto-Altaic had a vowel system based on a palatal contrast. For example, Poppe (1960) reconstructs the following 9-vowel system for proto-Altaic, which is based on a PH analysis of Turkic and Mongolic languages and their respective protosystems, see Figure 6.

However, as argued by Vaux (2009) and supported by Ko (2012), reconstruction of RTRH for proto-KMT supports reconstruction of RTRH for the larger putative proto-family, see Figure 7.

On this view Turkic innovates with respect to the RTRH-to-PH shift. This idea can be formalized as a series of "contrast shifts" (cf. Dresher et al. 2012) consisting of "reanalysis" ([αRTR] → [αdorsal]; cf. Kalmyk/Oirat) and "fusion" as shown below in Figure 8.

	[front]		[back]	
	[-round]	[+round]	[-round]	[+round]
[closed]	i	y	ɨ	u
[middle]	e	ø		o
[open]	ɛ		a	

Figure 6. Reconstructed proto-Altaic vowel system (Poppe 1960: 92).

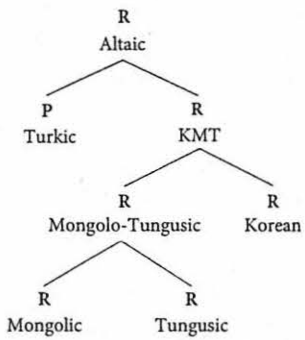

Figure 7. RTR analysis of Proto-Altaic (cf. Ko 2012; Vaux 2009).[15]

15. This tree groups languages within Altaic (in Poppe 1960's original sense) only by the features [retracted tongue root harmony] and [palatal harmony]. It is not intended as a complete genetic classification, or as a "proof" that the languages are related.

Proto-Altaic: [low] > [coronal] > $\boxed{\text{[RTR]}}$ > [labial] (= Proto-Tungusic)

[low] > $\boxed{\text{[coronal] > [dorsal]}}$ > [labial] (reanalysis)

Proto-Turkic: [low] > $\boxed{\text{[dorsal]}}$ > [labial] (fusion)

Figure 8. Turkic shift: A hypothesis (Ko 2012).

We emphasize here that we do not intend the hypothesis of a "Turkic shift" as an argument "for" proto-Altaic. The results in Starostin et al. (2003) demonstrate the difficulty of maintaining a large number of lexical comparisons while also reconstructing VH for proto-Altaic. Either VH is not reconstructable for the proto-family, or many of the lexical comparisons posited by Starostin et al. must be abandoned, or many of the alleged cognates have undergone VH class shifts in the daughter families that as yet have not been accounted for.[16] Our point here is merely that if proto-Altaic is a valid genetic unity and if VH is reconstructed for the proto-family, a shift from RTRH to PH is much better motivated than a shift in the opposite direction.

3. A non-argument for secondary [RTR] harmony in proto-Tungusic

As noted in the previous section, Starostin et al. (2003) argue against reconstructing VH for proto-Altaic, and they extend this view to proto-Tungusic as well. In this section we argue against the latter claim; whatever the case for a putative proto-Altaic unity, comparative considerations solidly support reconstructing RTRH for proto-Tungusic. Table 15 repeats the basic vowel correspondences from Table 11 for a sample of representative languages. We organize them as northern (Even, Evenki, Negidal, Oroqen, Solon); transitional (Oroch, Udihe); and southern (Nanai, Ulcha, Orok, Jurchen, Manchu) subgroups.[17]

Loss of one harmonic alternant is more prevalent among the high vowels, particularly the high front vowels. The latter in particular is a typologically common pattern. Thus Oroch, southern Udihe, and Manchu have lost the contrast between /i/ and /ɪ/, as in standard literary Evenki, Xunke Oroqen, and "Lower Amur" Nanai

16. See Robbeets (2005) for an item-by-item evaluation of the etymologies proposed by Starostin et al.

17. According to the classification proposed by Georg (2004), Oroch and Udihe belong to the northern subgroup.

Table 15. Basic vowel correspondences (initial syllables).[18]

TR	Benzing	Even	Oroqen	Oroch	Udihe	Nanai	Orok	Manchu
*i	*i	i	i	i	i	i	i	i
*ɪ	*ï	ɪ	ɪ	i	i	ɪ	ɪ	i
*u	*ü	i/u	i/u	i/u	i/u	u	u	u
*ʊ	*u	ʊ	ʊ	ʊ	u	ɔ	ʊ	ʊ/u
*ə	*ä	ə	ə	ə	ə	ə	ə	ə
*a	*a	a	a	a	a	a	a	a
*o	*ö	u/o[19]	u/o[20]	u	u	u	u/o[21]	u (~ ə)
*ɔ	*o	ɔ	ɔ	ɔ	ɔ	ɔ	ɔ	ɔ

(Kazama 2003); southern Udihe and Manchu have also lost the contrast between /u/ and /ʊ/, at least in some environments. However, it is important to point out that even in cases like literary Evenki, "Lower Amur" Nanai, and Manchu, the distinctions continue to condition harmonic alternations in a manner consistent with the historical contrasts.

For arguments that [RTR] should be reconstructed as the phonologically active feature value in proto-Tungusic, see Ko (2012) and the arguments presented in Section 1. Summarizing the comparative facts, in all attested Tungusic languages, for vowels with a TR contrast, those specified [RTR] cannot co-occur with those specified [ATR]. In languages or dialects where co-occurrence is possible, in fact TR is no longer specified for the relevant vowels. This is a powerful initial argument for reconstructing the TR contrast for proto-Tungusic. Below we summarize the arguments in Joseph & Whitman (2013).

18. These correspondences are primarily based on Tsintsius (1949), Benzing (1955), and Tsintsius (1975–1977). We have generally selected dialects with maximal vowel contrasts as representative of languages. Thus Even reflexes are based on the Ola dialect; Oroqen reflexes are based on the Chaoyangcun dialect (Hu 2001); and Nanai reflexes are based on the standard Najkhin dialect. In a few cases, we have chosen dialects because data was more abundant or accessible. So, for example, the Udihe reflexes are based on the southern dialect (Nikolaeva & Tolskaya 2001), although a richer inventory is described for a northern dialect in Sunik (1968) and materials collated in the *Sravnitel'nyj slovar' tunguso-man'chzhurskikh jazykov* (hereafter, *TMS*).

19. The Even vowel [o] is transcribed <ɵ> in the *TMS*.

20. The Oroqen vowel transcribed <o> is described as centralized [ɵ] by Hu (2001).

21. The Orok vowel [o] is transcribed <ȯ> in the *TMS* and <ɵ> by Ikegami (1997).

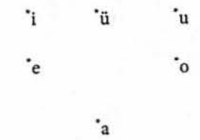

Figure 9. Proto-Tungusic vowels according to Starostin et al. (2003).

3.1 Starostin et al. (2003: 156–163)

Claiming that TRH is a secondary innovation in the family requires assuming that not just affixal VH but also the root structure constraint referred to above has been independently innovated in each descendent language. Nevertheless, Starostin et al. (2003: 156–163) propose a reduced proto-Tungusic inventory which they interpret as lacking a harmonic contrast altogether. Here we examine this proposal, see Figure 9.

Starostin et al. (2003) argue that proto-Tungusic did not have VH as such, but acquired it through contact with Mongolic. They claim that *i, *ü, and *u freely occur with any of the non-high vowels.

However, Starostin et al. propose vowel co-occurrence restrictions that are tantamount to the kind of stem shape restriction found in VH languages. For example, *e may not co-occur in the same stem with either *o or *a. While *o and *a may co-occur, *o is restricted to initial syllables (as in Benzing's system).[22] Thus, the reconstructed distribution of *e, *o, and *a is largely the same as for Benzing's *ä, *o, and *a, (*ə, *ɔ, and *a, respectively under the RTRH analysis). Thus we concentrate on the high vowels in our examination of Starostin et al.'s hypothesis, see Figure 10.

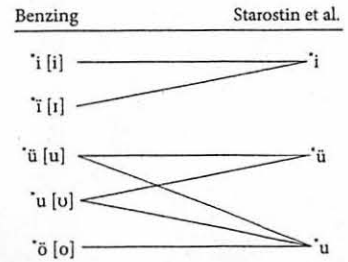

Figure 10. Proto-Tungusic high vowels in Starostin et al. (2003), compared with Benzing (1955).

22. A few additional sequences are banned: NO *o...u, NO *i...ü. The latter pattern in fact occurs in their reconstructions; rather, it appears that *ü...u is the non-occurring shape.

Under this reduced inventory of high vowels, accounting for the high vowel correspondences among daughter languages rests specifically on deriving the harmonic behavior of the reflexes of *i, *ü, and *u. In other words, it is necessary to condition the split of *i into the later, harmonically contrastive, behavior captured by Benzing's *i [i] and *ï [ɪ], and so forth.

3.2 Starostin et al.'s hypothesized stem-internal co-occurrence constraints

Starostin et al. (2003) propose that, in Tungusic generally, segregation of stems into the two harmonic classes is for the most part predictable on the basis of the vocalism of proto-Tungusic reconstructed stems (with exceptions), combined with the following stipulations, see Table 16.

This system should be assessed by the following criteria: (i) the distributional restrictions and the stipulations governing the sorting of proto-Tungusic stems into the attested harmonic classes must work; (ii) the proto-Tungusic reconstructions themselves must obey the stated correspondences; (iii) the distribution of the vowels as reconstructed by Starostin et al. should provide some natural basis for the claim that high-vowels freely co-occur with non-high vowels – since this claim is central to the characterization of this version of proto-Tungusic as non-harmonic.

3.3 Failures of the stipulations

Starostin et al.'s stipulations in Table 16 (a) and (b) simply replicate the results of a reconstruction positing VH in the proto-language. The crucial test of Starostin et al.'s system involves stems without non-high vowels, where in their view later harmonism is derived by the stipulations in Table 16 (c-d). The latter in particular has no clear phonetic motivation, but more importantly, we show that they do not adequately represent the facts of the relevant proto-Tungusic etyma reconstructed by Starostin et al.

Table 16. Stipulations for deriving later harmonism.

a. Words containing *a or *o develop "back" vocalism, i.e. our [RTR] vocalism. (In our system, this results directly from the reconstruction of these vowels as [RTR] *a and *ɔ.)
b. Words containing *e develop "front" vocalism, i.e. our [NonRTR] vocalism. (In our system, this flows directly from the reconstruction of this vowel as [NonRTR] *ə.)
c. Words containing *ü generally develop "front" vocalism unless Table 16 (a) is applicable ("front" vocalism is also expected when Table 16 (b) is applicable). (In our system, either [NonRTR] *u or [RTR] *ʊ.)
d. Words shaped *i...i, *u...u, *i...u, or *u...i generally develop "back" vocalism (with exceptions). (In our system and the traditional one, these two vowels conflate five vowels: [NonRTR] *i, *u, *o and [RTR] *ɪ, *ʊ.)

Under Table 16 (c), in etyma containing no non-high vowels, *ü is expected to give rise to "front" vocalism (our [NonRTR] vocalism) in the daughters. Of the five logically possible combinations (*ü...i, *ü...ü, *ü...u, *i...ü, *u...ü), *ü...u is not found among Starostin et al.'s reconstructions. Of the remainder, their *ü...ü and *i...ü show no clear correlation with "front" vocalism in the daughter languages. We give a few relevant examples, see Table 17.[23]

Table 17. Outcomes of *ü...ü and *i...ü in Starostin et al.'s proto-Tungusic.

	"front" vocalism (as predicted)		"back" vocalism (prediction fails)	
gloss	'tail'	'tongue'	'muddy, turbid'	'to wash'
Starostin et al.	*xürgü	*xilŋü	*sükü[24]	*silkü-[25]
Even	[irgə̆]	[ˈennə̆]	[(h)ɪqʊ] ~ [ɪqʊ(ŋ)]	[hilqă-] ~ [ɪlqă-] ~ [selqa-] ~ [helka-] ~ [hilkă-] ~ [hɪlkɔ-]
Evenki	[irgi]	[iɲɲi]	[sik(i)] ~ [hiki] ~ [ʃiki]	[silki-] ~ [hilki-] ~ [ʃilki-]
Negidal	[i:ɣi] ~ [idgi]	[iɲŋi]	[sɪxɪ:]	[sɪlkɪ-]
Oroqen	[irgi]	[iŋ:i]		[ʃɪlkɪ-]
Ewenke[26]	[ig:ə]	[iŋ:i]		[ʃɪx:ɪ-]
Oroch	[ig:i]	[iŋi]		[sik(:)i-]
Udihe	[igi]	[iŋi]		[siki-]
Nanai	[xujgu]	[siŋmu]		[sɪlqɔ-]
Ulcha	[xudʒu]	[siɲu]		[silʧu-]
Orok	[xudu] (: ACC [xud:o:])	[sinu] (: ACC [sin:o:])		[silʧi-] (: PERF [siltu-xa-])
Manchu		[iləŋgu]		[silgia-] 'to rinse'

23. We have included some additional languages or forms found neither in Starostin et al. nor in Tsintius et al. (1975–1977). Forms have been converted to an IPA-style transcription.

24. The stem is harmonically ambiguous in most varieties of Evenki, but in the standard dialect we also find [ʃaka-] 'to stir up, to muddy (the water)' and [ʃaka-diʧa:] 'muddy, turbid', indicating likely original "back" vocalism (*TMS* II: 80-1). Starostin et al. compare these reflexes to Nanai [suku] 'swamp', with "front" vocalism. When this putative cognate is excluded, however, the proposed etymon is left with a northern-only distribution, so the crucial evidence for reconstructing *ü disappears.

25. The stem is harmonically ambiguous in Oroch and Udihe, as in most varieties of Evenki, though note that the (southern) Tokminskij dialect and (eastern) Aldanskij and Uchurskij dialects attest a variant, [silka-] 'to crush, to mash', with clear "back" vocalism (*TMS* II: 84). Ulcha alone shows "front" vocalism.

26. Ewenke refers here and below to the Solon speaking subgroup of the Chinese Ewenke nationality (Chinese *Suǒlún Èwēnkè*).

Similarly, under Table 16 (d), all combinations of Starostin et al.'s *i and *u (in the absence of *a, *o, *e, *ü) are predicted to give rise to "back" vocalism (our [RTR]). Of the logically possible combinations (*u...u, *u...i, *i...u, and *i...i), in fact *none* show a clear correlation with "back" vocalism in the daughter languages. Table 18 gives a few relevant examples of *u...u and *u...i.

The same situation is observed for Starostin et al.'s *i...u and *i...i in the following Table 19.[27]

This leaves two high-vowel sequences, *u...ü and *ü...i. At first glance, both appear to bear out the prediction of "front" vocalism as in Table 16 (c). We focus on these cases in the following section.

3.4 Superficially successful predictions of "front" ([NonRTR]) vocalism

As we have seen, Table 16 (c) predicts that the proto-Tungusic high-vowel sequence *u...ü should give rise to "front" vocalism. In the system of Starostin et al., the reconstruction of *u...ü handles cognate sets in which the initial syllable shows [u] in all languages, whereas *ü in a following syllable should give [i] in the "northern" and "transitional" languages (Even, Evenki, Negidal, Solon, Oroch, Udihe) corresponding to [u] in the "southern" languages (Nanai, Ulcha, Orok, Jurchen, Manchu). However, a careful examination of the cognates reveals that they do not show the proper correspondences. Out of five lexical items reconstructed with their *u...ü, *none* unproblematically shows the requisite correspondence of northern/transitional [i]: southern [u] in the position where *ü is reconstructed. For example, their *xulbü- 'to bind, to arrange' has northern [u] or [ə] : southern [i]; their *xuldü 'warm; to heat; flame' has northern/transitional [i] : southern [i] or [u:], where southern [u:] must go back to /i+u/; their *xurumü- 'short' has northern [Ø] (zero), [i], or [u:] : southern [i]. The remaining forms face similar difficulties.[28] Thus, in the

27. For the shape *i...i, "back"-vocalic outcomes far outnumber "front"-vocalic outcomes. The tendency of *i...i to develop a "back"-vocalic outcome – unexpected on the traditional reconstruction – may reflect the tendency of this vowel to neutralize with its harmonic counterpart relatively early in the history of many langauges of the linguistic area. In addition to the preponderance of "back"-vocalic outcomes for pTg *i...i words, we note that in several languages including Manchu, monosyllabic stems with a high front vowel are systematically "front"-vocalic. Taken together, these facts suggest that the distinction between *i and *ɪ might have been conditioned by stem shape at some stage. This question awaits further study.

28. Following the traditional system of Benzing, these words can be reconstructed as "bright" or "front" *xölbV-, *xöldi(-), and *xörü-mi-, respectively. Under our TR interpretation, these would be [NonRTR] *xo:lbV-, *xoldi(-), and *xoru-mi-. In the interest of brevity, we dispense with a full accounting of these cognate sets (for which see Starostin et al. and the *TMS*). In our view, Starostin et al.'s *ü in these etyma should be reconstructed mostly as *i. However, in their system, *u...i is predicted to give "back" vocalism.

Table 18. Outcomes of *u...u and *u...i in Starostin et al.'s proto-Tungusic.

	"back" vocalism (as predicted)		"front" vocalism (prediction fails)	
gloss	'to gather, to collect'	'small river, brook'	'fat, thick'	'eagle'
Starostin et al.	*uru:[29]	*uńi	*burgu[30]	*gusi[31]
Even			[bərgə] ~ [borgo] ~ [burgə] ~ [bə̆rgə̆]	[gusə-tə] ~ [guhi-tə] ~ [guhu-tə] ~ [guhə-tə]
Evenki	[uru:w-]		[burgu(-mə)]	[gus] ~ [gusi-kə:n] ~ [guhi-kə:n]
Negidal	[ɔjʊw-]		[bəjgə] ~ [bɔjgɔ] ~ [bɔg:ɔ] ~ [bɔjgu]	[gusi-xa:n] ~ [gusi-kan]
Ewenke	[ʊrʊ-]		[bog:o]	
Solon			[burgu]	
Oroch		[ʊɲi] ~ [ɔɲi] 'small river; Anjuj river'	[bɔg:ɔ]	[gusi]
Udihe		[uni] 'Anjuj river'	[bɔgɔ]	
Nanai		[ɔɲɪ]	[bujgu]	[gusi]
Ulcha		[ʊɲɪ] 'brook'; [ʊɲa] 'spring'	[buʤu(n-)] [bɔʤɔ(n-)]	~[gusi]
Orok	[uru-]	[uɲi] 'river'; [ʊɲa] ~ [ʊɲaɣa] 'small river, tributary'	[bodo] ~ [bɔd(:)ɔ(n-)]	[gusi]

case of *u...ü, although the relevant sets of Tungusic cognates show the predicted harmonism, the vocalism of the reconstructions themselves is untenable.

29. Evenki forms are harmonically ambiguous. For Orok, Ikegami (1997: 221) gives urri- : PERF *uri-xa-* 'to heap, to pile up', with "back" harmonism.

30. Negidal, Ulcha, and Orok have "back"-vocalic variants. Oroch and Udihe only attest "back"-vocalic forms, but in those languages the harmonically unpaired vowel /ɔ/ can often be found in the reflexes of pTg "front"-vocalic stems.

31. In Ikegami (1997: 76), the form is harmonically ambiguous, with variant ALL case forms *gusi-tei* ~ *gusi-tai*.

Table 19. Outcomes of *i...u, and *i...i in Starostin et al.'s proto-Tungusic.

	"back" vocalism (as predicted)		"front" vocalism (prediction fails)	
gloss	'sap'	'to cut'	'roe deer'	'gums (gingiva)'
Starostin et al.	*dilgu	*giri-[32]	*gibu-[33]	*irki[34]
Evenki	[dilgu(-ksa)] ~ [delgu-ksa] ~ [dilgi-kta] 'sap'	[gir-] ~ [ger-] ~ [giri-]	[giw-ʧəːn] ~ [gip-ʧəːn]	
Negidal	[dɪlgʊ-ksa]	[giː-] ~ [gɪj-]	[giw-ʧəːn]	[irxi]
Oroqen			[giw-ʧəːn]	
Solon			[giː-sɔ̃ː]	
Oroch	[dʊgʊ-ksa] 'sapwood'	[giː-] ~ [giji-]	[gæːʊ-ʧa] ~ [giʊ-ʧa]	[ixi]
Udihe	[digæ] 'sapwood'	[giː-]	[giu(-sə)] ~ [giu(-sa)]	
Nanai	[ʤɪlqɔ̃]	[ɢɪrɪ-]	[giu]	[ilxī]
Ulcha	[ʤeːlʧʊ-ma]	[ɢɪrɪ-]	[giu(n-)]	[irxi(n-)]
Orok	[ʤɪlʊ]	[ɢɪrɪ-] (: PERF [ɢɪrɪ-ʁɑ-])	[giu]	[irki]
Manchu		[giri-] (: PERF [giri-χa])	[giu]	

Under Table 16 (c), the sequence *ü...i is also predicted to give rise to "front" vocalism, and in this one case, the stipulation and the reconstructed sequence itself both work. Not coincidentally, such forms are reconstructed in the traditional system in exactly the same way. Thus, for example, Starostin et al.'s *dügin 'four' would also be reconstructed in the traditional system as *dügin.[35] The vowel correspondences in both syllables are similarly well-behaved in both systems of reconstruction.

32. The stem is harmonically ambiguous in Oroch and Udihe, as well as most varieties of Evenki, though note that derived words such as Oroch [giː-naŋki] 'cutting board' and Evenki [gir-kaːt-] 'to cut out (an ornamental pattern)' indicate "back" vocalism, while Udihe [giː-ptilə] 'cuttings, trimmings' indicates "front" vocalism.

33. Oroch has "back"-vocalic reflexes; some forms in older Evenki materials collected in the *TMS* attest "back"-vocalic suffixes such as [giw-ʧan] (Titov 1926) and [gip-ʧan] ~ [gif-ʧan] (Castrén 1856). Otherwise, "front"-vocalism is unproblematic.

34. The stem is ambiguous in Orok, but Ikegami (1997: 81) gives the ALL case form as *irki-tai*, indicating "back"-vocalism.

35. Benzing (1955: 101) in fact gives the reconstruction *dügün, but according to his system of vowel correspondences, the second vowel must be pTg *i.

3.5 The Distribution of Starostin et al.'s proto-Tungusic *ü

So far we have seen that in general, the stipulations in Table 16 (c–d) are unsuccessful. The claim that *i and *u give rise to "back" vocalism when no other vowels are present in stems is falsified by counterexamples.

Although Starostin et al. claim that their *ü combines freely in principle with all other vowels, they themselves state that it occurs overwhelmingly in stems that go on to develop "front" vocalism. When we examine the distribution of this vowel, we find that a large portion of the logically possible configurations do not occur in Starostin et al.'s reconstructions or are spurious within the system of correspondences they themselves assume. Thus, to begin with, *ü...u does not occur, although its absence is not explained; and although the sequence *u...ü is reconstructed for several etyma, the attested reflexes do not support *ü.

Other combinations of *ü with "back" vowels *a and *o are few: *o...ü is reconstructed for just one etymon, *solüki 'kolinsky (Siberian weasel); ferret'; *ü...a is reconstructed for *tüpa 'nail; fingernail', *tüksa 'house cover made of birchbark', and *tüla- 'to become exhausted; to stop growing, to weaken; to miss time, opportunity', all of which are problematic.[36]

Meanwhile, *a...ü is reconstructed for four items (*xar-kü- 'to bite, to sting', *(x)abü 'stem, stalk', *xadü- 'to be worn out, become thin, fragile', *najü 'pole, shaft of fish-fork'), but in fact the list could be expanded if additional etyma were considered.

Starostin et al.'s *ü only exhibits the desired free co-occurrence in post-initial syllables. In other words, it behaves as a "front" vowel in initial syllables, as in the successfully reconstructed sequence *ü...i, but as a neutral vowel in post-initial syllables, as in the sequence *a...ü. This simply shows that its correspondences should be handled, as in the traditional reconstruction, by two different vowels: pTg *ü (our [NonRTR] *u) where it occurs in "front"-vocalic (i.e. [NonRTR]-vocalic) words, and pTg *u (our [RTR] *ʊ) where it occurs in "back"-vocalic (i.e. [RTR]-vocalic) words. In Benzing's original analysis, which we endorse, "back" *u ([RTR] *ʊ) has the northern/transitional [ɪ] : southern [ʊ] reflex pattern only in post-initial syllables.

In conclusion, the claims in Table 16 (c–d) have too many counterexamples to be tenable. We thus conclude that the full eight-vowel inventory with a harmonic

36. Starostin et al.'s pTg *tüpa 'nail; fingernail' and *tüla- 'to become exhausted, ...' involve cognate sets in which either the harmonic class is wrong or the particular reflex supporting their *ü is an outlier. Their *tüksa 'house cover of birchbark' has a robust set of cognate reflexes, but the correspondences in the initial syllable are irregular, with [i]/[ɪ] in Even, Evenki, and Negidal, but [u]/[ʊ] in Oroch and Udihe, suggesting intra-Tungusic borrowing. For comparison, note that their *ü...e occurs in at least twenty etyma.

contrast posited in the traditional reconstructions is reaffirmed. We note that a similar conclusion is reached by Robbeets (2005), in the context of a broader Altaic comparison.

4. [RTR] harmony as an inherited feature

Up to this point we have argued in favor of reconstructing [RTR] harmony for each of KMT. We have also argued, following Vaux (2009), that if proto-Altaic is a valid proto-family, and if VH is reconstructable on the basis of lexical comparisons, we should reconstruct [RTR] harmony for it. We now shift to a broader areal perspective.

From work on African TRH in an areal context we know that TRH spreads easily within and across genetic groupings of various scales (families, big branches, small branches, and so on). We discuss the status of TRH as an areal phenomenon in Northeast Asia in the next section. Indeed in the view of Starostin et al. (2003), Tungusic VH is attributed to contact with (on their view genetically related) Mongolic. But this raises other questions: what is the distribution of *real* palatal harmony? Does palatal harmony *also* spread broadly across languages and phyla the way TRH has spread in the Central Sundanic Zone? Even if all branches of Altaic have TRH, does it have to be inherited in all cases from proto-Altaic? What about non-Altaic languages in NE Asia with TRH and/or vowel inventories similar to Altaic (see the following section)?

We saw in the previous section that the idea that Tungusic vowel harmony is a secondary development is implausible, mostly because of the overwhelming (though not perfect – cf. especially Udihe, Oroch, Negidal) agreement across all Tungusic languages with respect to the harmony class membership of native cognates. We concluded that, whatever its source, VH has to be reconstructed for proto-Tungusic. On this view, if Tungusic VH is from Mongolic, the influence would have to have taken place at the proto-Tungusic stage, completely reorganizing the entire lexicon prior to the break-up of proto-Tungusic. (An additional possibility is that Tungusic had an original VH that was replaced by a different, Mongolic-influenced VH system.)

So, if proto-Mongolic, proto-Tungusic, and proto-Korean are reconstructed with VH (*and* they are genetically related), an important question arises: should we expect cognate vocabulary to agree in harmony class? Judging from the Tungusic-internal situation, not necessarily. Rather, the answer to this question depends on the details of the sound correspondences assumed by each reconstruction.

Table 20. NonRTR words often shift to RTR in Udihe.[37]

TR version of Benzing's pTg	*sə:ksə? *sə:gsə? 'blood'
Even	hə:s 'dried and hardened blood'
Evenki	sə:ksə ~ sə:hsə ~ ʃə:wʃə ~ ʃə:hə
Negidal	sə:ksə
Solon	sə:kʧə ~ sə:gʧə
Oroch	sə:ksə
Udihe	sakeæ (*TMS*), sakia (Kazama)
Nanai	sə:ksə
Ulcha	sə:ksə
Orok	sə:ksə (Kazama)
Manchu	səŋgi
Jurchen	*səgi (四譯館), *ʃəŋgi (會同館)

Consider the case of an established clade such as Tungusic: some languages have lost RTRH altogether (Manchu dialects);[38] some languages attest pervasive but (so far) unpredictable shifts from one class to another (Udihe, see Table 20); some lexical items appear to go back to original doublets (one 'isotope' from each harmony class).

Some lexical items *might* go back to original doublets, see Table 21.[39]

In looking at two interpretations of the proto-Altaic vocalic correspondences separated by 45 years (Poppe 1960; Robbeets 2005), the vowel correspondences for proto-Mongolic, proto-Tungusic, and proto-Korean are fairly transparent; for example, consider Poppe and Robbeets' basic correspondences for eight short monophthongs in initial syllables, as in Table 22.[40] Poppe's correspondences are for Written Mongolian, proto-Tungusic, and modern Korean; Robbeets' are for proto-Mongolic, proto-Tungusic, and proto-Korean.

On the basis of these correspondences in the traditional system, Mongolic and Tungusic are expected to preserve the original Altaic harmony classes (at least in initial syllables), *modulo* some minor adjustments related to neutralization of individual pairs, such as *ï, *i > /i/ or *u, *ü > /u/ (the full original system without neutralizations is reconstructed for pTg).

37. Benzing had suggested that the shift is related to long *ɔ:, but the pattern is not robust.

38. RTRH has been "lost" in Sanjiazi and Sibe, in the sense that the most basic co-occurrence restrictions are violated.

39. One supposes that, like sound symbolic words in Korean, each form had distinct nuances of meaning, possibly systematic.

40. We ignore Poppe's marginal *é.

Table 21. Original doublets of some lexical items.

'fat, thick'	NonRTR *borgə?	RTR *bɔrga?
Even	[bərgə] ~ [borgo] ~ [burgə] ~ [bə̆rgə̆]	
Evenki	[burgu-]	
Negidal	[bəjgə]	[bɔjgɔ] ~ [bɔjgu] ~ [bɔg:ɔ]
Ewenke	[bog:o]	
Solon	[burgu]	
Oroch		[bɔg:ɔ]
Udihe		[bɔgɔ]
Nanai	[bujgu]	
Ulcha	[buʤu]	[bɔʤɔ]
Orok	[bodo]	[bɔd(:)ɔ]

In Korean, however, the full range of correspondences adduced by Poppe (1960) is less tidy. Like Mongolic and Tungusic, Korean /i/ arises from both *ï and *i; in addition, Korean /u/ can arise from any of the proto-Altaic round vowels *ö, *ü, *o, *u in Poppe's system, significantly expanding the distribution of the resulting neutral vowels. Furthermore, Korean "je̯" < ㅓ > has a source in *ï, giving rise to neutral vowels. Note that some Korean switches in harmonism (cf. 'goat') or to disharmonic words. Note that some Korean cognates with /i/ derived from *ï are [NonRTR]-harmonic; this implies that in Korean this neutralization can be accompanied by harmony shift. Korean *alay a* <ɔ> is not given a very clear treatment in this system.[41]

In looking at Poppe's comparisons, it is clear that he generally pays close attention to harmonism. However, a number of Poppe's cognate sets are problematic with respect to harmony. A general problem is that Poppe relies heavily on Evenki for Tungusic comparanda; unfortunately, Evenki has neutralizations (especially among high vowels) that obscure the original proto-Tungusic harmonism, which can only be recovered by looking more deeply at derived forms and cognates in the other Tungusic languages. The result is that Poppe often gives unconvincing Tungusic cognates in his Altaic comparisons, or suggests Evenki and Manchu cognates that together do not converge on a proto-Tungusic etymon.[42] Obviously, it is inherently desirable to identify and eliminate incorrect comparisons. One positive outcome is that correspondences can sometimes be simplified as a result, since harmonically mismatched "cognates" often turn out to be the exceptions to more robust correspondence patterns.

41. K-M Lee (1958) suggests a number of additional etymologies involving pA *o > *alay a* < ㆍ > [ɔ], but acknowledges that the latter has multiple sources. For Poppe, *u is a more frequent source.

42. The same problem is utterly rampant in Starostin et al.

Table 22. Poppe (1960) and Robbeets' (2005) basic correspondences for eight short monophthongs in initial syllables.

TRH view	proto-Altaic		Mongolic		Tungusic		Korean	
	Poppe 1960	Robbeets 2005	P (WMo)	R (pMo)	P (pTg)	R (pTg)	P (ModK)	R (pK)
*i	*i	*i	*i > i	*i	*i	*i	i?	*i
*ə	*e	*e	e	*e	*ä (*e)	*e	e̯?	*e
*o	*ö	*ə	ö	*ü~ö	*ö	*u	u? e̯? i̯?	*Ø~u
*u	*ü	*u	ü	*ü~ö	*ü	*u	i̯ (> u)?	*wu
*ɪ	*ï	–[43]	*ï > i	–	*ï	–	i? je̯?	–
*a	*a	*a	a	*a	*a	*a	a?	*a
*ɔ	*o	*o	o	*a-~*-o[44]	*o	*o?	o? u?	*wo
*ʊ	*u	*ʉ	u	*u	*u	*u	u? a̯? o?	*Ø~o

At the same time, taking VH seriously in reconstruction also raises important difficulties. For example, certain languages – especially Korean – have large numbers of harmonic doublets ("isotopes" in Martin's terminology). Are there many such words at the proto-branch level? Were there many doublets in proto-Altaic, too? In light of this, how should we really handle harmony mismatches?

Harmony mismatches in Tungusic are of several types, some of which are truly problematic. For example, the "migration" of a number of apparently original [NonRTR] words into the [RTR] class in Negidal, Udihe, and Oroch is definitely real, but unexplained. This pattern does not seem like strong evidence for an original doublet. A superficially similar pattern is found for words like 'otter' (and some other animals?), where some languages clearly point to [NonRTR], while others clearly point to [RTR]. In such a case, it is perhaps easier to imagine an old doublet, with some kind of systematic semantic opposition, such as augmentative versus diminutive, or male versus female, or some other physical attribute. And yet, wouldn't we then expect to find both doublets, appropriately differentiated, in at least one daughter language?

Our conclusions in this section are necessarily tentative. Family-internal evidence strongly supports the reconstruction of TRH – on our view RTRH – in Mongolic and Tungusic. Martin (2000) and others have expressed skepticism

43. Robbeets does not reconstruct a back/RTR high front vowel. However she notes that this "is because the sifted comparative evidence reconstructing proto-Transeurasian *ï is numerically not significant." She does not exclude the possibility that *ï should be reconstructed (Martine Robbeets, p.c.).

44. Robbeets' reflex for pT onset *o is pM *a; her reflex for noninitial pT *o is pM *o.

about whether VH should be reconstructed for earlier Korean, but the primary datum Martin cites, disharmonic stems in MK, primarily involve the syllable /ye/ [jə], which as we noted above is likely to have a dual source. There is, then a solid case for reconstructing RTRH in all three of these language families. If VH is reconstructable for a protolanguage grouping together all three, it is likely to have been of the RTRH type.

5. [RTR] harmony as an areal feature

5.1 RTR/height harmony in NE Asia outside KTM

Janhunen (1981) points out that within Northeast Asia, "apertual harmony" (our RTRH) is an eastern feature, while "palato-velar harmony" (our PH) is a western feature. Our argument in this paper is that the domain of the "eastern" RTRH feature extends further into the center of the region, to include KMT. Janhunen explains the near-complete predominance of RTRH in modern KMT languages as the result of a diachronic "vowel rotation" as in Figure 11.

The vowel rotation hypothesis is similar to Svantesson's "velarization" hypothesis for Mongolic discussed in Section 2. The main support for it comes from K-M Lee's (1964, 1972) hypothesis of a vowel shift between EMK and LMK, but as we saw in Section 2, the empirical support for the vowel shift hypothesis has eroded. We return to the matter of Korean prior to EMK below.

Janhunen observes that in the eastern NEAsian families he discusses, Chukotko-Kamchatkan and Nivkh, RTRH may be a primary feature. As Janhunen points out, modern Chukotko-Kamchatkan languages generally involve some reduction of an original [RTR]-dominant system, represented by Bobaljik (2009) as follows in Figure 12 for Proto-Chukotkan.

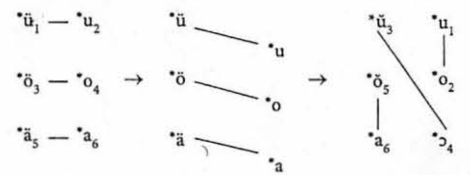

Figure 11. "Vowel rotation" in NEAsia: the Korean case (Janhunen 1981).

Recessive	*i	*u	*ɛ
Dominant	*e	*o	*a
Transparent		*ə	

Figure 12. Proto-Chukotkan vowel inventory (Bobaljik 2009).

In modern Chukchi *ɛ and *e have merged, while in Alutor varieties *ɛ > *a and *o > *u have merged. These changes – and the persistence of harmony as a stem property even after vowel mergers – suggest an original seven vowel system with [RTR]-dominant harmony.

In Nivkh, too, Janhunen (1981: 139–140) points out the evidence for an apertual ([RTR]) harmonic opposition, based on an alternation in prefix shape between *i*- before /u/, /ə/ and *e*- before /o/, /a/. Shiraishi and Botma (2013) survey 335 disyllabic roots in the spoken corpus *Sound Materials of the Nivkh Language* (http://ext-web.edu.sgu.ac.jp/hidetos/HTML/SMNStitle.html). They find that /o/ never occurs stem-internally with /ə/ and that /a/ never occurs with /u/ and only once with /ə/, suggesting vestiges of stem-internal co-occurrence restrictions based on an [RTR] : [NonRTR] opposition.

A third candidate for vestigial RTRH, this time to the north of KMT, is Yukaghir. Nikolaeva (2006: 57 ff) reconstructs a PH system for proto-Yukaghir. But as Maslova (2003: 35, fn 8) notes, attributing the observation to Bernard Comrie and Christian Lehmann, the present-day Kolyma Yukaghir harmony "might be more appropriately described as (advanced) tongue root (rather than palatal) harmony". In the Kolyma Yukaghir system, /e/, /ø/ contrast with /a/, /o/. The high vowels /i/, /u/ are transparent, but stems with /i/, /u/ normally belong to the same class as /e/, /ø/, with the majority of exceptions involving /i/. The matter obviously requires further investigation, but Nikolaeva's (2006: 57) reconstruction might be reinterpreted as indicated in Table 23.

Neither Kolyma nor Tundra Yukaghir attests *y or *ü (Nikolaeva 2006: 57). On the RTRH interpretation in Table 23, this reflects loss of the TR contrast for the high vowels, a typologically common development.

On the view that we have presented here, KMT occupy the western and southern edges of an RTRH zone. Most languages in the zone, including most daughters of KMT, show some degree of erosion of an earlier RTRH system, to the point that it is not easy to identify a focal center of the zone, just as it is not easy to identify a particular phylum that is the source of TRH in the Central Sudanic Zone (CSZ) of Africa as defined by Clements and Rialland (2008). However, the NE Asian system shows at least two broad contrasts with the Central Sudanic situation. First, where we have information, [RTR] appears to be the dominant feature in NEAsia, while

Table 23. Proto-Yukaghir vowels.

Nikolaeva (2006: 57)					RTRH reinterpretation				
front	*i	*e	*ö	(*ü)	NonRTR	*i	*e	*o	*u
back	*y	*a	*o	*u	RTR	*ɪ	*a	*ɔ	*ʊ

Niger-Congo and Nilo-Saharan show both [ATR] and [RTR] dominance (Casali 2003). Second, the classic CSZ inventories are 7 or 9 vowels, with 8 or 10 if /a/ shows a TR opposition. Inventories in NEAsia are in general smaller, and most seem reconstructible as 8 vowel systems, with frequent loss of a TR contrast for /i/. The crucial structural difference is that while CSZ TRH languages most frequently have a TR contrast for mid vowels (the 5 Height and 4 Height (Mid) inventories in Casali 2003 and Clements & Rialland 2008), NEAsian RTRH languages never do. NEAsian RTRH languages typically motivate just a single height contrast. Mid vowels function as the [NonRTR] counterparts of [RTR] low vowels in NEAsia, while 72 of the 110 languages in Casali's survey have a TR contrast between mid vowels.

5.2 The behavior of TRH in contact

The CSZ example teaches us that TRH spreads across families and phyla (Niger-Congo, Nilo Saharan, Afroasiatic). But it is not clear that this spread is particularly rapid. Even claimed instances of expansion of the TR contrast within a vowel inventory (e.g. Przezdziecki 2005 for Yoruba) are open to other interpretations (Joseph & Whitman 2013). Likewise, within NEAsia, RTRH seems to have to be reconstructed at the proto-family level. This is Janhunen's (1981) view for Chukotko-Kamchatkan and Nivkh, and we have argued that the same is true for KMT. RTRH is an areal feature: Given the lack of evidence for relatedness between at least some of the families, RTRH in NEAsia was almost certainly spread by contact too (Janhunen 1981). But the best evidence is that, as a feature, RTRH in NEAsia is old and its spread is very ancient.

In the specific case of Niger-Congo in the CSZ, it has been argued that TRH is an innovation (Dimmendaal 2001; Hyman 2011). Our claim is that RTRH is a retention in each of the families we have examined (KMT, Chukotko-Kamchatkan, Nivkh, possibly Yukaghir). This means that if any of these families are genetically related, RTRH must be reconstructed for their parent, in the absence of compelling evidence to the contrary. In particular, if KMT are genetically related, given this fact and the near-identity of their vowel inventories, RTRH must be reconstructed for their ancestor. Attempts to reconstruct an ancestor without this feature, such as Starostin et al. (2003), are thus efforts at internal reconstruction within the proto-family.

5.3 Reconciling the Korean vowels

In the preceding section we remarked that the KMT vowel inventories (in addition to the presence of RTRH) are almost identical. The same point is made by Janhunen (1981: 142). The single aberration is the proto-Korean vowel system, which as we saw in Section 2 has a [±round] contrast only for non-low vowels. The PH interpretation of proto-Korean must posit the "vowel shift" hypothesized by K-M Lee (1964, 1972), but as we saw in Section 2, the EMK and Mongolian loanword evidence for this hypothesis does not stand up to scrutiny. Janhunen (1981: 131) also cites comparative data from Chinese mentioned by K-M Lee (1972) and a single loanword comparison with Japanese: MK *kŏm*: J *kuma* 'bear'. But as pJ *o was raised in non-final syllables in main island and most Ryukyuan varieties, the Japanese form does not tell us whether the original first-syllable vowel in this word was *u or *o. As for the Chinese forms, pre-EMK phonograms such as 毛 (MC maw, OC *C.mˤaw; Baxter & Sagart 2011), 老 (MC lawX, OC *C-rˤuʔ), 所 (MC srjoX, OC *s-qʰraʔ), 刀 (MC taw, OC *C.tˤaw) all transcribe syllables whose LMK vowel is /o/. If a vowel shift had occurred after the adoption of the phonograms, we might expect this vowel to have been transcribed using MC (or OC) /u/, but this occurs only in the case of the single phonogram 古 (MC kuX, OC *kˤaʔ). This phonogram is also used to transcribe Old Japanese /kwo/, indicating the existence of a local transcription practice where this character was used to represent a syllable with a mid vowel.

Thus none of the available loanword evidence supports a "shifted" or rotated interpretation of the Korean vowels, even at the pre-EMK level. However, as noted by many authors, internal evidence suggests a special status for the LMK non-low central vowels /ɨ/ and /ʌ/. These vowels are restricted in their distribution, occurring not at all (in the case of /ʌ/) or only once (in the case of /ɨ/) in absolute onset position. They are considered to have been the target of syncope (K-M Lee 1991; Martin 1996), and are generally characterized as "weak" vowels.

Under the RTRH analysis, the aberrant feature of LMK /ɨ/ and /ʌ/ is that they are not round. Ko (2012) gives the LMK inventory the following analysis, as in Table 24.

A single feature, absence of a set of low round vowels, distinguishes the LMK inventory from the inventories we have argued for in proto-Mongolic and proto-Tungusic. Suppose the pre-EMK antecedents of /ɨ/ and /ʌ/ were originally rounded. Both vowels must have been distinct from /u/ and /o/, the [labial] [NonRTR] and [RTR] vowels respectively. This suggests a restructuring from a system like the one represented in Table 25.

Table 24. Analysis of LMK vowel inventory in Ko (2012).

	i	ə	a	ɨ	ʌ	u	o
[coronal]	+	–	–	–	–	–	–
[labial]	–	–	–	–	–	+	+
[low]	–	+	+	–	–	–	–
[RTR]	–	–	+	–	+	–	+

Table 25. Analysis of pre-EMK vowel inventory prior to delabialization of low vowels.

	*i	*ə	*a	*o	*ɔ	*u	*ʊ
[coronal]	+	–	–	–	–	–	–
[labial]	–	–	–	+	+	+	+
[low]	–	+	+	+	+	–	–
[RTR]	–	–	+	–	+	–	+

On this analysis the pre-EMK sources for /ɨ/ and /ʌ/ are *o and *ɔ. Delabialization of these vowels, perhaps triggered by weakening, forced a restructuring of the system as in LMK (Table 24), since loss of the [labial] feature would have eliminated the contrast with *ə and *a. Effectively, delabialization triggered the centralization and raising of these vowels. The inventory as reconstructed in Table 25, motivated by the single change of delabialization, brings pre-EMK into line with proto-Mongolic and proto-Tungusic, and more generally with NEAsian two-height RTRH systems.

The delabialization of the original low back rounded vowels in pre-EMK, but not in Tungusic and Mongolic, may have been abetted by the absence of rounding harmony in Korean. Rounding harmony is a more "western" feature than TRH: Turkic and Yukaghir have it as well as Mongolic and Tungusic, but not Korean or Nivkh. Since /ɨ/ and /ʌ/ are overwhelmingly the most common suffixal vowels in Korean, rounding harmony would have resulted in a very high frequency of [labial] tokens of both. But as Korean appears never to have had RH, we may hypothesize that this left both vowels "susceptible" to weakening/delabialization.

6. Conclusions

The conclusions of this paper are the following:

I. RTRH should be reconstructed for pK, pMo, and pTg.
II. The shift RTRH -to- PH is better motivated than a shift in the opposite direction.
III. If pK, pMo, pTg, pTk form a genetic unity, and the proto-language had VH, the specific type of harmony was most likely RTRH.
IV. KMT reside in a larger zone of [RTR]-dominant TRH families or phyla. In each of these, RTRH appears to be reconstructable to the proto-family level. The focal area or source of RTRH in the region is as yet unclear.

Of these conclusions, (II) and (IV) in particular raise questions that must be the focus of further research. Our hope is to have made a first step toward tackling these questions.

Abbreviations

ATR	advanced tongue root	PH	palatal harmony
CSZ	Central Sudanic Zone	pK	proto-Korean
EMK	Early Middle Korean	pMo	proto-Mongolic
IPA	International Phonetic Alphabet	pTg	proto-Tungusic
KMT	Korean, Mongolic, and Tungusic	pTk	proto-Turkic
LMK	Late Middle Korean	RTR	retracted tongue root
MC	Middle Chinese	RTRH	retracted tongue root harmony
MK	Middle Korean	SE	Southeast
MVS	Mongolic Vowel Shift	SW	Southwest
NE	Northeast	TR	tongue root
NW	Northwest	TRH	tongue root harmony
OC	Old Chinese	VH	vowel harmony
OK	Old Korean	WMo	Written Mongolian
OM	Old Mongolian		

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CHAPTER 8

Old Japanese bigrade paradigms and Korean passives and causatives

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There is a consensus that two Old Japanese (OJ, 8th c. CE) verb paradigms, called *bigrade*, were not present in proto-Japanese (pJ, 1st millennium BCE). There is less agreement on how the bigrades originated and how many unitary pJ vowels their reconstruction requires. I argue here that bigrade verbs began as a proto-Korean-Japanese (pKJ) passive or inchoative formation, and that six unitary pJ vowels (allowing intrasyllabic glides) suffice to capture the observed alternations of bigrade and all other verb stems. An alleged seventh pJ vowel, *i, is not needed, though it may have been present in proto-Korean-Japanese. The pKJ reconstructed passive may have been an innovation that distinguished it from other Macro-Tungusic branches.

Keywords: Japanese, paradigms, vowels, passives, causatives

1. Introduction

The goal of this study is two-fold: I will present a theory that explains the bigrade verb paradigms of Old Japanese as early Japanese-internal innovations, and discuss the implications of this theory for the historical comparison of Korean and Japanese, concluding with some remarks on the Macro-Tungusic and Transeurasian hypotheses.

I first essayed such a theory in Unger 1993 [1977]. Whitman (2008) and Frellesvig (2008) have elaborated on it in different ways. I prefer Frellesvig's approach to Whitman's for the reasons summarized by Robbeets (2009: 148) and for some others that will emerge in the sections below. But I believe Frellesvig's analysis can be improved in two respects. First, Frellesvig assumes, as does Whitman, that proto-Japanese had seven unitary vowels (Frellesvig & Whitman 2004, 2008a, 2008c). In this paper, I offer an alternative with six vowels plus intrasyllabic glides that both accommodates Frellesvig's theory of bigrade paradigm formation and

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