The end of the Korean Vowel Shift controversy

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The Korean Vowel Shift

“Documentary evidence suggests that a significant phonological change – a “Korean Vowel Shift,” as it has been called – took place between the 13th and 15th centuries. The evidence for the change comes primarily from Mongolian loanwords.” (KM Lee & Ramsey 2011:94)

The proposed KVS hypothesis is untenable

Mongolian loanwords do not support the hypothesis
Outline

- What is the Korean Vowel Shift?
  - Overview
  - Evidence
    - Mongolian loanwords
    - Jǐlín lèishì
  - Problems
- Looking back Old Mongolian vowel system (Ko 2011a, b)
  - An RTR (not palatal) analysis of OM
  - Evidence
    - Comparative methods
    - Chinese transcription of Old Mongolian
    - General linguistics prefers
      - a RTR-to-palatal shift (Vaux 2009) to a palatal-to-RTR shift (Svantesson 1985)
- The correspondence between OM and MK revisited
- Conclusion
The Korean Vowel Shift

Overview
Vowel harmony in Middle Korean

- Stem-internal vowel harmony
  a. Stems with Yang (RTR) vowels only
  b. Stems with Yin (non-RTR) vowels only

- Vowel harmony across morpheme boundary
  Yang (RTR) vowel stem   Yin (non-RTR) vowel stem
  a. Verb/adjective stem + conjunctive suffix ‘-a/-ǝ’
     /mak-ǝ/ ‘block’ /
     /kot-ǝ/ ‘straight’ /
     /sal-ǝ/ ‘burn’ /
  b. Verb/adjective stem + adnominal suffix ‘-on/-un’
     /mak-on/ ‘block’ /
     /kot-on/ ‘straight’ /
     /sal-on/ ‘burn’ /
  c. Noun + particle (accusative particle ‘-ʌl/-il’ or locative particle ‘-aj/-ǝj’)
     /sarʌm-ʌl/ ‘person’ /
     /tocʌk-ʌl/ ‘thief’ /
     /barʌl-aj/ ‘sea’ /
     /narα-aj/ ‘nation’

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### VH in MK (cont.)

#### Vowel system (15th c.)

<table>
<thead>
<tr>
<th>i</th>
<th>ɨ</th>
<th>u</th>
</tr>
</thead>
<tbody>
<tr>
<td>ə</td>
<td>o</td>
<td></td>
</tr>
<tr>
<td>a</td>
<td></td>
<td>ʌ</td>
</tr>
</tbody>
</table>

#### Harmonic feature?

- **Harmonic pairing**
  - /u/ ~ /o/
  - /ə/ ~ /a/
  - /i/ ~ /ʌ/

- **What is the nature of VH?**
  - Horizontal (height) harmony
  - Vertical (palatal) harmony
  - Diagonal harmony
  - (tongue root harmony)

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VH in MK (cont.)***

- No known feature explains the harmonic pairing in MK
  - Tongue root feature has been unknown or disregarded
  - cf. TR analysis

- Altaic hypothesis (yet to be proven)
  - ‘macro’-Altaic
    - Korean belongs to Altaic (à la G. J. Ramstedt), thus is likely to share the same vowel harmony and system as other Altaic languages
  - Proto-Altaic (and Proto-Mongolic)
    - originally had a ‘palatal’ harmony

- Old Korean had a ‘palatal’ system
- MK vowel harmony is based on OK vowel system
  - = “Discrepancy” between vowel system and vowel harmony
- How is this possible?
  - Mediated by the proposed KVS

- Old Korean
  - `i`  `ü`  `u`
  - `æ`  `æ`

- Early Middle Korean
  - `i`  `ü`  `u`
  - `æ`  `æ`

- Late Middle Korean
  - `i`  `æ`  `u`
  - `æ`  `æ`

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The Korean Vowel Shift

Documentary evidence
Empirical evidence

- Mongolian loanwords transcribed into Korean in
  - Pŏnyŏk Pak T’ongsa 騏譯朴通事 (1517)
  - Hunmong chahoe 訓蒙字會 (1527)

- Jīlín lèishì 鶴林類事 ‘Assorted matters of Jīlín’
  - 350 words and phrases
    - 天1曰2漢捺3
    - ‘sky’1 is called2 ‘[the Korean word]’3 (LMK 하늘, Chinese pronunciation)
Mongolian loanwords in Middle Korean

MK transcription of 13th century Mongolian vowels (K-M Lee 1964)

<table>
<thead>
<tr>
<th>OM</th>
<th>i</th>
<th>e</th>
<th>a</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK</td>
<td>ü</td>
<td>ö</td>
<td>u</td>
</tr>
</tbody>
</table>

Examples (KM Lee 1964, 1972, 2011:96ff)

<table>
<thead>
<tr>
<th>M~K</th>
<th>Mong</th>
<th>Kor</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>ü~stdafx</td>
<td>küreng</td>
<td>kurəŋ</td>
<td>‘dark brown’ (Pak. I, 63r)</td>
</tr>
<tr>
<td>ö~stdafx</td>
<td>ögsin</td>
<td>kəwəkəin</td>
<td>‘old wild falcon’ (Hun. I, 15 v)</td>
</tr>
<tr>
<td>u~⎧</td>
<td>bayudal</td>
<td>paotal</td>
<td>‘military camp’ (Hun. II, 8 r)</td>
</tr>
<tr>
<td>o~⎧</td>
<td>olang</td>
<td>oranə</td>
<td>‘belly-band, girth’ (Pak. I, 30r)</td>
</tr>
</tbody>
</table>
Mongolian loanwords (KM Lee 2011:94)

“Why was the Korean vowel ㅗ equated to a front vowel?”

“ㅗ was not a back vowel, but rather a front vowel, *ü, which moved to the back of the mouth by the 15th century.” (KM Lee 2011:94)

“Similarly, ㅓ represented the Mongolian front vowel e and therefore must itself have been a front vowel *e that only later became [ə].”

MK transcription of 13th century Mongolian vowels (K-M Lee 1964)

<table>
<thead>
<tr>
<th>OM</th>
<th>i</th>
<th>e</th>
<th>a</th>
<th>ü</th>
<th>ö</th>
<th>u</th>
<th>o</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK</td>
<td>ㅏ</td>
<td>ㅓ</td>
<td>ㅏ</td>
<td>ㅗ</td>
<td>ㅏ</td>
<td>ㅏ</td>
<td>ㅏ</td>
</tr>
</tbody>
</table>

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Jīlín lèishì 駕林類事 (KM Lee 2011:94ff)

- **LMK /ʌ/ < EMK */ɔ/*
  - 河屯 ‘one’ (LMK *hoton *ʰʌ tʌ), 末 ‘horse’ (LMK mol ㄠ)
  - Yuan-period Chinese: 河 *xɔ 末 *mɔ

- **LMK /i/ < EMK */ə/*
  - 黑根 ‘big’ (LMK khun ㄕ ﹟ < *hukun)
  - Yuan-period Chinese: 黑 *xəj 根 *kən

<table>
<thead>
<tr>
<th></th>
<th>i</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ü</td>
</tr>
<tr>
<td>2</td>
<td>e</td>
</tr>
<tr>
<td>3</td>
<td>a</td>
</tr>
</tbody>
</table>

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The Korean Vowel Shift

Problems
Problems of the KVS (a summary)

- Provides no link to the description in *Hunminjeongeum Haerye*
- Discrepancy between harmony and system?
- Cannot be reconstructed by comparative methods (cf. Hattori 1975)
- Lack of phonetic motivations (S-s Oh 1998)
- A counterexample to the typology of vowel shifting (Labov 1994)
Problems of the KVS (cont.)

- Insufficient data from *Jilin lèishi* and Mongolian loanwords (Martin 2000, Vovin 2000)
- Wrong predictions (Hattori 1975, Martin 2000)
- Inconsistent with recent findings
- Mongolian loanwords do not support the hypothesis
  - Hattori (1975), Vovin (2000), Ko (2011a, b)
Comparative Methods

- No modern reflexes of the proposed front-back vowel contrast (cf. Hattori 1975:12)

<table>
<thead>
<tr>
<th>Sound correspondence in initial syllable (based primarily on Kwak 2003)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle Korean</td>
</tr>
<tr>
<td>Northwest</td>
</tr>
<tr>
<td>Northeast</td>
</tr>
<tr>
<td>Central</td>
</tr>
<tr>
<td>Southeast</td>
</tr>
<tr>
<td>Southwest</td>
</tr>
<tr>
<td>Cheju</td>
</tr>
</tbody>
</table>

Reconstruction: *i ə a i c u o
Wrong predictions

- Hattori (1978: 80, 81, recited from J Kim 1993)
  - Given the phonetic value of ㆍ (alay a) in EMK assumed by KM Lee, MM olang, bora, yodoli are predicted to be transcribed as OK 옯랑, 보라, 고도리 instead of the attested 오랑, 보라, 고도리.

- “Did the people of ‘Kwolye’(高麗), as required by the vowel-shift hypothesis, call their nation /kwulya/?” (Martin 2000:26)
Solving the problems?

- An RTR analysis of the MK vowel system

\[
\begin{align*}
&<\ | > \ i \quad <-\text{> i} \quad <\text{-} > \ u \\
&<\cdot > \Lambda \quad <\text{-} > \ 0 \\
&<\ | > \varepsilon \\
&<\ | > \ a
\end{align*}
\]

- Does not encounter any of the aforementioned problems
- More economical (no vowel shift)
- Consistent with the fact that many Altaic languages, esp. Mongolic and Tungusic, have an RTR harmony

- **Still does NOT exclude the possibility of a palatal-to-TR shift at an “earlier” stage**
Hattori (1975, 1978)

“Comparative research on modern dialects shows that MKㅏㅗㅜㅡㅣ were pretty much the same vowels as modern [a][o][u][ɨ][i].” (Hattori 1975:12)

Hattori (1978: 80, 81, recited from J Kim 1993)

Given the phonetic value of ㅓ(alay a) in EMK assumed by KM Lee, MM olang, bora, ɣodoli are predicted to be transcribed as OK 오랑, 봉라, 미드리 instead of the attested 오랑, 보라, 고도리.
“I hesitate to conclude that ᵻ was [ü] in 12th century Middle Korean.” (Kang 1980:161)

“ Twig appears close to [u] except for a few examples.” (Kang 1980:184)
J Kim (1993)

- Complexity of the direction of changes
  - Fronting, backing, raising, lowering, unrounding, etc.
- Unattested case of push-chain-only (in the 2\textsuperscript{nd} phase)
  - Cf. Lass (1984:127)
    - “...no one has seriously entertained the push chain alone...”
- Time span is too short (only 100-150 years)
- No exception at all?
  - Applied to all lexical items in all dialects
- *Discrepancy* between harmony and system?
  - Unnecessary if we accept tongue root analysis for MK
J Kim (1993) (cont.)

- **Vowel correspondence between Manchu and Korean in 淸學音 (18c)**
  - Ma. ŭ :: Kor ㅜ (examples taken from Seong 1981:82)
    
    | 清學音            | 写本满文            |
    |-------------------|---------------------|
    | angdarago         | 양다라고              |
    | gosi              | 고시                |
    | holla             | 홀라                |
    | cf. aggu          |악구                |
    |                   |不信                |
    |                   |三十                |
    |                   |呼                  |
    |                   |無                  |
    |                   |akdarakū             |
    |                   |gūsin               |
    |                   |hūla                |
    |                   |akū                 |

- **Evidence for a vowel shift?**

- **Perception test: modern Mongolian (Khalkha & Chakhar)**
  - Almost the same correspondence
    
    | Mongolian :: Korean |
    |---------------------|
    | ü :: 타             |
    | u :: 탑             |
    | o :: 탑             |
Labov (1994)

Three principles of vowel shifting (Labov 1994:116)

- In chain shifts,
  - **PRINCIPLE I** long vowels rise.
  - **PRINCIPLE II** short vowels fall.
  - **PRINCIPLE IIₐ** the nuclei of upgliding diphthongs fall.
  - **PRINCIPLE III** back vowels move to the front.

- “The development of Korean vowels from the 13th century onward shows an even more extensive set of counterexamples, which make it seem as though an entirely different organizing principle were at work.” (Labov 1994:138)
S-s Oh (1998)

- Lee’s explanation of vowel shift in terms of system asymmetry is not consistent.
  - If the raising/fronting of OM ä to e was to fill up the hole in the mid/front region of vowel space, then what caused it to be pushed back again, breaking the symmetry?
- The proposed KVS does not follow the general principles of vowel shift (e.g., Labov 1994)
- Most of the individual changes of the proposed chain shift lack phonetic motivation from the perspective of Natural Phonology (Stampe 1969)
S-s Oh (1998) (cont.)

- Modern reflexes of 烏, 命, 宇 (S-s Oh 1998:455 based on M. H. Miyake’s reconstruction (p.c.))

<table>
<thead>
<tr>
<th>Mandarin</th>
<th>Taiwanese</th>
<th>Vietnamese</th>
<th>Japanese</th>
<th>Korean</th>
</tr>
</thead>
</table>
| u        | o         | o(?)       | o        | 烏     | 'crow'  
| u        | go        | ngo        | go       | 命     | 'country name/surname'  
| ü        | u         | vu         | u        | 宇     | 'universe'  

- “... the loans retain the same original Chinese vowels, and that only Chinese underwent a shift” (o>u, u>ü)
C Park (2000)

- ‘ォ’ was unrounded.
- No evidence that ‘ォ’ was a front vowel
  - more likely a central vowel
- ‘ォ’ was lower than ‘ዓ’ but higher than ‘ォ’
- The phonetic value was [ʌ] or close to it.
H Park (2001)

EMK (鷃林類事)  LMK (朝鮮館譯語)

Martin (2000)

“I would not want to analyze the difference between the sounds of Chaucer and those of Shakespeare on the basis of loanwords from (or to) French, nor would I want to posit phonetic values for either Middle or Old English purely on the basis of the values we reconstruct for Old French or for Latin, from which English took the characters with which it is written.” (Martin 2000:29)

“Did the people of ‘Kwolye’ (고려), as required by the vowel-shift hypothesis, call their nation /kwulya/?” (Martin 2000:26)
Vovin (2000)

- **MM ü :: MK wu (†)**
  - “First, it is **attested only in one word** in Yi Kimun’s examples: *kwuleng-mol* ‘brown-color horse’, WM *küreng* (not attested in ’Phags-pa materials). Second, the attestation is **limited to Written Mongolian**, where we cannot be sure of the exact vocalism of the word. Third, there is **no one-to-one correspondence** between MM */ü/* in ’Phags-pa and WM */ü/*.” (Vovin 2000:62-7)

- **Examples** (Vovin 2000:65-6, all taken from glossary in Poppe 1941)
  
<table>
<thead>
<tr>
<th>Written Mongolian</th>
<th>Middle Mongolian(Phags-pa)</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>kümün</td>
<td>k’u’un</td>
<td>‘person’</td>
</tr>
<tr>
<td>kücün</td>
<td>k’ucu/k’ücün</td>
<td>‘strength’</td>
</tr>
<tr>
<td>……</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Monge Nokeltay

“Finally, as late as in 1741, compilers of Monge Nokeltay still used Korean wu (ㅜ) to transcribe Mongolian /ü/, although by that time according to Yi Kimun the shift was long completed.” (Vovin 2000:66)

Examples (Vovin 2000:65-6, taken from Poppe 1941)

<table>
<thead>
<tr>
<th>WM</th>
<th>Monge Nokeltay</th>
<th>gloss (page)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ire-kü</td>
<td>ilekhwu</td>
<td>‘to come’ (2a)</td>
</tr>
<tr>
<td>Kümün</td>
<td>khwun</td>
<td>‘person’ (2b)</td>
</tr>
</tbody>
</table>

......
Proto-Japanese

*ɪ *i *u
*ɛ *ə *o
*a

basic vowel correspondences

<table>
<thead>
<tr>
<th>MK</th>
<th>OJ</th>
<th>PJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>i</td>
<td>*i</td>
</tr>
<tr>
<td>i</td>
<td>o</td>
<td>*i</td>
</tr>
<tr>
<td>u</td>
<td>u</td>
<td>*u</td>
</tr>
<tr>
<td>yə</td>
<td>i, ye&lt;</td>
<td>*ɛ</td>
</tr>
<tr>
<td>ə</td>
<td>o, a&lt;</td>
<td>*ə, *a</td>
</tr>
<tr>
<td>o</td>
<td>u, wo&lt;</td>
<td>*o</td>
</tr>
<tr>
<td>Λ</td>
<td>o, a&lt;</td>
<td>*ə, *a</td>
</tr>
<tr>
<td>a</td>
<td>a</td>
<td>a</td>
</tr>
</tbody>
</table>

“... the vowel correspondences we have discussed give no support for (33). (33) predicts correspondences of the type EMK *e > LMK ə :: OJ i < PJ *e, but all correspondences of this type in (31) involve LMK Cə, not Cə, supporting our hypothesis that only the former descends from a front vowel. Similarly, (33) predicts EMK *u > LMK o :: OJ u < PJ *u, but (30) shows that LMK o corresponds to OJ u only in raising environments; elsewhere, it corresponds to OJ wo.”
An RTR analysis of OM

Proposal & evidence
Old Mongolian

- **Old Mongolian** (Svantesson et al. 2005: 98)
  - The immediate ancestor language that can be reconstructed from documents written in four different scripts: Uigurs, Chinese, Arabic, and ’Phags-pa in the 13th to 14th centuries
  - Cf. *Middle Mongol* (Rybatzki 2003), *Middle Mongolian* (Poppe 1955)

- **Proto-Mongolic** (Janhunen 2003:1)
  - The technical term for the common ancestor of all the living and historically attested Mongolic languages

- **Classical Mongolian** (*Written/Literary Mongol(ian)*)
  - The written language which has been used since about the 13th century and is still used by the Mongols of Inner Mongolia, China (Poppe 1954, 1955; Svantesson 1985; Janhunen 2003)
Pre-modern Mongolic vowel system

- **Proto-Mongolic**
  - Janhunen (2003:4) *i *ü *u
  - *ö *ö *o
  - *e *a

- **Old Mongolian**
  - Svantesson et al. (2005:111)

<table>
<thead>
<tr>
<th>Front</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>i y u</td>
</tr>
<tr>
<td>Nonhigh</td>
<td>e ø a o</td>
</tr>
</tbody>
</table>
Middle Mongolian: a palatal system?

- An assumption that has never been proven to be true
  - The transcription of both MM <u> and <o> into MK <ㅗ> is not decisive
    - Could be a mere reflection of the acoustic similarity between MM <u> <o> and MK <ㅗ> as in modern Mongolian and modern Korean (Vovin 2000:64ff)
- ’Phags-pa Mongolian
  - Unreliable for the reconstruction (Hattori 1975:16ff)
  - “no one-to-one correspondence” between MM /ü/ in ’Phags-pa and WM /ü/” (Vovin 2000:65)
  - “It would be more reasonable to analyze Mongolian vowels based on 15th c. Korean vowels since the latter is more convincing.” (J Kim 1993:50)
An RTR analysis of OM (proposal)

- My ‘RTR’ analysis vs. Traditional ‘palatal’ analysis

\[
\begin{align*}
&i & u & \\
i & & y & u \\
\mathrm{e} & & \ddot{\mathrm{o}} & a & o \\
\mathrm{a} & & \mathrm{c}
\end{align*}
\]
Evidence in favor of the RTR analysis of OM

- Comparative methods (Campbell 2004:131ff)
  - Majority wins
  - Economy
  - Naturalness(directionality)

- Textual evidence
  - Mongolian-Chinese correspondence (Hattori 1975)
Majority wins

Reconstruction of OM vowels

<table>
<thead>
<tr>
<th>Language</th>
<th>a</th>
<th>o</th>
<th>u</th>
<th>e</th>
<th>o</th>
<th>u</th>
<th>i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khalkha</td>
<td>a</td>
<td>o</td>
<td>u</td>
<td>e</td>
<td>o</td>
<td>u</td>
<td>i</td>
</tr>
<tr>
<td>Chakhar</td>
<td>a</td>
<td>o</td>
<td>u</td>
<td>e</td>
<td>o</td>
<td>u</td>
<td>i</td>
</tr>
<tr>
<td>Baarin</td>
<td>a</td>
<td>o</td>
<td>u</td>
<td>e</td>
<td>o</td>
<td>u</td>
<td>i</td>
</tr>
<tr>
<td>Monguor</td>
<td>a</td>
<td>o</td>
<td>u</td>
<td>e</td>
<td>o</td>
<td>u</td>
<td>i</td>
</tr>
<tr>
<td>Bonan</td>
<td>a</td>
<td>o</td>
<td>u</td>
<td>e</td>
<td>o</td>
<td>u</td>
<td>i</td>
</tr>
<tr>
<td>Santa</td>
<td>a</td>
<td>o</td>
<td>u</td>
<td>ie, e</td>
<td>o</td>
<td>u</td>
<td>i</td>
</tr>
<tr>
<td>Moghol</td>
<td>a, o</td>
<td>o</td>
<td>u</td>
<td>e</td>
<td>o</td>
<td>u</td>
<td>i</td>
</tr>
<tr>
<td>Buriat</td>
<td>a</td>
<td>o</td>
<td>u</td>
<td>e</td>
<td>u</td>
<td>u</td>
<td>i</td>
</tr>
<tr>
<td>Khamnigan</td>
<td>a</td>
<td>o</td>
<td>u</td>
<td>e</td>
<td>u</td>
<td>u</td>
<td>i</td>
</tr>
<tr>
<td>Dagur</td>
<td>a</td>
<td>o</td>
<td>o</td>
<td>e</td>
<td>u</td>
<td>u</td>
<td>i</td>
</tr>
<tr>
<td>Kalmyk</td>
<td>a</td>
<td>o</td>
<td>u</td>
<td>e</td>
<td>o</td>
<td>u</td>
<td>y</td>
</tr>
</tbody>
</table>

Reconstruction

Old Mongolian  *a  *o  *u  *e  *o  *u  *i
Economy (1)

A palatal analysis

3 rules: Pal \(\rightarrow\) RTR

Old Mongolian

Kalmyk/Oirat

Monguor

Khalkha

Dagur

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Economy (2)

An RTR analysis

I rule: RTR $\rightarrow$ Pal
Kalmyk/Oirat

Old Mongolian

Kalmyk/Oirat
Monguor
Khalkha
Dagur

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Naturalness: Vaux (2009)

- **Palatal-to-TR shift** (Svantesson 1985)
  - No known phonetic principles
  - No known attested cases

- **TR-to-palatal shift** (a reverse shift)
  - Phonetically grounded:
    - TB movement is concomitant with TR movement (Lindau 1975; Archangeli & Pulleyblank 1994)
  - Attested in e.g., Somali, Louisiana English
  - Explains the Southwest Turkic voicing
  - Simplification
  - Enhancement of the perceptability (F2 difference)
    - Maximal distribution of the back vowels
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- Vaux’s claim:
  - Proto-Altaic originally had a TR system.

- This seems to be true at the Mongolic level too!
MM-Chinese correspondence

- Hattori (1975)
  - “It is more likely that Middle Mongolian had a vowel harmony of ‘open-narrow’ type (= TR type)”

- In the transcription of the Secret History of the Mongols into Chinese characters

- MM ü – Chinese u
  - /gü/ (or /kü/)    古[ku²] 估[ku²] 沽[ku¹,2] 誼[ku²,3]
  - /kü/    枯[k‘u¹] 窟[k‘uʔ²]

- Rationale:
  - The transcription was made based on Northern dialect, maybe Beijing dialect (by assumption).
  - 14th c. Pekingese had the distinction between [u][uʔ] and [y][yʔ].
RTR-RTR analysis: my view

MK transcription of 13th century Mongolian vowels (K-M Lee 1964)

<table>
<thead>
<tr>
<th>OM</th>
<th>i</th>
<th>e</th>
<th>a</th>
<th>ü</th>
<th>ö</th>
<th>u</th>
<th>o</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK</td>
<td>ṭ</td>
<td>ṭ</td>
<td>ṭ</td>
<td>ṭ</td>
<td>ṭ</td>
<td>ṭ</td>
<td>ṭ</td>
</tr>
</tbody>
</table>

- **OM (RTR system)**
  - \(<i>\) i
  - \(<\text{ü}>\) u
  - \(<\text{u}>\) ŭ
  - \(<\text{e}>\) ē
  - \(<\text{ö}>\) ō
  - \(<\text{a}>\) a
  - \(<\text{o}>\) ɔ

- **MK (RTR system)**
  - \(<\text{ṭ}>\) i
  - \(<\text{ṭ}>\) i
  - \(<\text{ṭ}>\) u
  - \(<\text{ṭ}>\) ē
  - \(<\text{ṭ}>\) ɔ
  - \(<\text{ṭ}>\) a

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Conclusion

- The Korean Vowel Shift hypothesis by Prof. K-M Lee is not well-supported

- Evidence shows that the original Mongolic vowel system is based on RTR contrast

- Thus, there is no reason to believe that Old and Early Middle Korean had a palatal system

- Therefore, no vowel shift!
Selected references


