A proposal for a Hunminjeongeum-based writing system for Aymara

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1. Introduction

This paper seeks to analyze the phonological system of Aymara, a language widely used in Bolivia, and to propose an appropriate writing system for it.

Taking four Bolivians, Omar Ramirez Nina (male, 28 years old), Rodolfo Quispe Alabe (male, 31), Estela Sabia Velasquez Rosso (female, 32), and Rithlena Choque Gutierrez (female, 24)[1] as our consultants, we conducted linguistic surveys of five hours each on March 30, 2011.[2] At present, 810 basic words have been phonetically transcribed.[3]

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[1] The listed were short-term Bolivian visitors to Korea through the invitation of KOICA. We would like to express our gratitude to them and the people at KOICA. Omar and Rodolfo are speakers of Aymara, and Estela and Rithlena speak Quechua.

[2] This language survey was led by Chang Min Kim, head of SNU's Center for Latin American Studies, and Juwon Kim, SeungJae Lee, Sangchul Park, and Hui Jin were participants. The survey questionnaire was based on Choi *et al* (2011), *Linguistic Questionnaire for Investigation of Altaic Languages*, developed by Juwon Kim and others. Due to time limitations, only the items of highest priority (level 1) were surveyed. The

It is on the basis of these transcriptions that we have been able to analyze the phonological system of Aymara. Though it may not be perfect, the data being so scarce, we attempted a thorough analysis with the help of data from the UCLA Phonetics lab[4], the Websters online dictionary[5], and the research on Aymara conducted by Hardman (2001).

Based on this analysis, we aim to propose a writing system and orthography well adapted to the Aymara language. A writing system should be easy to learn and effectual in use. The formation of the letters should be scientific and reasonable. As is widely known, Hunmin jeongeum (hereon abbreviated to HMJE) is an excellent example of a scientific and reasonable writing system, and it is these traits that we wish to extend and apply to a 'HMJE-based writing system' for Aymara. This system differs in quite a few details from HMJE, such as its shapes and layout, but the basis is the same.

It must be stressed first and foremost that the HMJE-based writing system for Aymara is only for the Bolivians, not Koreans, for whom HMJE was originally developed. If the Aymara speakers of Bolivia are to adopt this writing system it must be well suited to the Aymara phonological system. For example, in Aymara there is a phonological contrast between

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questionnaire was translated into Spanish by Chang Min Kim. From this translated survey were gathered 810 basic word items, 83 grammatical items, and 84 basic conversation items. For recording we used the Sound device 722 model, and Praat for phonetic analysis. From April 2011, SeungJae Lee, Sangchul Park, and Hui Jin met to listen and phonetically transcribe the gathered data together. This collaboration was to ensure there are as few errors as possible in the transcription process.

[3] Refer to the appendix 'Illustrations of HMJE-based Transcriptions of Aymara.' From considerations of space we have only listed around 100 items from the larger pool of analyzed data.

[4] See the website, http://www.phonetics.ucla.edu.

[5] See the website, http://www.websters-online-dictionary.org/browse/Aymara.

/l/ and /r/,[6] which calls for two different letterforms. The single "ㄹ" of the Korean system does not suffice to differentiate between the two sounds. Therefore "ㄹ" could represent the sound /l/, and for /r/ we must devise a new letterform, "ㄹ", which did not previously exist in HMJE. Also, Korean speakers are more familiar with writing in syllabic clusters, but considering the phonology of Aymara a linear orthography is more appropriate. Although the HMJE-based writing system of Aymara takes HMJE as its starting point, such adaptations and changes are necessary in order to absorb the linguistic characteristics of the Aymara language. To effectively reflect the phonological system and morphological properties of Aymara and to provide for the convenience of the speakers of Aymara in Bolivia, these were our primary considerations in the selection and development of this writing system.

2. Vowels

2.1. Vowels and long vowels

Aymara has five vowels, /a/, /i/, /u/, /e/, /o/. The basic vowels are /a/, /i/, and /u/, while /e/ and /o/ usually appear only when the uvular consonants /q/, /q'/, /qʰ/ are in close proximity. With this fact in mind, the Webster dictionary for Aymara did not include "e" and "o" in their Roman alphabet transcriptions. However, it is phonologically unsound to limit the vowels of Aymara to just /a/, /i/, and /u/, as /e/ and /o/ occasionally appear even where there are no uvular consonants (/q/, /q'/, /qʰ/) nearby.

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[6] /r/ is a voiced alveolar flap, which is notably absent from word-initial position. However, in agreement with the analysis of Hardman (2001:16) we considered it a distinctive phoneme.

Below are some instances of /e/ and /o/ that appear without the presence of a uvular consonant.

(1) Instances of [e]

[elxanˈlapi] (146. paper), [uniˈseɾi] (184. enemy), [kuseˈʃiɲa] (247. brain), [uniseɾi] (596. bad)[7]

(2) Instances of [o]

[aˈɾoma] (61. evening), [noaˈʃiɲa] (180. war), [qoˈnoɲa] (282. chair), [qʼoloqʼolo] (379. fungus)

It is true that such examples are not numerous. Therefore we are faced with two options, that of limiting the vowel phonemes to three (/a/, /i/, /u/), and including /e/ and /o/ to make five. In this proposal we include five vowels, as it is better to have more possibilities open when creating a new writing system. Letterforms standing for /e/ and /o/ can first be devised, and then if they are found to be unnecessary, one can always eliminate their use.

The vowel /a/ is represented with " · ", /u/ with " − ", and /i/ with " ｜ ".

The most common phoneme in Aymara being /a/[8], it was assigned the simplest form, a dot " · ". Korean speakers call " · " the 'arae-a (low /a/) ', so this assignation seems quite natural. The second most frequently used vowel in Aymara is /i/, which was assigned the single vertical line " ｜ ". This also took the Korean " ｜ " into consideration. The next most frequent vowel is /u/, which was assigned the horizontal single line " − ". In HMJE


"ㅡ" stands for the unrounded high back vowel /ɯ/, but as Aymara does not have this phoneme the letterform can be assigned without confusion.

The vowel letters "ㆍ, ㅡ, ㅣ" are taken directly from the Three Germinants of Heaven, Earth and Man (天地人) of HMJE, called the Basic Letters (初出字). In this paper they will be referred to as the basic letters. The basic letters are all formed by one stroke, without bent edges. Keeping the same in common, the vowel /e/ was assigned "\", and the vowel /o/ was assigned "/". These forms are taken from the right and left edges of the triangular vowel chart ▽, respectively. Thus reflecting in the letterforms the location of /e/ and /o/ on the vowel chart, it becomes easier to remember the correlation of the letter and the actual vowel.

(3) Vowel letters

/i/ ㅣ   ㅡ /u/   /i/ → ㅣ

                               /u/ → ㅡ

/e/ \   / /o/   /a/ → ㆍ

                               /e/ → \

         ㆍ /a/   /o/ → /
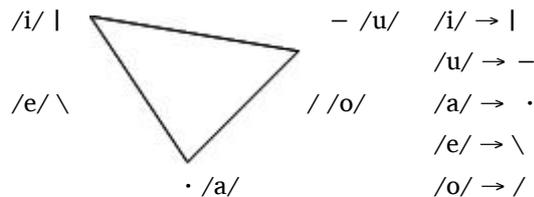
Aymara has long vowels /a:/, /u:/, /i:/ as well (Hardman 2001:20). For them are assigned "‥", "=", "‖" respectively. Since long vowels can be analyzed phonologically as a doubling of the length of vowels, the basic letters have been duplicated to create letterforms for long vowels. According to this formation, /e:/ and /o:/ are given the forms "⦙" and "⫽".

(4) Long vowel letters

/a:/ → ‥   /u:/ → =   /i:/ → ‖

/e:/ → ⦙   /o:/ → ⫽
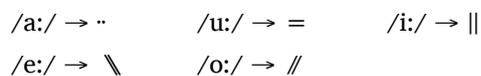
2.2. Diphthongs

Aymara has two semivowels, /j/ and /w/. In phonetic value /j/, /w/ are not very different from /i/, /u/. With this in mind they are initially accorded the forms " **|** " for /i/ and " − " for /u/. However, unlike the vowels /i/ and /u/, /j/ and /w/ cannot stand alone. When this is applied to the letterforms themselves, one can distinguish between full vowels and semivowels. Here we propose a method of appropriately utilizing the existing forms " **|** " and " − " instead of creating new letters.

For example, take the diphthong /ja/ and the two consecutive vowels /ia/. As /ia/ denotes a successional series of /i/ and /a/, /ia/ can be written as "|·" without confusion, but how must one write down the diphthong /ja/? A diphthong, phonologically defined, is a complex vowel in which a glide is parasitically attached to an adjacent vowel. This fact can be applied to the letterforms so that the vertical line " **|** " is attached to another vowel. For example, for /ja/ one can vertically combine " **|** ", which has the phonetic value of /i/, and " · ", which has the value of /a/, to form "!". If /ja/ is written as "!" through vertical composition and /ia/ is written as "|·" in left-right succession, /ja/ and /ia/ will be naturally distinguished in form. If this method is selected, glides need not be given separate letterforms, and reflecting the subordination of glides in the letterforms themselves will strengthen the correlation between phonology and orthography. Thus the principle will be that "diphthong letterforms are created through a vertical combination of the basic letters."

The Aymara language has not only diphthongs but also triphthongs. A triphthong refers to a vowel with a glide both before and after, examples of which include /waj/ (7 occurrences). Rising diphthongs with initial /j/ include /ja/ (52 occurrences), /ju/ (7), /jo/ (6), and falling diphthongs with /j/ include /aj/ (60 occurrences), /uj/ (9), /oj/ (1). Rising diphthongs

with initial /w/ include /wa/ (60 occurrences), /wi/ (12),[9] and falling diphthongs include /aw/ (18 occurrences), /iw/ (15). Forms created for these sounds according to the vertical combination rule would result in the following:

(5) Vertical combinations of " ㅣ " and " ㅡ " applied to diphthongs/
    triphthongs

    /ja/ → !   /ju/ → ⊥   /jo/ → V
    /aj/ → ¡   /uj/ → T   /oj/ → ⋏
    /wa/ → ╌   /wi/ → T
    /aw/ → ╌   /iw/ → ⊥
    /waj/ → ╌|, ╌¡

If diphthongs are given letterforms according to (5), the diphthong /aj/ and the consecutive vowels /ai/ are written respectively as "¡" and "·|", making them automatically discernible. In the same way, the diphthong /aw/ and consecutive /au/ are written as "╌" and "·-", and are easy to tell apart. Through the vertical combination rule it also becomes possible to reflect in the letterforms the properties of a diphthong, that of being a simultaneous unit made from two vowels. The properties of two consecutive vowels, being a succession of two complete vowel units, are also reflected in the form. Considering this, the forms suggested in (5) are useful for a closer connection between phonology and orthography.

However, upon closer inspection some forms suggested in (5) seem to disagree with the rule of vertical composition. The forms for the diphthongs /jo/ and /oj/, namely "V" and "⋏", seem to be examples of left-right succession. This is merely a limitation of computer font input. If the

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[9] In the currently collected data, there are no occurrences of the diphthongs /ji/, /je/, /wu/, /wo/, /ij/, /ej/, /uw/, /ew/, /ow/. It has not yet been ascertained whether these blanks are systematic gaps or accidental gaps.

vertical and diagonal strokes could be adjusted to meet in the center, as to create forms such as "ㅓ" or "ㅓ", the principle could be recognized. It is needless to say that if a writing system is selected for Aymara, new fonts must be created including all of these letterforms.10 In the current computer environment it is difficult to appropriately combine the three forms relating to /waj/, " — ", " · ", " | ", in a vertical manner. With new fonts this problem can also be taken care of. For example, replacing the second stroke of the Korean "ㅠ" with a dot to create "ㆌ" could result in an appropriate depiction of the triphthong /waj/. Thus with the creation of new fonts, the principle of vertical combination for diphthongs and triphthongs can be observed.

There remains an issue to be solved in the suggestions of (5). /ju/ and /iw/ are assigned the identical form of " ⊥ ", and /uj/ and /wi/ are both assigned "ㅜ". This makes it difficult to show which of the two vowel sounds is the nucleus vowel. To solve this problem, /ju/ could be written as "�", and /iw/ as "�". According to this principle, /uj/ would be "ㅜ̿" and /wi/ would be "ㅜ̿". This means that when the nucleus vowel is /u/, it will be stressed with "=" instead of " — ", and when it is /i/ it will be stressed with "‖" instead of " | ".

A revised suggestion reflecting the above discussion is as follows:

(6) Revised diphthongs/triphthongs

/ja/ → !	/ju/ → �	/jo/ → V (ㅑ)
/aj/ → ¡	/uj/ → ㅜ̿	/oj/ → Λ (ㅓ)
/wa/ → ㅡ̈	/wi/ → ㅠ̈	
/aw/ → ㅗ̈	/iw/ → competition	
/waj/ → ㆌ		

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10 Furthermore, new character codes must be allotted.

These letterforms have as their premise that /ju/ and /iw/ are phonologically distinctive. If they are not, it is better to write both /ju/ and /iw/ as the "ㅛ" of (5). Accordingly, if /uj/ and /wi/ are not phonologically distinct, only one letterform "ㅜ" will be necessary.

With the revised list in (6), we encounter yet another problem. A transcription for a word such as [kaju] (224. foot) allows two different versions, "ㄱ·ㅛ" and "ㄱㅑㅡ". Considering that among syllable types, CV is the most stable, it could be suggested that "ㄱ·ㅛ" is the more appropriate transcription. However, in Aymara there is a very high number of occurrences for /aj/, with the glide following after. In our data there are only 7 instances of /ju/, but 60 instances of /aj/. This suggests that in Aymara, off-glides, with the glide following after, are to be given precedence over on-glides, with the glide preceding. In sum, [kaju] may be better transcribed as "ㄱㅑㅡ" rather than "ㄱ·ㅛ".

Aymara, like Korean, is an agglutinative language, with various grammatical morphemes being added successively to the root. In such a case, a writing system that is in accord with the results of morphological analysis can be said to be much more effective.

(7) An illustration of on-glides and off-glides in grammatical morphemes
    1. Suti.ya.wi.n.ka.s.k.i.wa   'She is at the baptism'
       name > VCAUS > N in > V CONT ASP 3p ss   (Hardman 2001:69)
    2. suti.ya.wi.n.k.iri   'the person at the baptism'
       name > VCAUS > N in > V > NAGEN (Hardman 2001:70)

Hardman (2001) denoted morpheme boundaries with ".". In this analysis, the {ya}[11] of (7) corresponds to the grammatical morpheme for Verb causative, and {wi} to the morpheme for 'Noun in' (locative case). If these

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[11] Corresponds to the diphthong [ja] in IPA notation.

two come in immediate succession, such as in (7), a Romanization would result in the transcription "-jawi-". However, in such a transcription one cannot visually identify whether "w" is an on-glide or an off-glide. In the HMJE-based system, however, one can clearly show the status of the glide in /-jawi-/ through the transcription "�". In other words, the verb causative morpheme /ja/ is transcribed as "�D" and the locative morpheme /wi/ as "ㅠ", visually conveying that "w" belongs to the second morpheme. Furthermore, when succeeding a vowel-final root, {ja} and {wi} can be visually disconnected from the root through the fixed forms of "�D" and "ㅠ". In other words, morphological analysis can be applied directly to the writing system. Unlike Romanization, the proposed writing system can demonstrate syllable boundaries and morpheme boundaries clearly in the written form itself. In this respect, the proposed writing system is a much more accurate and diversified one.

In conclusion, the vowels /a/, /u/, /i/ are written as " · ", " − ", " | " respectively, applying the three Germinants of HMJE, and the vowels /e/ and /o/ are assigned the reverse diagonal line "\" and diagonal line "/" respectively, reflecting the shape of the triangular vowel chart ▽. These vowel forms are either one stroke or a single dot, the simplest forms possible. No new letterforms are created for diphthongs, but the forms " | " and "-" are reapplied, " | " for the glide /j/ and " − " for /w/. Glides have the trait of attaching to the immediately preceding or succeeding vowel, and this property can be demonstrated through the vertical combination of vowel letterforms. According to this principle, Aymara glides can be written as suggested in (6), and on-glides and off-glides can be distinguished visually. The Roman alphabet system does not allow for these distinctions.

3. Consonants

3.1. Places of articulation

The consonants of Aymara can be grouped into five places of articulation, namely the bilabial /p/, alveolar /t/, palatal /tʃ/, velar /k/, and uvular /q/. This does not line up with the five places of articulation in HMJE, 牙舌脣齒喉 (molar, tongue, lip, tooth, throat).

Aymara distinguishes between the places of articulation of /k/ and /q/, but Korean speakers cannot tell this apart, as Korean does not have the uvular consonant /q/. Aymara has the uvular /q/, but no throat sound (喉音).[12]

Since the uvular consonant /q/ of Aymara and the glottal sound of HMJE are exclusive in distribution, one can stand in for the other. Accordingly, the bilabial /p/ of Aymara can be written as "ㅂ", the alveolar /t/ as "ㄷ", the palatal /tʃ/ as "ㅈ", the velar /k/ as "ㄱ", and the uvular /q/ as "ㅇ".

(8) Basic consonant letters

Place of articulation	bilabial	alveolar	palatal	velar	uvular
Basic consonant	p	t	tʃ	k	q
Letter assigned	ㅂ	ㄷ	ㅈ	ㄱ	ㅇ

/p/, /t/, /k/, and /q/ in Aymara are stops, and sound to the Korean speaker like /ㅃ/, /ㄸ/, /ㄲ/, and /ㄲ/. However, to reflect this impression in the writing system and assigning "ㅃ", "ㄸ", "ㄲ", "ㄲ" to /p/, /t/, /k/,

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[12] The /h/ sound of Aymara can be seen as a glottal sound, but it is difficult to limit the place of articulation for /h/ to a single region, as is the Korean phoneme /ㅎ/. Here, according to pattern congruity in phonological systems, /h/ has been classified as a uvular sound.

/q/ is not a wise choice. /k/ and /q/ are distinctive phonemes, and following Korean speakers' auditory impressions of them would break down the one-on-one correspondence between phoneme and letter. Moreover, as /p/, /t/, /k/, /q/ are frequently occurring basic consonants, it is better to assign them letterforms with less strokes, "ㅂ", "ㄷ", "ㄱ", "ㅇ". /tʃ/ in Aymara is a palatal affricate, and sounds like "ㅉ" to the Korean speaker. However, along the same lines, it is assigned the letterform "ㅈ".

Although the phoneme /q/, which has no corresponding phoneme in Korean, sounds to Korean speakers like the "ㄲ" of Korean, it clearly has a different place of articulation. It may seem strange to use "ㅇ" for the uvular /q/, as in Korean the same letter has no phonetic value in syllable onset position and stands for /ŋ/ in the coda. Although there are differences in pronunciation, /q/ is assigned "ㅇ", as the Aymara speakers who will newly learn this writing system will have no trouble with this application.

There are three consonants in Aymara that palatalized from an initially alveolar position and took on the status of autonomous phonemes: /ɲ/, /ʎ/, /ʃ/. The vowels /i/ and /j/ have the phonological ability to change alveolars into palatals. As /i/ and /j/ were previously assigned the form "ㅣ", the palatals /ɲ/, /ʎ/, /ʃ/ can well be written as "ㄴ", "ㄹ", "ㅅ", with the vowel form "ㅣ" implied with the lower stroke. "ㄴ", "ㄹ", "ㅅ" can be seen as a short vertical line combined with "ㄴ", "ㄹ", "ㅅ" respectively.[13] Transcribing palatals in this fashion, all phonemes with the feature [+palatal] will have a consistent letterform at its end, reinforcing the correlation between the phoneme and the written form.

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[13] The last stroke of "ㅈ" can also be interpreted in this manner. It is advisable to take this into consideration when creating fonts for Aymara.

3.2. Manner of articulation

The basic consonants in (8) are all voiceless unaspirated sounds. Aymara is similar to Korean in that there are no voiced consonant phonemes. There are two other types of stops, articulated in the same places but in a different manner. One is the ejective consonant,[14] and the other is the aspirated consonant, with a release of air like the Korean sounds "ㅍ, ㅌ, ㅊ, ㅋ". Ejectives are not familiar to the Korean speaker but the aspirated consonant is.

The ejective consonants /p'/, /t'/, /tʃ'/, /k'/, /q'/ are articulated with a closed glottis, creating a plosive sound with the air inside the oral cavity. It is an IPA convention to add the diacritic mark " ' " to the upper right side of the consonant, but here in the HMJE-based system it will be added to the left side, like "'ㅂ". This is to easily distinguish the diacritic from the vowel letter " · " or the diphthong forms "ㅣ", et cetera. With the use of this diacritic, the trouble of creating five new consonant forms can be avoided.

(9) Ejective consonant letters

Place of articulation	bilabial	alveolar	palatal	velar	uvular
Ejective	p'	t'	tʃ'	k'	q'
Letter assigned	'ㅂ	'ㄷ	'ㅈ	'ㄱ	'ㅇ

The aspirated consonants /pʰ/, /tʰ/, /tʃʰ/, /kʰ/ can be written using the Korean letterforms "ㅍ, ㅌ, ㅊ, ㅋ". A problem arises with the uvular aspirated consonant /qʰ/. As the forms "ㅍ, ㅌ, ㅊ, ㅋ" are created by adding a stroke to the basic letters, the form "Ө" can be devised for /qʰ/. "Ө" adds a horizontal stroke to the basic letter "ㅇ".

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[14] According to Hardman (2001:13), these were said to be 'glottalized' consonants. However, a phonetic analysis shows that they are 'ejective' consonants.

(10) Aspirated consonant letters

Place of articulation	bilabial	alveolar	palatal	velar	uvular
Aspirated consonant	p^h	t^h	$tʃ^h$	k^h	q^h
Letter assigned	ㅍ	ㅌ	ㅊ	ㅋ	Ө

There are three fricatives in Aymara: /s/, /x/, /h/. They are assigned the letters "ㅅ", "ㅇ̄", "ㅎ" respectively. The letter "ㆅ" of HMJE has similar phonetic qualities with /x/, but aiming for a letterform with fewer numbers of strokes, we have selected the form "ㅇ̄" for /x/.

The /s/ in Aymara tends to become palatalized to /ʃ/ around /i/ or /j/. Since this sound has a high possibility of being an autonomous phoneme[15], it is necessary to distinguish between /s/ and /ʃ/. /s/ is "ㅅ", and /ʃ/ can be written as the aforementioned letterform "ᄉ̂". The fricative /h/ in Aymara also tends to palatalize and be pronounced as [ç] around /i/ or /j/, but as this sound is only an allophone, it has not been necessary to give it a separate letterform. /h/ is sometimes pronounced as [ɸ] before /u/, but this also is an allophone. The velar fricative /x/ in Aymara has many variations, and are sometimes pronounced as [ɣ], [g], [ɢ], [X], or [ʀ]. Further study is required to check the distinctions between these sounds, but one must first note that there are no voiced consonants in the Aymara consonant system. With this in mind, at this point we leave these sounds under one phoneme, /x/.

(11) Fricative consonant letters

Place of articulation	bilabial	alveolar	palatal	velar	uvular
Fricative		s	ʃ	x	h
Letter assigned		ㅅ	ᄉ̂	ㅇ̄	ㅎ

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[15] In Hardman (2001:22), /ʃ/ was not considered a phoneme.

There are two nasals in Aymara: /m/ and /n/. Phonetically one can find [ŋ], but only before velar consonants and uvular consonants. Therefore [ŋ] can be treated as an allophone of /n/. To /m/ and /n/ are assigned the letterforms "ㅁ" and "ㄴ." In Aymara, the palatalized form of /n/, /ɲ/, is an autonomous phoneme. As mentioned above, there is no separate letterform assigned to /ɲ/, but a short vertical line is to be added below "ㄴ" to make " ".

(12) Nasal consonant letters

Place of articulation	bilabial	alveolar	palatal	velar	uvular
Nasal	m	n	ɲ		
Letter assigned	ㅁ	ㄴ	ㄴ̡		

There are two liquids in Aymara: /r/ and /l/. /r/ is commonly realized as a flapped [ɾ], and /l/ is realized as a lateral [l]. As /r/ and /l/ are differentiated in English, so it is with Aymara. Since there is only one letter, "ㄹ", for liquids in HMJE, a second letterform must be made. The existent form "ㅭ" could be considered, but it has too many strokes and may be confused with the palatalized lateral "ᄙ". The form "ㄹ" could be assigned to /r/ and "ᄙ" to /l/, but the latter still has too many strokes to be useful. Therefore /l/ is assigned "ㄹ", and to /r/ is assigned "ㄱ", omitting the last "ㄴ"-shaped stroke of "ㄹ". The /r/ in Aymara does not palatalized, but /l/ often palatalizes into /ʎ/. As this /ʎ/ is an autonomous phoneme, it is also assigned the letterform "ᄙ". As discussed before, the short stroke below "ㄹ" serves to show that "ᄙ" too is a palatal sound.

(13) Liquid consonant letters

Place of articulation	bilabial	alveolar	palatal	velar	uvular
Flapped / Lateral		r / l	ʎ		
Letter assigned		ㄱ / ㄹ	ᄙ		

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The aforementioned consonants shown in one graph is as follows. If we take /ʃ/ to be an autonomous phoneme, Aymara has 25 consonants in total. The Aymara language, though having a small number of vowels, has a relatively large number of consonants.

(14) Full consonant letter chart

Manner \ Place	bilabial	alveolar	palatal	velar	Uvular
Basic letter	p → ㅂ	t → ㄷ	tʃ → ㅈ	k → ㄱ	q → ㅇ
Ejective	p' → 'ㅂ	t' → 'ㄷ	tʃ' → 'ㅈ	k' → 'ㄱ	q' → 'ㅇ
Aspirated	pʰ → ㅍ	tʰ → ㅌ	tʃʰ → ㅊ	kʰ → ㅋ	qʰ → Ɵ
Fricative		s → ㅅ	ʃ → ᄾ	x → ㆆ	h → ㅎ
Nasal	m → ㅁ	n → ㄴ	ɲ → ᄂ		
Liquid		l → ㄹ r → ㄺ	ʎ → ᇏ		

4. Letter combination

It is the case in many writing systems that letters are written from top to bottom, left to right. The HMJE-based system for Aymara also follows this order. There are at least two ways to write letters in combination, that of writing vertically from top to bottom and horizontally from left to right. Only the latter will be used in this writing system, as it is currently the most common and well suited to today's computer-based digital environment.

The HMJE-based writing system for Aymara takes desyllabified, in-line writing as the base. In Korean the letters are grouped together by syllables, so that at first sight it looks as if there are more than a thousand

letterforms. One of the pros of desyllabified writing would be to avoid this kind of misunderstanding. Especially if a new writing system is to be introduced to Aymara speakers, it must be simple and easy to learn in order to be effective.

The choice is appropriate not only with regard to the digital environment, but also for demonstrating the morphological characteristics of the Aymara language. As seen in (7) above, single consonants such as {n}, {s} and {k} can function as morphemes in themselves, and if these were to be written in syllabified groups, the morphological analysis would be completely ignored in the writing. Such a writing system would not be effective.

(15) Examples of single-consonant morphemes in Aymara
1. awki.p   tayka.p   jiw.x.ipan   manq'a.ɲ.   thaqa.s.iri.w
   Father 3POS   mother 3POS   die ASP SUB   eat >N ZERO   hunt   RFLX
        GOAL ss (Hardman 2001:67)
2. uta.t.x qʰipa.r   jiw.xa.spa.w   s.i.wa
   that of ss back → die ASP 3>3D ss   say 3>3S ss (Hardman 2001:68)

As shown in (15), the consonants /p/, /x/, /ɲ/, /s/, /w/, /t/, /r/[16] each function as different morphemes in Aymara. If such morphemes were to be written combined with adjacent vowels, it will be more difficult to take in the meaning. As morphemes are the smallest units bearing meaning, it is important to accord them a level of visual independence. Desyllabified and written consecutively, these consonants can have an independent standing that well reflects the morphological characteristics of Aymara.

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[16] /w/ is also in this list. The /w/ in (15) is a kind of sentence suffix, making it a kind of morpheme. In the HMJE-based system, such occurrences of /w/ identified as a morpheme will be separately written as "－".

Desyllabified writing does not imply, of course, that Aymara phonology does not recognize syllables, which they do. Take ['maɾka] (014. stream) for example. A speaker of Korean would syllabify this into three syllables, and transcribe it as ['maɾɯka]. However, the correct Aymara pronunciation is ['maɾka], with two syllables. The fact can be demonstrated with the application of the stress rule. Aymara speakers who also speak Spanish are affected by the stress rules of Spanish so that they tend to stress the penultimate syllable of a word. In the case of this word, the stress comes on the [a] of [ma], not on the [ɯ] of a syllable [ɾɯ]. This demonstrates that Aymara speakers treat this word as having two syllables. Korean speakers tend to transcribe this word as having three syllables, which is completely at odds with Aymara speakers' intuition regarding syllabic units. The reason for the Korean speaker's confusion is that [ɾ] is released even before the consonant [k]. All Aymara consonants are thus released, even when preceding other consonants or a pause. To effectually demonstrate this in the writing system, the desyllabified method is much more appropriate than the syllabified. If written in syllabic clusters, with the coda situated in the underpinning position, the existing Korean readers will doubtlessly take the consonant to be an unreleased one.

In the HMJE-based writing system for Aymara, there is barely any need for combination rules. Phoneme letters need only be written left to right in order of pronunciation. The only required rule, as mentioned above, is that the letters denoting diphthongs and triphthongs should be written from top to bottom, as they are formed by a vertical combination of the basic letters. This is to say that diphthongs and triphthongs are written as one byte. Therefore, the letter units that must be included in a font for the HMJE-based system for Aymara are 5 vowels, 11 diphthongs and triphthongs, 25 consonants, making 41 in total. Even with the addition

of punctuation marks peculiar to Aymara, this will call for less than 50 letterforms.

5. Conclusion

When searching for a new writing system, it is necessary to consider what kind of system is more competent. To be a competent writing system one must be easy to learn and effectual in use. What are the specific qualities of such a system?

First, the shapes must be simple and the number of strokes few.[17] In this light, Chinese characters are rather difficult to learn. Writing systems with a small number of strokes, and with more straight lines than curved, are easier to learn and use. Below is a comparison of Aymara words written in Hangeul, the Roman alphabet, and the HMJE-based system, demonstrating the relative complexity of each.[18]

(16) Comparison of writing systems

A: Aymara pronunciation:	[hatʃapampa] (008. field)	[tuŋka] (506. ten)
B: Hangeul transcription :	하자밤바	둥가
C: Romanization:	hacapampa	tunka
D: HMJE-based:	ㅎ·ㅈ·ㅂ·ㅁㅂ·	ㄷㅡㄴㄱ·

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[17] The theme of a symposium on writing systems (Venice University, Sept. 11-12, 2011) organized by Professor Aldo Tollini (Department of East Asian and North African Studies, Ca'Foscari University of Venice) is "Rationalizing Script: the simplification of characters and of writing systems". This title well reflects the contemporary interest in the simplification of letters and writing systems.

[18] A fuller comparison of Hangeul, the Roman alphabet, and the suggested HMJE-based writing system can be made through 'Illustrations of HMJE-based Transcriptions of Aymara', provided as an appendix. A slight modification of the IPA transcriptions given there yields the Romanized transcriptions.

If the words [hatʃapampa] and [tuŋka] were to be written in Hangeul by a speaker of Korean, it would be "하자밤바" and "둥가", as in (16B). Would this be as easy to learn as the Romanized trascriptions in (16C), "hacapampa" and "tunka"? The Hangeul transcription would have more strokes, and also requires additional training for writing in syllabic clusters, such as "밤" or "둥". Considering this, the current Hangeul system is difficult for non-Korean speakers to learn. If, however, one chooses to write with the HMJE-based system for Aymara as in (16D), "ㅎ·ㅈ·ㅂ·ㅁㅂ·" and "ㄷ－ㄴㄱ·", not only are there a smaller number of strokes, but also a simpler style. Having a small number of strokes and being easy to learn and use, the HMJE-based writing system is competent. In addition, the HMJE-based system has more straight lines than the Roman alphabet, making it simpler and easier to learn, even for children.

Second, the letterforms must be closely related to each other. In the case of the Roman alphabet, the letters "k" and "g" both stand for velar stops, but there is nothing in the shapes of the letterforms themselves to show the phonological similarities between the two. On the other hand, the forms "ㄱ" and "ㅋ" of both the Hangeul system and the HMJE-based system, the basic velar stop and the aspirated stop respectively, directly show their phonological relationship. This is the characteristic that distinguishes Hunmin jeongeum from other writing systems in the history of letters. Hunmin jeongeum is often praised for reflecting the shapes of the articulatory organs in the forms of its initial consonants, but the rules for adding strokes and combining letterforms must be accorded higher credit, as they are the principles that allow the letters to be closely related to each other. The HMJE-based writing system for Aymara faithfully follows this example. In the consonant letters, such as "ㄷ ： ㅌ", the rule of adding strokes is applied, and in diphthongs, such as "!" (/ja/), "ㅜ" (/uj/), the rule of combining letterforms is applied. Also, in the case of the

letterforms for uvular consonants, they are all given a circle as their common base, as can be found in "ㅇ, 'ㅇ, ꀀ, ㆆ". In this manner, the HMJE-based writing system for Aymara is one that closely ties its letterforms together, making it easier to learn and remember.

Third, the letters must be easily distinguishable to the eye. Sanskrit is an example of a writing system that, although it is phonological, is too complicated in form to distinguish letters easily. In comparison, the Roman alphabet or the Korean Hangeul system has forms that are visually distinct. If Hangeul were to be written in a desyllabified manner the distinctions would become easier, since Hangeul is composed mainly of highly contrasting horizontal and vertical strokes, whereas Roman letters have more curves than straight lines, creating less contrast. If someone unfamiliar with Hangeul were to compare the Hangeul transcriptions in (16B) and the HMJE-based (16D), one would probably find the latter to be more visually recognizable. In fact, in Hangeul there sometimes is confusion between such forms as "둥" and "등", "홀" and "흘", etc. With the elimination of such problems, the HMJE-based system for Aymara has even more advantages.

Fourth, the phonological and morphological characteristics of the language in question must be well demonstrated in the writing system. Writing systems that can show syllable and morpheme boundaries are superior to those that cannot. Morphemes and words can be grasped much more quickly through the former type, and semantic confusion can be avoided in advance. Since the HMJE-based system can clearly show to which syllable an intervocalic glide belongs, it has an advantage over the Roman alphabet. Also, it can independently show morphemes made up of a single consonant, making it more effectual than the Korean Hangeul.

The HMJE-based writing system for Aymara is founded upon the phonological and morphological characteristics of Aymara. There is still

work to do, such as checking if diphthongs /wi/ and /uj/ are distinct phonemes, and a closer examination of the velar fricatives. However, it can be assured that the system currently includes all phonemes of Aymara, and considerations have been taken for the single-consonant morphemes that are a characteristic of Aymara. Moreover, the HMJE-based system is well suited to the present-day environment of computers and digital media. Promising to improve upon it in the future, we set forth the HMJE-based system described above as a tentative plan.

Through the process of creating this proposal, we have again had the chance to marvel at the scientific and well-reasoned nature of Hunmin jeongeum. Although we have tried to preserve the virtues of Hunmin jeongeum, we have been obliged to make many changes according to the phonological or morphological properties of Aymara. These changes are in accord with the following statement: The HMJE-based writing system for Aymara is a writing system *of* the Bolivians, to be used *by* the Bolivians, and *for* the Bolivians.

References

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UCLA Phonetics Lab (http://www.phonetics.ucla.edu)

＜**Appendix**＞

Illustrations of Huminjeungeum-based
Transcriptions of Aymara

＜Explanatory Notes＞

1. Due to lack of space, only around 100 items are listed from a larger pool of analyzed data.

2. The numbers are item numbers in the Altaic language questionnaire.

3. When a single word is pronounced in more than one way, both pronunciations have been transcribed.

4. When transcriptions differ among transcribers, both transcriptions have been given.

5. Uncertain transcriptions have been marked in red.

6. When two or more HMJE-based transcriptions are possible, both have been given.

7. For convenience, [tʃ] has been replaced with [ts].

No.	IPA	Hangeul	HMJE-based	Spanish	English	Korean
001	ˈinti	인디	ㅣㄴㄷㅣ	sol	sun	해(태양)
003	ˈwaɾa	와라	ㅜㄱ·	estrella	star	별
008	hatsaˈpampa	하자밤바	ㅎ·ㅈ·ㅂ·ㅁㅂ·	campo	field	밭/들
009	ˈtsˈaʎa~ˈtsˈaʎʎa	’자럐	’ㅈ·ㄹ·	arena	sand	모래
013	haˈwiɾa	하위라	ㅎ·ㅠㄱ·	río	river	강
017	tsˈuɲuɾˈkala~ tsˈuɲuɾɯˈkala	’주뉴르가롸	’ㅈㅡㅖㅡㄱㄱ·ㄹ·	hielo	ice	얼음
018	ˈuma	우마	ㅡㅁ·	agua	water	물
021	ˈnina~ˈninna	니나~닌나	ㄴㅣㄴ·	fuego	fire	불

022	'kala~[qala] (Hardman:16)	가따~아따	ㄱ·ㄹ·~ㅇ·ㄹ·	piedra	stone	돌
023	hatsa'maɾɯka	하자마르가	ㅎ·ㅈ·ㅁ·ㄱㄱ·	país	country	나라
029	'haʎu	하류	ㅎ·ㄹㅠ	lluvia	rain	비
031	'kʰunu	쿠누	ㅋㅡㄴㅡ	nieve	snow	눈 (雪)
040	'kuɾmi	구꾸르미	ㄱㅡㄱㄹㅁ|	arcoiris	rainbow	무지개
046	'maɾa	마라	ㅁ·ㄱ·	año	year	해/년
054	'pʰaxsi	파흐시	ㅍ·ㅎ·ㅅ|	mes	month	달/월
055	(ma)'uɾu	우루	(ㅁ·)ㅡㄱㅡ	día	day	날 (日)
058	kʰa'ɾuɾɯ~ kʰa'ɾuɾu	카루르 카루루	ㅋ·ㄱㅡㄱㅡ	mañana	tomorrow	내일
061	a'ɾoma	아로마	·ㄱ/ㅁ·	noche /tarde	evening	저녁
076	'hake~'haqe	하게~하에	ㅎ·ㄱ\~ㅎ·ㅇ\	persona	person	사람
078	'suti	수디	ㅅㅡㄷ|	nombre	name	이름
080	'tsatsa	자자	ㅈ·ㅈ·	hombre	man	남자
081	'waɾɯmi	와르미	ㅜㄱㄹㅁ|	mujer	woman	여자
083	atsa'tsila	아자찌따	·ㅈ·ㅈ|ㄹ·	abuelo	grandfather	할아버지
084	a'witsu	아위주	·ㅠㅈㅡ	abuela	grandmother	할머니
088	'tata	다다	ㄷ·ㄷ·	padre	father	아버지
089	'mama	마마	ㅁ·ㅁ·	madre	mother	어머니
093	'ɸutsa~'hujtsa	후자~후이자	ㅎㅡㅈ·~ㅎㅠㅈ·	hija	daughter	딸
094	'hila	히따	ㅎ|ㄹ·	hermano	older brother	형
096	ku'ʎaka	구땨가	ㄱㅡㄹㄱ·	hermana	older sister	누나
101	'altsi	알지	·ㄹㅈ|	nieto	grandson	손자
127	ojxawa'tiɾi	오이햐와디리	ㅅㅎ·ㅜㄷ|ㄱ|	ovejero	shepherd	양치기
141	'ʔoɾɯke~'qolqe	오르게~올에	ㅇ/ㄹㄱ\~ㅇ/ㄹㅇ\	dinero /billete	money	돈/화폐

143	a'laɲa	아라냐	·ㄹ·ㄴ·	comprar	buy	사다
144	al'haɲa	알하냐	·ㄹㅎ·ㄴ·	vender	sell	팔다
146	elxan'lapi~ belkani'lapi	엘핸롸비~ 벨가니롸비	\ㄹㅎ·ㄴㄹ·ㅂ\~ ㅂ\ㄹㄱ·ㄴ\ㄹ·ㅂ\	papel	paper	종이
153	tʰo'goɲa	토고냐	ㅌ/ㅎ/ㄴ·	danza	dance	춤
157	qeʎe'qata	에례아다	ㅇ\ㄹㄷ\ㅇ·ㄷ·	letra	letter	글자
180	noa'ʃiɲa	노아시냐	ㄴ/·ㅅ\ㄴ·	guerra	war	전쟁
184	uni'seɾi	우니세리	—ㄴ\ㅅ\ㄱ\	enemigo	enemy	적
200	'pʼeqe	ˈ베에	ˈㅂ\ㅇ\	cabeza	head	머리
202	'paɾa	바라	ㅂ·ㄱ·	la frente	forehead	이마
203	a'hannu~ a'xannu	아한누~ 아햔누	·ㅎ·ㄴㄴ—~ ·ㅎ·ㄴㄴ—	cara	face	얼굴
206	'nasa	나사	ㄴ·ㅅ·	nariz	nose	코
210	'laxaɾa~ 'lahaɾa	롸햐라~ 롸하라	ㄹ·ㅎ·ㄱ·~ ㄹ·ㅎ·ㄱ·	lengua	tongue	혀
216	'kuŋka	궁가	ㄱ—ㄴㄱ·	cuello	neck	목
220	pu'ɾaqa	부라아	ㅂ—ㄱ·ㅇ·	vientre	belly	배 (腹)
223	am'paɾa / ampaɾa'naka	암바라~ 암바라나가	·ㅁㅂ·ㄱ·~ ·ㅁㅂ·ㄱ·ㄴ·ㄱ·	manos	hand	손
224	'kaju	가유	ㄱ·ㅛ~ ㄱ\—	pies	foot	발
225	lu'kʰana	루카나	ㄹ—ㅋ·ㄴ·	dedo	finger	손가락
226	'siʎu	시류	ㅅ\ㄹ—	uña	fingernail	손톱
236	pu'ɾaka	부라가	ㅂ—ㄱ·ㄱ·	estómago	stomach	위
243	'wila	위롸	ㅍㄹ·	sangre	blood	피
247	kuse'ʃiɲa	구세시냐	ㄱ—ㅅ\ㅅ\ㄴ·	cerebro	brain	뇌
255	'tsʰokʰa	초카	ㅊ/ㅋ·	pis	urine	오줌
256	'tʰusa	투사	ㅌ—ㅅ·	saliva	saliva	침 (唾)
282	qo'noɲa~ ko'noɲa	오노냐~ 고노냐	ㅇ/ㄴ/ㄴ·~ ㄱ/ㄴ/ㄴ·	silla	chair	의자
311	heqʼe	헤ˈ에	ㅎ\ˈㅇ\	humo	smoke	연기

314	isi	이시	ㅣㅅㅣ	ropa	clothing	옷
345	maŋkʰɲa~ maŋqʰɲa	망크냐~ 망크냐	ㅁ·ㄴㅋㄴ·~ ㅁ·ㄴθㄴ·	comer	eat	먹다
356	t'ant'u	'단'두	'ㄷ·ㄴ'ㄷㅡ	pan	bread	빵
357	ajtsa	아이자	¡ㅈ·	carne	meat	고기
359	k'awna~ q'awna	'가우나~ '아우나	'ㄱᆢㄴ·~ 'ㅇᆢㄴ·	huevo	egg	알/달걀
370	haju	하유	ㅎ·ᆖ~ㅎ¡ㅡ	sal	salt	소금
379	q'oloq'olo	'오로'오로	'ㅇ/ㄹ'ㅇ/ㄹ/	hongo	Fungus/ mushroom	버섯
424	waka (nomas)	와가	ᆢㄱ·	vaca	ox	소
427	kʰutsʰi	쿠치	ㅋㅡㅊㅣ	cerdo	pig	돼지
429	pʰisi	피시	ㅍㅣㅅㅣ	gato	cat	고양이
435	wahaɾa	와하라	ᆢㅎ·ㄱ·	cuerno	horn	뿔
436	lip'itsi	찌'비지	ㄹㅣ'ㅂㅣㅈㅣ	pelaje	fur/coat	털 (동물의＋)
437	waʎpa	왈바	ᆢㄹㅂ·	gallina	chicken	닭
438	hamats'i	하마지	ㅎ·ㅁ·'ㅈㅣ	pájaro	bird	새
440	mamani	마마니	ㅁ·ㅁ·ㄴㅣ	halcón	falcon	매
442	tsʰexa~tsʰeqʰa	체햐~체하	ㅊ\ᆞ·~ㅊ\θ·	alas	wing	날개
444	tsaʎwa	짜꽈	ㅈ·ㄹᆢ	pescado	fish	물고기
446	k'iʃimiɾa	'기시미라	'ㄱㅣㅅㅣㅁㄱ·	hormiga	ant	개미
448	asiɾu	아시루	·ㅅㅣㄱㅡ	vibora	snake	뱀
450	qoqa	오아	ㅇ/ㅇ·	árbol	tree	나무
456	qora	오라	ㅇ/ㄱ·	pasto	grass	풀
465	lapʰi	짜피	ㄹ·ㅍㅣ	hoja	leaf	잎
467	qoɾi	오리	ㅇ/ㄱㅣ	oro	gold	금
468	qolqe	올에	ㅇ/ㄹㅇ\	plata	silver	은
475	maŋkʰa~maŋqʰa	망카~망하	ㅁ·ㄴㅋ·~ㅁ·ㄴθ·	dentro	inside	안 (집＋에)
476	aŋqa	앙아	·ㄴㅇ·	fuera	outside	밖 (집＋에)

481	pata	바다	ㅂ·ㄷ·	arriba	above	위 (집＋)
484	kupi	구비	ㄱ—ㅂ│	hacia la derecha	to the right	오른쪽으로
497	maja	마야	ㅁ¡·ㅁ·!	uno	one	일 (一)
498	paja	바야	ㅂ¡·ㅂ·!	dos	two	이 (二)
499	kimsa	김사	ㄱ│ㅁㅅ·	tres	three	삼
500	puʃi	부시	ㅂ—ㅅ│	cuatro	four	사
501	pʰesqa~ pesqa	페스아~ 베스아	ㅍ\ㅅㅇ·~ ㅂ\ㅅㅇ·	cinco	five	오
502	soxta	소ᅘ다	ㅅ/ㅎㄷ·	seis	six	육
503	paqalqo	바알오	ㅂ·ㅇ·ㄹㅇ/	siete	seven	칠
504	kimsaqalqo	김사알오	ㄱ│ㅁㅅ·ㅇ·ㄹㅇ/	ocho	eight	팔 (八)
505	jatuŋka	야둥가	!ㄷ—ㄴㄱ·	nueve	nine	구
506	tuŋka	둥가	ㄷ—ㄴㄱ·	diez	ten	십
507	tuŋka kimsani	둥가 김사니	ㄷ—ㄴㄱ· ㄱ│ㅁㅅ·ㄴ│	trece	thirteen	십삼
508	tuŋka pʰesqani	둥가 페스아니	ㄷ—ㄴㄱ· ㅍ\ㅅㅇ·ㄴ│	quince	fifteen	십오
509	patuŋka	바둥가	ㅂ· ㄷ—ㄴㄱ·	veinte	twenty	이십
510	kimsatuŋka	김사둥가	ㄱ│ㅁㅅ·ㄷ—ㄴㄱ·	trinta	thirty	삼십
511	puʃituʃka	부시두시가	ㅂ—ㅅ│ㄷ—ㄴㄱ·	cuatrenta	forty	사십
512	pʰesqa tuŋka~ pʰeskatuŋka	페스아둥가~ 페스가둥가	ㅍ\ㅅㅇ· ㄷ—ㄴㄱ· ~ ㅍ\ㅅㄱ· ㄷ—ㄴㄱ·	cincuenta	fifty	오십
513	soxtatuŋka	소ᅘ다둥가	ㅅ/ㅎㄷ· ㄷ—ㄴㄱ·	sesenta	sixty	육십
514	paqalʔtuŋka~ paqalqtuŋka	바알둥가~ 바갈으둥가	ㅂ·ㅇ·ㄹㄷ—ㄴㄱ·~ ㅂ·ㅇ·ㄹㅇㄷ—ㄴㄱ·	setenta	seventy	칠십
515	kimsaqalʔ tuŋka	김사알 둥가	ㄱ│ㅁㅅ·ㅇ·ㄹ ㄷ—ㄴㄱ·	ochenta	eighty	팔십
517	pataka	바다가	ㅂ·ㄷ·ㄱ·	cien	hundred	백
518	waraŋqa	와랑아	�ㄱ·ㄴㅇ·	mil	thousand	천 (千)

519	tuŋka waraŋqa	둥가 와랑아	ㄷㅡㄴㄱ· ㅡㄱ·ㄴㅇ·	diez mil	ten thousand	만
520	Qawqasa~ qaoqasa	아우아사~ 아오아사	ㅇㅡㅇ·ㅅ·~ ㅇ·/ㅇ·ㅅ·	cuantos	how many	몇 개
521	'qaoqa	'아오아	'ㅇ·/ㅇ·	cuanto	how much	얼마
542	naja	나야	ㄴ·!ㄴ¡·	yo	I	나
556	kuna	구나	ㄱㅡㄴ·	cómo	how	어떻게
557	kawki	가우기	ㄱㅡㄱ|	dónde	where	어디
568	hiʃk'a	히시'가	ㅎ|ㅅ'ㄱ·	pequeño	small	작다
630	ʎaki	랴기	ㄹ·ㄱ|	triste	sad	슬프다
635	kikpatsa	기그바자	ㄱ|ㄱㅂ·ㅈ·	igual	same	같다

Discussion: A proposal for a Hunminjeongeum-based writing system for Aymara

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In the paper "A proposal for a HMJE-based writing system for Aymara" presented by Professor Lee, a new writing system for Aymara is proposed. The authors must have poured enormous effort into this presentation given that a meticulous linguistic analysis is essential to developing a writing system for a language without any orthography and the resultant orthographic output should become easily available for the general public.

In this commentary I would like to ask some questions to the authors. These comments may be controversial. However, they are intended to stimulate wider discussion at the symposium and afterwards.

① Your proposal states that the Aymara vowels /a/, /u/, /i/ should be represented with the Korean letters '·, ㅡ, ㅣ' which are symbolic of 'heaven, earth, and man' in HMJE. It has some meaningful implications for preserving HMJE's basic orthographic principles. However, I remain skeptical

about its ongoing applicability to the current era. In particular, the Korean letter '·' representative of the Aymara vowel /a/ stands in an unfavorable position to be used in small type or in handwriting. Above all, the letter '·' poses serious problems because it is indiscernible from a 'period' used at the end of a sentence. Of course, it might be easily legible if it is printed in large type just like the records of the 15th century. But, such a simple dot won't be easily discernible if it follows a contemporary printing method, and it is hard to clearly write the letter '·' in pen. That's probably why the Korean letter '·' (dot) was later replaced with '丶' (short stroke) in xylographic books.

② Your proposal suggests the assignation of diagonal strokes '/' and '\' to Aymara vowels /e/ and /o/. But, diagonal strokes may be indiscernible from vertical stroke of 'ㅣ(/i/)' in handwriting. Moreover, I don't agree with you that these diagonal strokes can be easily memorized just because their formation is taken from the triangular vowel chart. The vowel chart itself is too hard to be understood by the general public.

③ Notably, your proposal excludes the letter 'ㅇ'— an 'alif' denoting a syllable beginning with a vowel, thereby inventing new letters for diphthongs or triphthongs. But, the application of the letter 'ㅇ' needs to be actively considered as a representation of a syllable beginning with a vowel. If so, it won't be necessary to devise unique letters for diphthongs. It might be seemingly difficult to teach the use of the letter 'ㅇ' as an alif at the beginning of a syllable. Actually, however, this is not entirely true, considering that contemporary Korean

people can use the letter 'ㅇ' regardless of their knowledge level.

④ In case the proposed writing system entails numerous unique symbols irrelevant to HMJE or Hangeul, it will be hard to say that it is actually grounded upon HMJE (or Hangeul). I think it is necessary to clarify once more whether the proposed orthographic development aims to simply produce a new writing system for the Aymara language or to create it based on HMJE. And I want to know your proposal's distinctive advantage compared with the existing Yapita's alphabet or Aymara Official Alphabet or Unified Alphabet introduced by the Peruvian government in 1985.

Aymara Phonemic Alphabet/ Juan de Dios Yapita Moya (1968)

Consonant phonemes:

	Bilabial	Alveolar	Palatal	Velar	Postvelar
Occlusives/Affricates					
Simple	p	t	ch	k	q
Aspirated	p"	t"	ch"	k"	q"
Glottalized	p'	t'	ch'	k'	q'
Continuants					
Fricative		s		j	x
Laterals		l	ll		
Nasals	m	n	ñ		
Glides	w		y		
Trill		r			

Vowel Phonemes: i   a   u   Vowel length: ¨

Aymara Official Alphabet or Unified Alphabet introduced by the Peruvian government

Vowels

a	ä	i	ï	u	ü
[a]	[aː]	[i]	[iː]	[u]	[uː]

Consonants

ch	chh	ch'	j	k	kh	k'	l	ll
[tʃ]	[tʃʰ]	[tʃ']	[x]	[k]	[kʰ]	[k']	[l]	[ʎ]

m	n	ñ	p	ph	p'	q	qh	q'
[m]	[n]	[ɲ]	[p]	[pʰ]	[p']	[q]	[qʰ]	[q']

r	s	t	th	t'	w	x	y
[ɾ]	[s]	[t]	[tʰ]	[t']	[w]	[χ]	[j]