

Ancient Indian and Chinese Models of Sound Classifications and Their Reflections in the Writing Systems

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1. Introduction

Classification of the sounds of a language is achieved only by a thorough study of the sounds. It presents the systematic distribution of the sounds or the phonemic structure of the language. The origin of a script did not necessarily presuppose a complete study of the sounds, but when a model of classification of the sounds had been available, a new script could be created effectively and systematically.

A writing system consists of a set of visual signs each of which represents a sound or sounds and may or may not stand for a meaning(s). The signs, or *letters*, of a phonographic writing system are learned and memorized generally in a fixed *order*. If a learned knowledge of the sound system were reflected in the script, it could be found either from the graphic forms or from the order of the letters.

As it is well known, the Korean alphabet, *Han'gŭl*, was created in the middle of the 15th century on the basis of phonemic classification of

Korean. The consonantal sounds were classified by the place and manner of articulation modeling after the Chinese paradigm. For the vowels, a new model previously unknown was introduced. The systematic contrasts between the sounds were reflected in the graphic forms of the letters.¹ In the *Hunmin chŏng'ŭm* of 1443 the order of the letters follow the rows and columns of the classification. However, in a work published in 1527 the letters are arranged in a different way similar to that we know today.

As early as in the 5th century BC, the Indian phoneticians thoroughly observed the process of producing speech sounds. They classified the sounds by the place and manner of articulation. Their findings were reflected in the order of the letters of all Indic writings.

In the historical studies of writings *adaptation* of an earlier script for another language(s) has been thought as an indispensable presupposition. For the establishment of historical relationship between two or more scripts, comparison of the external forms of the letters with their phonetic representations has been supposed to be the necessary requirement. Thus, in order to find the origin of the Korean alphabet *Han'gŭl*, earlier scripts, of which the shapes of a certain letters are identical or similar with those of the Korean, have been sought enthusiastically for over a hundred years with few persuasive results.

As it is to be seen in this paper, all the Indic scripts share a common feature in the *order* of the letters, which was originated from the systematic classification of the sounds by the ancient Indian phoneticians. A certain letters of a certain scripts may look alike but the external similarity is not necessarily regarded as the criterion of the evidences to establish a genetic relationship of Indic writings. It is obvious that the numerous Indic scripts were created on the basis of the classification of the sounds available. The

¹ Because of this feature found only in Korean *Han'gŭl*, Sampson (1985, pp.120-144) set up an independent category of writing, "featural system."

system, but the forms of letters, was adapted when creating a new script.

Obviously the Korean alphabet was created on the basis of the systematic classification of the sounds. For the creators who clearly understood the phonetic system in which individual sounds (or ‘phonemes’ in modern sense) are regularly contrasting, adoption of the forms of the letters of an earlier script need not be a major concern. Fruitless comparison of external forms of the letters to prove the origin of the Korean alphabet should be discontinued.

In this paper the ancient Indian classification of the sounds is briefly introduced to show its reflection in Indic writings. Also, the traditional Chinese model of initial consonants is discussed in connection with the Korean alphabet.

2. Ancient Indian Model of Sound Classification and Its Reflections in Indic Writing Systems

As early as in the 5th century BC the Indian phoneticians contemplated the process of producing speech sounds. Their observations from various primary sources are rearranged and introduced with interpretations in Allen (1953). The following is a summary of the first part of Allen’s work.

The ancient Indian phoneticians studied the sounds physiologically and divided them into two main types, ‘internal’ (ābhyantar) and ‘external’ (bāhya). The first type comprises processes occurring within the oral cavity or **intra-buccal** and the second, those occurring elsewhere or **extra-buccal**.

The intra-buccal processes include (a) **closure**, which is associated with the production of the stop consonants, (b) **opening**, which is associated with that of the vowels; and (c) **constriction** of two degrees, (i) which is associated with that of the fricatives and (ii) which is associated with that of the semi-vowels.

The extra-buccal processes comprise (a) **glottal**, which is associated with the production of the voiced sounds; (b) **pulmonic**, which is associated with that of the aspirated sounds; and (c) **nasal**, which is associated with that of the nasals.

By the intra- and extra-buccal processes the sounds were classified as what we see in the table of the Devanāgarī script.

Table 1. The Sounds Associated with Closure (Stop Consonants)

	Voiceless Stops		Voiced Stops		Nasals
	Unaspirated	Aspirated	Unaspirated	Aspirated	
Velar	ka	kha	ga	gha	ṅa
Palatal	ca	cha	ja	jha	ña
Retroflex	ṭa	ṭha	ḍa	ḍha	ṇa
Dental	ta	tha	da	dha	na
Labial	pa	pha	ba	bha	ma

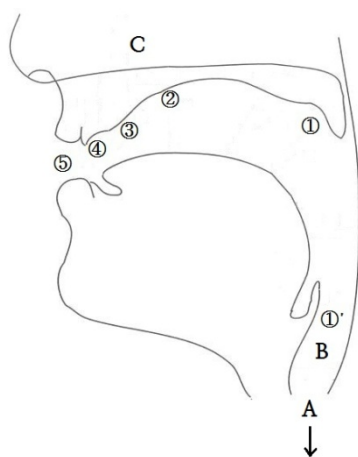
Table 2. The Sounds Associated with Opening (Vowels)

	Short	Long	Secondary	Diphthong
Glottal	a	ā		
Palatal	i	ī	e	ai
Retroflex	ṛ	ṛī		
Dental	ḷ	ḷī		
Labial	u	ū	o	au

Table 3. The Sounds Associated with Constriction (Fricatives)

	Sonorants	Sibilants
Palatal	ja	ʃa
Retroflex	ra	ʂa
Dental	la	sa
Labial	va	
Others	(la)	ha

As shown on Tables 1-3 above, the sounds classified into the three intra-buccal processes are sub-classified into five categories by the places of articulation: **velar** or **glottal**, **palatal**, **retroflex**, **dental** and **labial**.² The five categories are arranged strictly in an order from the place nearest to the origin of the air-stream, i.e., the lungs, toward the lips.³



Intra-Buccal	Extra-Buccal
①' Glottis	A. The Lungs (Pulmonic)
① Velar	B. The Glottis (Voiced)
② Palate	C. Nasal Cavity (Nasal)
③ Front Palate (Retroflex)	
④ Dental	
⑤ Labial	

² On Table 3 the sub-class for glottal/velar lacks. The Indian phoneticians did not consider [h] as a velar or glottal fricative. Actually [h] is a fricative articulated anywhere, from the velar to the lips. The place of articulation is determined by the accompanying vowel.

³ According to Allen (1953:20 "Note") the order of letters show considerable divergences in the Indian sources. "This fact, however, is explicable by the phonological, as opposed to phonetic, approach there adopted."

Each of the five categories of sounds associated with closure includes five kinds of sound that are distinguished by the three extra-buccal processes: **voicing** which is processed at the glottis (glottal), **aspiration** which is processed by the lungs (pulmonic) and **nasalization** which is processed in the nasal cavity (nasal). The three extra features, following the featureless basic, are arranged again in the order from the deepest, i.e., the lungs (aspirated), via the glottis (voiced), combination of previous two features (voiced-aspirated) and the nearest to the lips, the nasal cavity (nasal). In sum, we have a table of stop consonants as Table 1 above.

The sounds associated with opening of the mouth, i.e., the vowels, are classified also by the places of articulation as shown on Table 2 above. It is noted that from the order of the vowels [a]-[i]-[u] we understand that the Indian phoneticians obviously perceived the place of articulation for [i] is in the middle, between the glottis and the lips. They did not describe [i] as the most front and the highest vowel (in reference to the position of the tongue) as the modern phoneticians do. The Indian phonetician's description seems to be more reasonable. The vowels [a], [i] and [u] may be more properly described as 'glottal', 'palatal' and 'labial' respectively, rather than 'low-back', 'high-front' and 'high-back'.

The sounds associated with constriction include fricatives and semi-vowels, or sibilants and sonorants. As shown on Table 3 above, these sounds may be classified by the places of articulation like the explosives, but do not parallel the latter in the sub-classes. That is, the sounds under this category are not distinguished by the manners: aspiration, voicing and nasalization.

The order of the Devanāgarī alphabets begins with the vowels and continues with the plosive consonants, the semi-vowels and the fricatives as shown number (1) below. Anyone may easily understand the rationale of the order of the Devanāgarī letters. It exactly corresponds to the horizontal and/or the vertical order of the sound classifications shown on

Tables 1-3 above.

Devanāgarī appeared in the 8th century AD and was used for writing Sanskrit beginning ca. 12th century. But the order of the letters must be the one inherited from the earlier scripts used for writing Sanskrit such as the various Brāhmī scripts (since 3rd c. BC or earlier), Gupta (since 400 BC on ?) and Siddham (used ca 600-1200 AD). The order of the letters of Siddham, almost identical with that of Devanāgarī, is found in the table of the script contained in the *P'alman taejanggyōng* 八萬大藏經 (*Tripitaka Koreana*) of the 13th century.

The ancient Indian principle of ordering the letters was not blindly adopted but adjusted to fit for the languages for which new scripts were created. It would have also experienced changes along with passing of times. However, the fundamental has been maintained, especially in the order of the letters for the plosive consonants. The letters for plosive sounds are arranged, as in the Devanāgarī script, in the order of ① the velar group, ② the palatal group, ③ the retroflex group, ④ the dental group and ⑤ the labial group. In each group the letters are in the order of (a) basic or unaspirated-voiceless, (b) aspirated, (c) voiced, (d) aspirated-voiced and (e) nasal. In case a category (by place of articulation) or a class (by manner of articulation) did not exist in the language, the letters for them were not created. For example,⁴ in the Tibetan script (3), which was created in the 7th century, letters for the sounds of retroflex category and aspirated-voiced class lack as those sounds did not exist in Tibetan. Letters for vowels were not created but marked by diacritics. In the ḥPags-pa script (4), created in the 13th century, as in Tibetan, the letters for the sounds of retroflex and aspirated-voiced do not exist also. Independent letters for vowels were

⁴ See the appropriate number under "Alphabetical Orders by Transcriptions of Representing Sounds" below for the order of the whole letters of the scripts mentioned herewith.

created which were placed after the consonants. The order of the letters of the ḥPags-pa script is found in the *Fashukao* 法書考 and *Shushi huiyao* 書史會要, both of which were compiled in the 14th century. In the Burmese script (5) the sounds of the second group, which are supposed to be palatal plosives, are transcribed as affricates [sa sha za za]. As a matter of fact, not only in Burmese but also in many other languages a palatal plosive [c] is hardly differentiated from a palatal fricative [ç] and is often interchangeable with a post-alveolar/alveolar/dental fricative [s] etc. In the Thai script (6) each group of the plosives comprises six to eight letters, unlike four or five in other scripts. Yet the principle of ordering is kept. It is noted that the inherent vowel of the letters of the Thai, and the Lao, script is an [o].⁵ Thus, an easily recognizable feature of Indic writings is that the series of the consonantal letters are headed by those representing a [k(a)]. In the Gurmuki script (2) the initial letters are, somehow, for [sa] and [ha] but they are followed by the groups of the plosives in the normal order.

Alphabetical Orders by Transcriptions of Representing Sounds⁶

(1) Devanāgarī

a i u ṛ ḷ e o // ka kha ga gha ṇa / ca cha ḷa ḷha ṇa / ṭa ṭha ḍa ḍha ṇa /
ta tha da dha na / pa pha ba bha ma / ja ra la wa ṣa sa ha (In the
vowel listings long vowels and diphthongs are omitted.)

⁵ Actually the inherent vowels of the scripts of many languages, which are commonly transcribed by 'a', sounds more like a schwa [ə].

⁶ Regarding the arrangements of the letters of the scripts, the appropriate articles in the internet encyclopedia, Wikipedia (<http://en.wikipedia.org/wiki>) and Nakanishi (1990) are consulted. A pair of slant '/' denotes the boundary between the series of vowels and that of consonants and a single slant '/' separates the groups of sound categories. Transcriptions are in IPA but aspirated sounds are not transcribed by a superscribed 'h' but by a normal 'h', as 'kh', 'th' and 'ph'. Retroflex sounds are represented by 'ṛ' and 'ḷ', instead of IPA 'ɻ' and 'ɽ'.

(2) Gurmukhi

(three vowel-basis letters) // sa ha / ka kha ga gha ṇa / ca cha ḷa ḷha
ṇa / ṭa ṭha ḍa ḍha ṇa / ta tha da dha na / pa pha ba bha ma / ja ra la
wa ra

(3) Tibetan

ka kha ga ṇa / tṣa tṣha dṣa ṇa / ta tha da na / pa pha ba ma / tsa tsha
dza wa ṣa sa ṭa ja ra là ṣa sa ha a

(4) ḥP'ags-pa

ka kha ga ṇa / tṣa tṣha dṣa ṇa / ta tha da na / pa pha ba ma / ṣa ṣha
ja wa za za ja ra la ḷa sa ha 'a // i u e o (next 7 letters are omitted)

(5) Burmese

a i u e o an // ka kha ga ga ṇa / sa sha za za ṇa / ta tha da da na / ta
tha da da na / pa pha ba ba ma / ja ya la wa ḙa ha la (long vowels are
omitted)

(6) Thai

ko kho kho kho kho kho ṇo / tṣo tṣho tṣho so tṣho yo / do to tho tho
tho no / bo po pho fo pho fo pho mo / jo ro lo wo so so so ho lo 'o ho

3. Chinese Model of the Classification of the Initial Consonants and Its Reflection in the Korean Alphabet

The study of speech sounds in China is said to have begun in the 1st century AD, perhaps, under the influence of the ancient Indian phonetics which was introduced along with Buddhism. Terms for the classification of the sounds appear in the works of the 6th century onward, but the

traditional Chinese model of classification was settled down in the 9th-10th century. Probably because of the mono-syllabic nature of the Chinese language, the traditional study of sounds in China was mainly concerned with classification of the initial consonants or *sheng* 聲 and the rhymes or *yun* 韻.

The initial consonants were classified by five (later seven) *yin* 音, which may be understood as five places of articulation, and four *sheng* 聲,⁷ which may be interpreted as four manners of articulation. Thirty initial consonants were distinguished in the earlier works but later the number increased to thirty-six. Each initial consonant was represented by a specific character, e.g., [k] by 見, [kh] by 溪, [g] by 群 etc. The most widely known classification of the 36 initial consonants is shown on Table 4 below with literal translations of the Chinese names of the categories and classes.

Table 4. Traditional Chinese Classification of Initial Consonants

		All-clear 全清	Second-clear 次清	All-muddy 全濁	Not-clear Not-muddy 不清不濁	Clear 清	Muddy 濁
Molar Sounds 牙音		見 k	溪 kh	群 g	疑 ŋ		
Tongue Sounds 舌音	Tongue-head 舌頭音	端 t	透 th	定 d	泥 n		
	Tongue-up 舌上音	知 c	徹 ch	澄 ɟ	娘 ɲ		
Lip Sounds 脣音	Lip-heavy 脣重音	幫 p	滂 ph	並 b	明 m		
	Lip-Light 脣輕音	*非 f	*敷 f'	*奉 v	*微 w		

⁷ In traditional Chinese phonetics a term frequently appears in multiple senses. The basic meaning of *sheng* 聲 is 'sound', but may denote 'initial consonant' or 'one of the four manners of articulation' depending upon the context.

Tooth Sounds 齒音	Tooth-head 齒頭音	精 ts	清 tsh	從 dz		心 s	邪 z
	Tooth-proper 正齒音	照 tɕ	*穿 tɕh	*牀 dʒ		審 ɕ	禪 ʒ
Throat Sounds 喉音		影 ʈ	曉 x	匣 ɣ	喻 j		
Half-tongue S. 半舌音		來 l					
Half-tooth S. 半齒音		日 ɳʐ					

* Initials not included in the earlier list of thirty.

Five or Seven Categories by the Place of Articulation

The arrangement of the five primary categories is in the order of molar (back-tooth), tongue, lip, tooth and throat which are roughly, not exactly, correspond to velar, alveolo-palatal, labial, alveolar/dental and glottal respectively in IPA terms. At a glance, the arrangement appears to be similar to that of the ancient India's. However, it is noted that in the Indian tradition the categories of the sounds are referred by the names of the upper parts of the speech organ, i.e., 'velar', 'palate' etc. Whereas in the Chinese classification the articulator 'the tongue' is used as a category name and the rest four are names of the organs that comprise both upper and lower parts. Anyhow, the first three categories are in the order of the organs from the deeper part toward the front. This order can be interpreted as fundamentally identical with that of the Devanāgarī alphabet shown on Table 1 above.

However, the next two categories, the 'tooth' (alveolar/dental) and the 'throat' (glottal) are in the different order. Physically speaking, their arrangement is from front to back, the opposite direction from that of the first three. I have not found an adequate explanation why the Chinese arranged the categories of the initial consonants in this order. In this connection, it may be pertinent to point out one fact, i.e., the consonants

under the first three categories are stops or plosives, whereas those under the last two categories are affricates and sibilants, or fricatives. When a stop consonant is produced, a complete closure, or a contact of the upper and the lower parts of the speech organ is required. But for the sibilants, the upper and lower parts are not closed, but narrowed. For the affricates both contacting and narrowing of the upper and lower parts occur. It is noted that in the Indian tradition those sounds under the Tooth and Throat categories in the Chinese classification do not belong to the first five categories of plosives. Actually the Palatal and the Retroflex categories of the Indian classification are missing in the Chinese.

The Tongue-up sounds correspond to the Palatal plosives in the Indian model. The sounds under this category merged with those under Proper-tooth. The retroflexes did not exist in Chinese.⁸ However, in modern Chinese retroflex fricatives are distinguished from the palatals and the dentals.

The term 'molar' looks inadequate for what is known in modern linguistics 'gutturals' or 'velars'. The origin of the term might have had a certain connection with the Indian tradition, in which the *sthāna* ('position' or 'place') of the *k*-series is said to be *hanu-mūla* or 'root of the (upper) jaw'.⁹ If the Chinese who decided the Chinese names of the categories had knowledge of the Indian terms, he might have chosen 'molar' (牙 牙) for 'root of jaw' as the molars are near to the root of the tongue.

The category of 'lip-light sounds' or 'labial fricatives' was added in the later period. This category lacks in the Indian model.

The 5th category of Throat sounds includes the zero-initial, semi-vowel and glottal fricative. And, for the liquid [l] and alveolar-ridge

⁸ Karlgren (1954) reconstructed 'palatal stops' for the 'tongue-up' and 'proper-tooth' sounds. But, Pulleyblank (1971, p.213) argued that they must have been 'retroflex stops' mainly based upon Sino-Vietnamese readings.

⁹ See Allen (1953), pp.51-52.

fricative [ɳʐ], two extra-categories, Half-tongue and Half-tooth were set up. As the number of categories increased by two, the name changed from ‘five-sound’ (*wuyin* 五音) to ‘seven-sound’ (*qiyin* 七音).

Four Classes by Manner of Articulation

The four sub-classes, All-clear, Second-clear, All-muddy and Not-clear Not muddy correspond to Voiceless-unaspirated, Voiceless-aspirated, Voiced-unaspirated and Nasals respectively in the Indian model. The Voiced-aspirated category in the Indian paradigm does not exist in the Chinese.¹⁰

Adaptation of the Chinese Model of Consonantal Classification by the Creators of the Korean Alphabet

In the traditional study of Chinese the reading of a Chinese character *zi* 字, or a ‘syllable’ in modern sense, was analyzed into two elements: *shengmu* 聲母 or the initial sound and *yunmu* 韻母 or the rhyme. The creators of the Korean alphabet further analyzed the rhyme into two parts upon which they conceived the minimal pronounceable unit of speech as consisting of three elements: *chosǒng* 初聲 or ‘the initial sound’, *chungǒng* 中聲 or ‘the medial sound’ and *chongsǒng* 終聲 or ‘the final sound’. They explained that a unit in Chinese is necessarily made up of the three elements. Whereas in Korean an initial and a medial sounds are required but the final is optional. The creators of *Han’gŭl* also realized that the initial and the final sounds belong to the same class. In terms of modern linguistics, they recognized the positional variations of a phoneme.

For the classification of the initial/final sounds, i.e., the consonants, the Koreans took the traditional Chinese model shown on Table 4 above. The ‘seven categories’ (by the place of articulation) and the ‘four classes’

¹⁰ Karlgren reconstructed voiced-aspirated consonants but a number of scholars have been critical about Karlgren's reconstructions.

(by the manner of articulation) were kept but the sub-divisions of the Tongue, Lip and Tooth categories were ignored since those consonants were not distinguished in Korean.

Table 5. Classification of the Korean Consonants

	All-clear 全清	Second-clear 次清	All-muddy 全濁	Not-clear Not-muddy 不清不濁
Molar sounds 牙音	ㄱ k	ㅋ kh	ㄱ ɡ	ㅇ ŋ
Tongue sounds 舌音	ㄷ t	ㅌ th	ㄷ d	ㄴ n
Lip sounds 脣音	ㅍ p	ㅂ ph	ㅍ b	ㅁ m
Tooth sounds 齒音	ㅈ c ㅉ s	ㅊ ch	ㅉ j ㅊ (z)	
Throat sounds 喉音	ㅎ ʔ	ㅎ h	x	ㅇ 0
Half-tongue s. 半舌音	ㄹ r			
Half-tooth s. 半齒音	ㄷ z			

While 36 sounds were registered in the Chinese model, 23 initial/finals are listed in the Korean classification as shown on Table 5. But, the six letters/sounds in the All-muddy class were not counted as the regular members of the Korean consonants.¹¹ The remaining 17 letter/sounds were considered as ‘regular’ members and were listed in the introduction part of the *Hunmin chŏng’ŭm* in the order exactly corresponding to that of the

¹¹ The All-muddy class has been considered to be voiced consonants. In Korean voiced plosives do not exist as phonemes. In many Chinese dialects voicing has lost its distinctive power for many centuries but it has been maintained in the historical studies of Chinese. Until the new orthography was introduced in the 1930s, the use of the All-muddy letters was extremely limited for writing native Korean. In the new orthography those letters represent the tensed plosives.

letters on Table 5. The order is presented “(7) Korean 1” below as those of the Indic scripts shown (1)-(6) above. This order also reveals a few similarities with those of the Indic scripts such as the head being the letter for [k], placing the letters for the sounds belonging to the same category together and so on.

The original order of the letters of the Korean alphabet, however, seems to have been replaced in several decades. In the *Hunmong chahoe* 訓蒙字會 of 1527 (a collection of elementary Chinese characters for children’s learning), the Korean letters are listed in a different order as in “(8) Korean 2” below. The author Ch’oe Se-jin was one of the most eminent phoneticians in the history of five hundred years of the Chosŏn dynasty. He compiled a number of works for the study of Chinese and Chinese characters.

In the order of the letters in the *Hunmong chahoe* of 1527, the first eight letters are defined as “those used for both the initial and the final sounds” and the next eight, as “those used only for the initial sounds.” The first eight letters are none other than those explained in the *Hunmin chŏng’ŭm* as “For the final sounds eight letters are enough.” In Korean all consonants are unreleased in the final positions. As a result, distinctions by aspiration and tension are neutralized in the final positions. For example, final [-k], [-kh] and [-kk] are pronounced the same. Accordingly the number of consonants occurring in the final positions is reduced. Perhaps, for practical purpose of learning the Korean alphabets, the arrangement of 1527 had turned out to be more useful than the original one which reflects the theoretical classification of the sounds. At a glance the first eight letters are in the order severely distorted from the original. But, by a careful examination the principle of ordering the letters is understandable. The head letter is the one for the sound of Molar (velar) category [k] which is followed by those of the Tongue [n, t], that of Half-tongue [r], those of Lip [m, p], that of Half-tooth [s] and finally that for [ŋ]. Among the two

sounds in the Tongue and Lip categories, the one representing the category was placed first. The five sounds/letters representing the five categories are in bold letters on Table 5 above.

The sound [ŋ] actually belongs to the Molar category. This sound was explained by the creators of the Korean alphabet as the one that cannot represent the Molar category because of its peculiarity, i.e., nasality, of the sound. So, they not only did not set this sound as the representative of the Molar category, but also did not make a letter containing an element shared by others of the category.¹² For this reason the letter representing an [ŋ] might have been placed at the end of the eight.

The letter for [ʔ] of the Throat category is omitted from the original 17 members. Actually the phonetic value represented by this letter was questioned from the time of creation of the Korean alphabet. It must have been made to fulfill the logical distribution of the sounds in the classification table.

The eight letters occurring only initially are in the order of the categories. That is the Molar [kh], the Tongue [th], the Lip [ph], the Tooth [c ch], the Half Tooth [z] and the Throat [0].

The order of the first eight letters in the *Hunmong chahoe* of 1527 has been the standard arrangement of the Korean alphabets until the present. But the order of the other letters has been distorted. A justification for the distortion is hardly found. See “ (9) Korean 3” below for the modern order of the Korean alphabets.

¹² The creators considered the sounds belonging to the Not-clear Not-muddy class must represent the categories. However, because there is not a Not-clear Not-muddy sound in the Tooth category and the sound [ŋ] cannot represent the Molar category, for these two categories the All-clear sounds were designated as the basic. The basic letters for the five basic sounds were created modeling after the shapes of the speech organ concerned and the others, by addition of a line or lines or combination of the already made letters.

Korean Model for the Classification of the Vowels

The creators of the Korean alphabet created their own model for the classification of the vowels. They conceived the three vowels [a], [u] and [i] as the fundamentals for which three symbols ·, — and 丨 were created respectively. The first one symbolized the roundness of the heaven, the second one, the flatness of the earth and the third one, the verticality of the human being. Other vowels were perceived and explained systematically in connection with the fundamentals and the symbols representing them were created by the logical combinations of the three fundamental symbols. Creation of the symbols step by step, which also reveal co-relationships among the sounds represented are shown in the table below.

Table 6. Classification of the Korean Vowels

		Yang 陽	Ŭm 陰	Neutral 中
I	The Fundamental Three	* · [a]	— [u]	丨 [i]
II	First-Stage Combinations	⌊ [o] ㅏ [a]	ㅓ [u] ㅗ [ə]	
III	Second-Stage Combinations	ㅜ [yo] ㅟ [ya]	ㅠ [yu] ㅠ [yə]	

In the *Hunmin chŏng'ŭm* of 1446 the order of the vowel letters was also identical with that found on classification Table 6 above. But, it was changed in the *Hunmong chahoe* of 1527 as the case of the consonant. The latter has been circulated until the present time.

Order of the Korean Alphabets by Transcription of Representing Sounds

(7) Korean 1 (*Hunmin chŏng'ŭm* of 1446)

k kh ŋ / t th n / p ph m / c ch s / ʔ h 0 / r z // ㅏ ㅓ ㅗ / o a u ə / jo ja
ju jə

(8) Korean 2 (*Hunmong chahoe* 訓蒙字會 of 1527)

k n t r m p s ŋ / kh th ph c ch z 0 h // a ja ə jə o jo u ju ɯ i ɐ

(9) Korean 3 (Modern)

k n t r m p s 0/ŋ / c ch kh th ph h // a ja ə jə o jo u ju ɯ i
(compounded letters are omitted)

4. Postscript

The order of any writing system would have been originally accompanied by a rationale, either phonetic or cultural. But, as the rationale was a matter unnecessary to remember for the learners and users of the script, it has been completely forgotten. Meanwhile, the arrangement of letters has been distorted in the passing of times. And, in the course of recurrent adoptions and adaptations for writing other languages, addition or omission of a certain letters and modifications in the order commonly occurred. Yet, traces of the original orders are detected in most writing systems, although they cannot be properly explained by themselves.

In most phonographic writings the first letters are for the sound [a], as in the Latin and the Arabic scripts. In the systems where signs for the vowels are distinguished from those for the consonants, as in the Devanāgarī and the Korean *Han'gŭl*, the series of vowel signs are headed by the letters for [a]. An [a] sound is the most common, inherent vowels of the basic sounds that individual letters of most Indic and other writings represent. These facts suggest that [a] has been universally recognized as the primary, principal sound since antiquity.¹³ The universal recognition

¹³ According to UPSID (The University of California, Los Angeles Phonological Segment Inventory Database) low-unrounded vowel phoneme /a/ is not the most widely

would have been the reflection of a natural perception of human beings or would have been the result of a thorough observation of the sounds.

In the arrangements of other letters that follow the heads for an [a], a universality is hardly observed. Nonetheless, a certain similarities could be detected in the order of letters of the scripts which have been known as the offsprings of a common ancestor. As an example, the arrangements, by transcriptions of the basic representing sounds, of the letters of five writing systems, which are known to be derivatives of the Phoenician syllabary of the 11th century BC, are shown below.

- | | |
|-------------------------|---|
| (10) Classical Greek | <u>a</u> <u>b</u> g d e dz ε th i <u>k</u> <u>l</u> <u>m</u> <u>n</u> x o p r s t u/y ph ch
ps o |
| (11) Classical Latin | <u>a</u> <u>b</u> k d e f g h i <u>k</u> <u>l</u> <u>m</u> <u>n</u> o p kw r s t u x i z |
| (12) Cyrillic (Russian) | <u>a</u> <u>b</u> v g d je jo z z i -j <u>k</u> <u>l</u> <u>m</u> <u>n</u> o p r s t u f x ts tɕ
ʃ ʃtɕ - i - e ju ja |
| (13) Hebrew | <u>a</u> <u>b</u> g d h v z h/x t j <u>k</u> <u>l</u> <u>m</u> <u>n</u> s 'a p 's k r ʃ t |
| (14) Arabic | <u>a</u> <u>b</u> t ɔ ɕ/ʒ h x d ɒ r z s ʃ ɕ ɖ ɗ ʒ ɒ/z ʕ ɣ f q <u>k</u> <u>l</u>
<u>m</u> <u>n</u> h w j |

In all of the five scripts the initial letters represent an [a] which is followed by those for a [b]. The four letters for [k], [l], [m] and [n] appear in the same sequences also. As both the Latin and the Cyrillic alphabets derived from the Greek, the partial correspondences in the arrangements of the sounds of letters are not a surprise. However, it would be an unexpected fact that the same sequences are also found in the Hebrew and Arabic scripts, although the Greek alphabet is known to have originated

distributed vowel in the 317 languages investigated, but the 4th, after /i/, /e/ and /o/. See Crystal (1987) p.167. English is one the languages where pure [a] rarely occurs.

from the Semitic.¹⁴

Ullman (1932/1969, p.20) wrote, “The order of the letters, which we know from very old Greek and Semitic sources, such as the alphabetic Psalms, is the same in Greek and Semitic. This order seems to be one of chance.”¹⁵ If we follow Ullman, we may assume that the two identical sequences [a-b] and [k-l-m-n] found in the above five scripts are remnant traces of Phoenician or an unknown earlier writing system from which Greek and Semitic scripts derived. Whether the original order of the letters was, as Ullman says, ‘one of chance’ or a phonetic or cultural reasoning was involved, cannot be easily judged. However, it is obvious that they could be taken as a common feature found both in Greek and Semitic writings. Considering the radical differences in graphic forms between Greek and Semitic, the two identical sequences of phonetic values of the letters could be regarded as an additional, significant evidence for the genealogical classification of the scripts.

As presented above, all Indic scripts share a common feature in the ordering of the letters which were originated from the ancient Indian phoneticians’ classification of the sounds. The creators of the Korean alphabet took the Chinese model for the classification of the Korean consonants. The Chinese model of the consonant classification was reflected in the order of the letters of the Korean alphabet.

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¹⁴ Gelb (1952, pp.176-177) discusses in detail the Semitic origin of the Greek alphabet.

¹⁵ Gelb (1952, p.177) also remarks the identical order of the letters of the two writings.

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Discussion: Ancient Indian and Chinese Models of Sound Classifications and Their Reflections in the Writing Systems

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This article is demonstrating the systematic reflections of phonetic knowledge involved in the inventing procedure of the Korean alphabet. The geographical dimension meets with proper demand to include the Indian and the Chinese traditions. As is widely known, the Korean alphabet is invented on the basis of a systematic understanding of the phonetic characteristics of the Korean language, enabled by the transmitted knowledge system in the field of phonetics from China and India, directly or indirectly. The question does not seem to be about the acceptance or rejection of foreign influence in this respect, but rather about the clarification of the exact procedure of knowledge transmission.

I

I would like to hear from the author some further clarifying and informing words about following points.

The historical diversity of Indian scripts will easily make the description on the Devanāgarī given on p.5 controversial. But the main point to be clarified would be that the order of letters taken by modern authors in most Indian scripts nowadays reflects somehow the phonetic analysis of the represented sounds. It means practically that the phonetic analysis in its historical origin in Indian culture can be and must be understood in the absence of the script system. This point is mentioned also in the article (p. 5) and demonstrated further (pp. 6-7) showing the ordering arrangement of various scripts indicating some phonological arrangement on the background. This point seems to build up a bridge to assimilated discussion about the Korean alphabet. The Korean alphabet which was systematically invented shows a systematic phonetic analysis of the Korean language available at that time. If this connection should be accepted as a historical fact, we should have direct historical evidence or convincing systematic similarities. The former, at least with respect to Indian phonetic traditions, I could not find in this article. Since the author is more informed on that, I, an ignorant in this field, would be very thankful to get a meta-bibliography. The latter is dealt with in this article, if I do not misunderstand. But the suggested similarity (p.11) looks very meager, though the author himself is talking cautiously enough on ‘a few similarities’.

The order is presented “(7) Korean 1” below as those of the Indic scripts shown (1)-(6) above. This order also reveals a few similarities with those of the Indic scripts such as the head being the letter for [k], placing the letters for the sounds belonging to the same category together and so on.

In the case of Indian script, we have obvious reason to find [k] on the first place. But in the Korean case, it is still not clear for me. The same kind of uncertainty would be felt in the case of comparison between *hanu-mūla* and 牙 (p.9).

The term ‘molar’ looks inadequate for what is known in modern linguistics ‘gutturals’ or ‘velars’. The origin of the term might have had a certain connection with the Indian tradition, in which the *sthāna* (‘position’ or ‘place’) of the *k*-series is said to be *hanu-mūla* or ‘root of the (upper) jaw’. If the Chinese who decided the Chinese names of the categories had knowledge of the Indian terms, he might have chosen ‘molar’ (*ya* 牙) for ‘root of jaw’ as the molars are near to the root of the tongue.

As cited in Allen (1953), p.51, n.6, *jihvā-mūla* (root of the tongue) is the articulator or the articulating organ, not the articulating position.

hanu-mūle jihvā-mūlena ka-varge sparśayati. (Taittirīya-Prātiśākhya II 35)

In this respect I would like to hear some further clarifying explanations which would be helpful to understand the intention of the author properly.

II

I would like to suggest some minor improvements for the stimulating and informative article.

The assertion like following (p.13) seems to me too general that it could be placed on the border line of academic acceptability.

The order of any writing system would have been originally accompanied by a rationale, either phonetic or cultural.

The explanation given in note 2 on [h] would breed some misunderstanding. The author seems to explain the aspiration of the consonants, not the phoneme /h/. Then the notation ‘[h]’ is misleading. So far the ancient Indian phoneticians and grammarians have understood, summarized in the tables 1—3 on the article, each aspirate consonant is a separate consonant;

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one may say [k^h] is an aspirated variant of [k], but not take the sign 'h' indicating the aspiration as a separate consonant or phoneme.

As an academic work it would be better to be without any small typing error. Some correction would raise the value of this contribution.

p.3, 1: ābhyantar > ābhyantara; p.5, 15ff: Devanāgarī > Devanāgarī; p.6, 17:
Gurmukhi > Gurmukhī

Lastly, I would like to suggest to adopt the International Alphabet of Sanskrit Transliteration (IAST) convention to Romanize the Sanskrit letters which is nowadays firmly established convention, if the author does not wish to stay with IPA.