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A contrastive analysis of Korean-Indonesian phonological structures

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ABSTRACT

This paper discusses the contrastive analysis of Korean-Indonesian phonological structure. The contrastive analysis here covers phonological correspondence and phonotactic structure between Korean and Indonesian. It also provides implications to pronunciation learning, especially Korean language learners in Indonesia. This paper is a descriptive qualitative research, using literature study from books, journals, and other related resources. This study revealed that Korean had more monophthongs and diphthongs than Indonesian, with Correspondence between Indonesian's 'ə' and Korean's 'ɨ', Korean's 'ə (ㅓ), o (ㅗ)' and Indonesian's 'o', and Korean's 'e (ㅔ), ɜ (ㅐ)' and Indonesian's 'e'. However, Korean and Indonesian had different classification of consonant's manner of articulation, especially on correspondence between voicing and affricative markedness. On syllable structure, Korean was considered to have stricter syllable structure than Indonesian, as seen on constraint applied on syllable. These findings will help instructor create more effective pronunciation learning, with a comprehensive syllabus in using phonological theory and language skills. However, the suprasegmental aspect and phonological process are excluded from this research.

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1. INTRODUCTION

Sound is an important aspect of language. Sound is likened to a symbol of language. Although there are some common sounds found in various languages, each language has its own sound symbolism. For example, almost all languages in the world have labial sounds, such as [m] and [p]. On the other hand, not all languages in the world have a fricative consonant [θ]. This is related to the markedness of sounds in languages around the world. Labial consonants, such as [m] and [p] have a fairly high level of markedness considering their relatively easy points of articulation, which are the lips.

Sound is also the first aspect that humans learn when learning to speak. The speaking process starts from babbling until finally being able to pronounce the full word. From this, it can be seen that sound is an aspect that cannot be separated from language. Sound or pronunciation is also an important aspect at the beginning of foreign language learning. The success of learning pronunciation at the beginning will determine the student's communication skills when using the foreign language. According to Suh (2007), improper and unnatural pronunciation will cause communication failure even though the use of vocabulary and grammar is good.

Pronunciation is the first stage of speaking competence for foreign language learners. If the learner is able to pronounce the sounds of a foreign language well, then he or she can speak larger language units, from words to sentences. Pronunciation imperfections at the beginning of foreign language learning will cause students not to be able to communicate well. The improper pronunciation will cause students to make mistakes in writing words, which also affects their reading and writing abilities. Therefore, pronunciation is the important and the first aspect that must be mastered by students before they learn the more complex foreign language units.

One of the foreign languages that is currently popular in Indonesia is Korean. This can be seen from the continued growth of centers or institutions that provide Korean language learning.[1] One of the reasons for the high number of Korean language enthusiasts is the *Hallyu* or Korean Cultural Wave that entered Indonesia in the late 1990s. The increasing number of Korean language enthusiasts has created the need for the development of a Korean language learning system.

Korean is one of the languages in East Asia whose language family is still unclear. There are several opinions regarding the Korean language family, which are the Altai language family, the Ural-Altai language family, the Japanese language, and the Dravidian language family. Among that, the most well-known opinion is the opinion that Korean belongs to the Altaic language family. This is evidenced by the vocal harmonization in Korean which is similar to the characteristic features of the Altaic language family. One of the evidences for this is presented by Poppe (in Lee & Ramsey, 2011) who compares the Proto-Altaic vocal system with the Early Middle Korean vowel system[2] where both of them have the characteristic of vocal harmonization. However, nowadays, the characteristics of Korean vowel harmonization are mostly seen in onomatopoeia or mimesis, for example in 깡총깡총 [k'a̲ngc^{h}o̲ng k'a̲ngc^{h}o̲ng] 'jumping' where there is a back vowel

[1] The Korean Language Education Study Program was first established in UGM, UI, and UNAS, and in UPI in 2015. In addition to universities, there is also King Sejong Institute which is spread across four cities, Jakarta, Bandung, Yogyakarta, and Surabaya for a period of 5 years since 2016. This does not include the Korean Language Education and Skills Institute (LPK) which is spread evenly in all regions in Indonesia, with the applicants usually being Indonesian Migrant Workers (PMI).

[2] Early Middle Korean was the Korean language spoken from the 10th to the 14th centuries, during the Goryeo kingdom. (K. M. Lee & Ramsey, 2011)

harmonization of 'a' and 'o'. In addition, many other sound dissimilarities have been found between Korean and other Altaic language families, so many experts say that Korean is an isolated language that has no close relationship with other languages (Sung, 2005). This isolated genealogy of Korean is distinctly different from Indonesian, which is an Austronesian language family, resulting in many different aspects of the two languages.

One of the differences in the genealogy of the two languages is the difference in the phonemes. Korean phonemes are written in the alphabet called Hangeul, consisting of 19 consonants and 21 vowels. Meanwhile, Indonesian is written with the Latin alphabet, consisting of 21 consonants and 6 vowels. From here, there is a clear difference, especially in the number of vowels that are much different. In terms of consonants, Korean consonants are divided into lax consonants (평음), aspirated consonants (격음), and fortis (경음). In contrast, Indonesian is divided into voiced and unvoiced sounds.

The difference in the phonemes of these two languages becomes one of the important basics in learning Korean pronunciation. Learners can identify which pronunciations are easy and which are difficult in Korean when they can compare them to the Indonesian phoneme system. It can also make Korean language teachers easier to emphasize parts that learners would find difficult to pronounce. However, there has been no research that comprehensively discusses the comparison of the phonemes between the two languages.

One of the comparisons of phonemes, especially between Korean and Indonesian vowels, was done by Meutia & Kim (2012) who compared Indonesian and Korean monophthongs, especially for the vowels 'ㅗ' [o] and 'ㅓ' [ʌ]. A study of Korean monophthongs for Indonesians was also conducted by Shin (2016). Another study was conducted by Chun & Park (2004) on the phonetic type of Indonesian plosive consonants. Nevertheless, this study did not specifically compare Indonesian and Korean plosive consonants. Febrina et al. (2016) also investigated the phonology of Korean but not contrasted it with Indonesian, so that there are no further implications regarding the teaching of Korean to Indonesian students.

Dessiar & Hwang (2016) investigated the interference of mother tongue (they examine a regional language in Indonesia in this study) on the pronunciation of single vowels in Korean. The study found that the mother tongue affects the pronunciation of single vowels in Korean because of the different locations of the vowel pronunciation. However, this study also did not specifically compare Korean and Indonesian phonemes. Meanwhile, Song (2014) discussed the comparison of single vowels and consonants in Indonesian and Korean in his research. However, the comparisons discussed are not detailed according to the types of sounds because the research focused more on learning Korean pronunciation for Indonesian students.

As this study also addressed implication on Korean pronunciation learning, some studies related from Park et al. (2011) need to be examined. Park et al. (2011) classify Korean phonological items into three areas, knowledge, attitude, and learning use. There are four categories for knowledge, such as phonetic and phonological, phonological system, syllable, and phonological processes. Korean alphabet invention principal, the status of Hangeul, Hangeul orthography, grammatical rules, etc are considered as part of Korean phonological items too. Here, Park et al. (2011) addressed basic research of Korean pronunciation learning for Chinese, Japanese, Thai KFL learners too.

About Korean pronunciation learning for Indonesian KFL learners, N. Lee (1999) compared Korean and Indonesian phoneme system before design the pronunciation education method.

Meanwhile Song (2014) indicates that Korean /o/ and /ə/ generates a notable pronunciation errors for Indonesian learners. This is examined by Meutia & Kim (2012) too. Meanwhile Fang & Yin (2021) and Shim & Kim (2017) using experimental research to see correlation between segmental and suprasegmental aspect to Korean pronunciation learning. Fang & Yin (2021) focused on phoneme /a/, /i/, and /o/, while Shim & Kim (2017) analysed correlation between pauses and pronunciation proficiency.

Furthermore, there are some research about pedagogical design and integration of pronunciation to language skill competency. Hyang Lee (2017) criticized about pronunciation learning that always focused on native-like pronunciation than intelligibility. He recommends pronunciation teaching based on segments, suprasegmental, and fluency to achieve better intelligibility, while suprasegmental and fluency will impact more on learners' native-like pronunciation. Zhang (2016) highlighted the necessity of integrating pronunciation into listening and speaking in order to help learners acquire phonological rules. In the term of textbooks, Hur & Park (2003) analysed the contents of Korean language textbooks which tended to focused on language communication skills and presented the prototype of Korean pronunciation learning on textbooks. Listen and repeat, explain the phonological rules, practice, and conclusion are the sequence of pronunciation teaching should be configured on Korean language textbooks.

Based on the explanation above, it can be concluded that comparative research on Korean and Indonesian phonemes has not existed yet, whereas until now Korean language learning in Indonesia is still running. Therefore, it is important to do comprehensive research on the comparison of the phonemes of the two languages so that the basis for learning Korean pronunciation for Indonesian students can be built well. Therefore, the writer is interested in examining the contrastive analysis of Korean and Indonesian phonemes, especially in terms of segmental phonemes. This research is expected to strengthen the linguistic basis of Korean language in Indonesia, especially phonology. In addition, this research is also expected to be useful for the development of Korean pronunciation learning for Indonesian students.

2. METHOD

This research adopted a qualitative descriptive study. Neergard (in Kim et al, 2017) stated that qualitative description is an appropriate objective when a direct explanation of a phenomenon is needed or when there is a need for information to create and improve questionnaires or interventions. This descriptive study was chosen to describe the data obtained from the literature for comparison. To find the characteristics of the phonological systems of the two languages, researcher collected data related to the phonological systems of the two languages, and then compared the characteristics of the phonological systems of the two languages and observed phonological changes.

Buren (1980) reveals that contrastive analysis should be able to present views regarding the similarities and differences between two or more languages. This is also in line with the definition of contrastive analysis by Fisiak et al. (1978) which states that contrastive analysis is a sub-discipline of linguistics that focuses on the comparison of two or more languages, or subsystems of these languages to determine their similarities and differences.

In this study, the researcher first presented the phonological system of the two languages, both vowels and consonants. The phonological systems of these two languages were taken from several books which are *Fonologi Bahasa Indonesia* (Chaer, 2009), *Tata Bahasa Baku Bahasa Indonesia* (Moeliono et al., 2017), Korean's Phonology (Kang, 2011), and Korean's Phonology System (J. Shin & Cha, 2013). In addition, data from journal articles, web pages, and other related sources

were used to support the analysis. Second, the researcher sorted and summarized data related to the consonant classification system, the monophthong and diphthong system, and the vocabulary system. Contrastive analysis method was used to obtain results that are in accordance with the research objectives.

3. RESULTS AND DISCUSSION

Based on the literature studies and comparisons, this section discusses the comparison of the phonemic system of Korean and Indonesian vowels and consonants, comparison of syllable structures, and their implications for learning Korean pronunciation for Indonesian students. The two initial aspects are the things that will underlie the analysis of Korean pronunciation learning.

3.1 Comparison in Phonemic Inventories

This section presents description of the vowel and consonant systems of Korean and Indonesian. The vowel system is divided into monophthongs and diphthongs from both languages, while the consonant system is divided based on articulation point classification and articulation method.

Vowel

The Korean and Indonesian vowel systems are aspects that must be considered at the beginning of language learning. For monophthongs, Korean and Indonesian have several aspects that are quite important to pay attention to. For diphthongs, the systems in both languages are very different so that the comparison of these two languages will be an important basis at the beginning of language learning. *Vowel Inventories*

Korean Vowel Inventories

Table 1

Korean's monophthong system (Kang, 2011)

Position, Roundness, Height	Front		Back	
	Unrounded	Rounded	Unrounded	Rounded
High	i (ㅣ)	ü (ㅟ)	ɨ (ㅡ)	u (ㅜ)
Mid	e (ㅔ)	ö (ㅚ)	ə (ㅓ)	o (ㅗ)
Low	ɜ (ㅐ)		a (ㅏ)	

Korean has 10 monophthongs, despite differences of opinion regarding this. [3] Korean monophthongs distinguish between the phoneme e (ㅔ) and ɜ (ㅐ), as well as the vowel ə (ㅓ) and o (ㅗ). High front and mid vowels in Korean also have pairs of rounded and unrounded sounds,

[3] The 10 monophthongs system is the most agreed system by experts, such as Heo (1985), Kim (1992), Lee (1996), and B. Lee & Choi (1997) who consider vowel ü (ㅟ) and ö (ㅚ) as monophthong. However, these two vowels can turn into diphthongs depending on their position. Meanwhile, Oh (1993) argues that there are only 9 monophthongs in Korean, considering ü (ㅟ) as diphthong. While the 8 monophthongs system proposed by Bae in the book entitled 국어음운론개설 *(The Establishment of Korean's Phonology)* in 1996, considers vowel ü (ㅟ) and ö (ㅚ) as diphthong. On the other hand, the 7 and 6 monophthongs system are monophthong system in midland dialect and Gyeongbu dialect. Therefore, in this article, the opinion used is the 10 monophthongs system.

namely the sound i (ㅣ): ü (ㅟ), and the sound e (ㅔ): ö (ㅚ). Moreover, there is no central vowel in Korean vowels.

The Korean has more monophthongs than any other languages. The concern is the mid front vowel e (ㅔ) and low front vowel ɜ (ㅐ) verbally have the same sound and can only be distinguished in writing (J. Shin & Cha, 2013). It is also usually difficult for Korean learners to distinguish between these two types of sounds.

Meanwhile, the vowel ü (ㅟ) and ö (ㅚ) can be diphthongs when not precede by a previous consonant (Heo, 1985), as the following example:

(a) 쥐 [čü] (b) 위반 [wiban]

In example (a), 위 [ü] is preceded by a consonant ㅈ [č] and is pronounced as monophthong, while in example (b), 위 [ü] is not preceded by a consonant and is pronounced as a diphthong. It can be seen from the examples above that the vowels ü (ㅟ) and ö (ㅚ) have sound alternations depending on the presence or absence of a preceding consonant.

Meanwhile for diphthong, the Korean diphthong system is divided into –y dihpthong system, and w- diphthong system. This diphthong division is also based on the hangul form. Diphthong -y is indicated by the presence of two strokes on a monophthong vowel, for example 'a' / ㅏ / with one horizontal stroke, and 'ya' / ㅑ / with two horizontal strokes. While diphthong -w is a combination of two monophthong vowels, for example the combination of vowels 'o' /ㅗ/ and 'a' / ㅏ / which becomes 'wa' /ㅘ/.

Table 2

Korean's y- diphthong system (Kang, 2011)

Position / Height	y+V (Rising diphthong)			V+y (Falling diphthong)		
	Front	Mid	Back	Front	Mid	Back
High	*yi	*yɨ	yu (ㅠ)		ɨy (ㅢ)	
Mid	ye (ㅖ)	yə (ㅕ)	yo (ㅛ)			
Low	yɜ (ㅒ)	ya (ㅑ)				

Except for ɨy (의), the Korean y- diphthongs are all rising diphthong. This is because the first vowel has a lower position than the second vowel. Korean rising diphthongs also have a fairly complete arrangement when viewed from the position and height of the tongue. However, Korean does not have a front high diphthong *yi and central high *yɨ. This is because in Korean, the glide between y and i, y and ɨ is so short that it cannot be realized.

Table 3

Korean's w- diphthong system (Kang, 2011)

Position / Height	Front	Mid	Back
High	wi (ㅟ)	*wɨ	*wu
Mid	we (웨, 외)	wə (ㅝ)	*wo
Low	wɜ (ㅙ)	wa (ㅘ)	

The semi-vowel 'w' is pronounced higher that the vowel 'u'. When this semi-vowel moves to another vowel, it forms a diphthong as shown in Table 3. It is important to note that the vowels wi (ㅟ) and we (ㅞ) are also found in Korean monophthongs. The vowels wi (ㅟ) and we (ㅞ) are also included in diphthongs if they are not preceded by a consonant, for example in the words '외국' [weguk] and '위반' [wiban].

From tables 1, 2, and 3, it can be concluded that Korean has 10 monophthongs, 7 y-diphthongs, and 5 w- diphthongs. The division of monophthongs and diphthongs is based on the realization of Korean vowel sounds. However, in the book *Bahasa Korea Terpadu untuk Orang Indonesia* as explained by Ahn et al. in the book entitled Bahasa Korea Terpadu untuk Orang Indonesia in 2015 the vowel division is based on the number of strokes, where there are 10 basic vowels and 11 double vowels. This vowel division that is not based on sound can cause students to experience confusion because of the difference between the number of vowels in writings and in sounds.

Indonesian Vowel Inventories

Indonesian has a system of 6 monophthongs which, when combined with allophones, the total is 10 monophthongs. In general, the Indonesian monophthong system is an uncomplicated monophthong system that almost all languages have. Most experts agree on the number of Indonesia monophthongs. In this article, the researcher describes the monophthong system of Moeliono et al. (2017) and Chaer (2009)[4].

Table 4

Indonesian's monophthong and allophone system (Moeliono et al., 2017)

Vocal	Front		Mid		Back	
	Unrounded	Rounded	Unrounded	Rounded	Unrounded	Rounded
High	i I*)					u U*)
Mid	e ɛ*)		ə			o
Low			A			ɔ*)
Notes	*) allophone					

Indonesian has a system of 6 monophthongs with a fairly complete vowel composition based on the position and height of the tongue. Front vowels only consist of /i/ and /e/ which are unrounded vowels. Indonesian front vowels do not have rounded vowel pairs. The middle vowel consists of the vowels /ə/ and /a/ which are unrounded vowels. Similar to front vowels, Indonesian middle vowels do not have rounded vowel pairs. A different thing is found in the back vowel which only has rounded vowels, and does not have unrounded vowel pairs, namely /u/ and /o/.

One thing that is quite noticeable is that most Indonesian monophthongs have allophones. Besides the vowels /ə/ and /a/, every vowel has a monophthong pair with the same tongue position and height except for the vowel and allophone pair /o/ and /ɔ/. The existence of this

[4] Regarding this monophthong system, Chaer (2009) has the same opinion as Moeliono et al. (2017). Chaer (2009) stated that Indonesian has 6 monophthongs.

allophone pair can cause difficulties for Indonesian language learners because the same alphabet can sound different depending on its condition. Below is the example (Moeliono et al., 2017):

(a) [batu] (b) [batUk]

In example (a), vowel /u/ is in an open syllable condition while in example (b) vowel /U/ is in a closed syllable condition and does not get hard stress. It can be concluded that the syllable structure and suprasegmental conditions affect the pronunciation of allophones in the vowel /u/.

For diphthong, there are differences between Moeliono et al. (2017) and Chaer (2009). These differences are summarized in the following table.

Table 5
Indonesian's diphthong comparative

Moeliono et al.	Chaer	Example
/ay/	/ay/	'sungai' /suŋai/
/aw/	/aw/	'pulau' /pulaw/
/oy/	/oy/	'sekoi' /səkoy/
/ey/		'survei' /survey/

From the table 5 above, it can be seen that there are three similar diphthongs, namely /ay/, /aw/, and /oy/. The diphthong /ey/ appears along with the number of loanwords that enter the Indonesian language. This diphthong varies with the /ay/ diphthong (Moeliono et al., 2017). The variation of diphthong /ey/ can be seen in the examples of 'seprei' /səpr̲e̲y̲/ and 'seprai' /səpra̲y̲/. This diphthong variation is also reflected in the way it is written.

In general, Indonesian does not have a complex diphthong system. This can be seen from the number of diphthongs that there are only four. What is interesting is that there are only rising diphthongs in Indonesian, marked by the first vowel which has a lower position than the second vowel. It can also be concluded that Indonesian diphthongs only begin with the first vowel /a/ and /o/, and with the vowel /e/ as a continuation due to the entry of loanwords into Indonesian.

Comparison

Monophthong

The Korean monophthong system has a more complete structure than Indonesian. Korean has 10 monophthongs, while Indonesian only has 6 monophthongs although there are also allophones. Among these monophthongs, Indonesian and Korean both have vowels i, a, e, and u. Judging from the position of the tongue, the height of the tongue, and the roundness of the vowels, these four vowels have the same characteristics.

Firstly, Indonesian vowel ə and Korean vowel ɨ have the same pronunciation at a glance. This also often causes Korean language learners to make mistakes when pronouncing the vowel ɨ (ㅡ). In terms of characteristics, vowel ə and vowel ɨ have different characteristics. Vowel ə is a mid center vowel, while the vowel ɨ is a high back vowel. This also shows that Korean does not have schwa or center vowels.

Secondly, students also usually have difficulty pronouncing the vowels ə (ㅓ) and o (ㅗ). This is because Indonesian only has the vowel o. Vowel o in both Indonesian and Korean have mid back vowel characteristics, but Indonesian vowel o is produced with less rounded lips. Meanwhile, the vowel pair ə (ㅓ) and o (ㅗ) are unrounded and rounded vowel pair.

The Korean vowel ə (ㅓ) has no comparison in Indonesian, so Indonesian students usually have difficulty pronouncing this. However, according to Dessiar (2019), the pronunciation of vowels ə (ㅓ) and o (ㅗ) can be seen more detail by Indonesian students from Javanese and Sundanese. Students whose first language is Javanese are considered to be able to pronounce these two vowels, while students whose first language is Sundanese cannot pronounce both correctly.[5]

Thirdly, the Korean vowels e (ㅔ) and ɜ (ㅐ) compared to the Indonesian vowel e have different locations and positions. Indonesian does not have the vowel ɜ, so when learning the vowel ɜ (ㅐ), students sometimes have difficulty. However, even though the vowels e (ㅔ) and ɜ (ㅐ) have differences in the height of the tongue, they are actually pronounced almost the same. Students should be able to distinguish them in writing.

Diphthong

Roach in Dosia & Rido (2017) states that diphthong is characterized by the transition or glide from one vowel to another because they are formed by combining two pure vowels. Korean diphthongs have a more complex number and systematics than Indonesian diphthongs. There are only four Indonesian diphthongs, namely /ay/, /aw/, /oy/, dan /ey/, while Korean diphthongs are divided into y- diphthongs and w- diphthongs [6]. The division of the y- and w- diphthongs is also influenced by Hangeul, where the total number of Hangeul vowels is also made for diphthongs.

Except for ɨy (의), Korean diphthongs are all rising diphthongs. However, diphthong ɨy (의) can also be seen as rising diphthong[7] because of the distance between the vowels ɨ (ㅡ) and i (ㅣ) is so short that the glide is not very noticeable. This is similar to Indonesian which only has rising diphthongs. Hence, even though Korean language learners will have difficulty adjusting Hangeul sounds and letters, these sounds also exist in Indonesian so they don't have too much difficulty in pronunciation.

Consonant

Consonant Inventories

Korean Consonant Inventories

Korean has 19 consonants and two semi-vowels. The 19 consonants are mapped based on their place and manner of articulation as illustrated in the table below:

[5] This opinion is based on the analysis of formant (F1 and F2), where the vowels ə (ㅓ) and o (ㅗ) pronounced by Javanese students show differences in between F1 and F2, while in Sundanese students there are no differences.

[6] A very different opinion was stated by Febrina et al. (2016), which says that Korean only has three diphthongs, namely ya (ㅑ), yo, (ㅛ), and yə (ㅕ). This opinion is not based on the Korean vowel system which has y- and w- diphthongs, and only provides limited examples of words. The y- and w- diphthong system has been agreed upon by Korean linguistic experts. (Bae, 1996; Kang, 2011; J. Shin & Cha, 2013)

[7] The opinion that vowel ɨy (의) is a rising diphthong was expressed by Heo (1985), H. Lee (1996), J. Shin (2000) and I. Lee (2001)who saw that this vowel is a combination of the average velar semivowel ɯ and high front vowel i.

Table 6

Korean's consonant system (Kang, 2011)

Manner of articulation			Bilabial	Alveolar	Apico-alveolar	Palatal	Velar	Laryngeal
Obstruent	Plosive	Lax	p (ㅂ)	t (ㄷ)			k (ㄱ)	
		Fortis	p' (ㅃ)	t' (ㄸ)			k' (ㄲ)	
		Aspirated	p^h (ㅍ)	t^h (ㅌ)			k^h (ㅋ)	
	Fricative	Lax		s (ㅅ)				
		Fortis		s' (ㅆ)				
		Aspirated						h (ㅎ)
	Affricative	Lax			č (ㅈ)			
		Fortis			č' (ㅉ)			
		Aspirated			$č^h$ (ㅊ)			
Sonorant	Nasal		m (ㅁ)	n (ㄴ)			ŋ (ㅇ)	
	Lateral			l (ㄹ)				
	Semi-vocal					y(=j), ɥ	w, ɯ	

Based on the point of articulation, Korean consonants consist of bilabial, alveolar, apico-alveolar, velar, and laryngeal, as well as palatal semi-vowels. It can be seen that Korean consonants have a fairly complete number of consonants. However, glottal consonants in Korean only consist of one sound, namely the 'h (ㅎ)' sound, and Korean does not have palatal consonants. The palatal sound is only indicated by the semi-vowel sound 'y(=j), ɥ'.

Meanwhile, based on the manner of articulation in general, major consonants in Korean consist of obstruent and sonorant. Each type of obstruent consonants is further divided into three types, namely lax, fortis, and aspirated. From the table 6 above, it can be seen that plosive obstruent sounds, fricative sounds, and affricative sounds are divided into three based on their sound features. The fortis consonants have the feature of [±constricted glottis]/[CG] which is seen in the consonants p' (ㅃ), t' (ㄸ), k' (ㄲ), s' (ㅆ), č' (ㅉ), while aspirated consonants have the feature of [±spread glottis]/[SG] which is seen in consonants p^h (ㅍ), t^h (ㅌ), k^h (ㅋ), $č^h$ (ㅊ). Besides the fricative consonants, plosive obstruent consonants, and affricative consonants, Korean also has those other three complete types of consonants.

The interesting thing is that Korean does not have voiced and unvoiced sound pairs. The plosive obstruent, fricative, and affricative consonants only consist of unvoiced sounds, although in allophones these voiced sounds can occur, for example:

(a) /aka/ '아가' → [aga]

In example (a), it can be seen that in the structure of the word '아가', 'ㄱ' represented as /k/, but in the surface structure it is pronounced as [g]. This shows that there is a sound alternation in Korean obstruent consonants.

Instead of the absence of voiced and unvoiced consonant pair in Korean, there are fortic and aspirated consonants as described above. This is a uniqueness of Korean, but it can be a difficulty for Korean language learners.

Indonesian Consonant Inventories

Indonesian has 22 consonants that can be mapped based on the point of articulation and the manner of articulation, as shown in the table below:

Table 7

Indonesian's consonant system (Moeliono et al., 2017)

Manner of articulation	Point of articulation	Bilabial	Labio-dental	Dental/Alveolar	Palatal	Velar	Glottal
Plosive	Voiced	b		d	j	g	
	Unvoiced	p		t	c	k	
Fricative	Voiced				z		
	Unvoiced		f	s	ʃ	x	H
Nasal	Voiced	m		n	ñ	ŋ	
Trill	Voiced			r			
Lateral	Voiced			l			
Semi-vocal	Voiced	w			Y		

Based on the point of articulation, Indonesian has bilabial, labio-dental, dental, palatal, velar, and glottal consonants. Judging from this arrangement, Indonesian has relatively complete consonants. Dental/alveolar consonants and palatal consonants are the most numerous consonants in Indonesian, with 6 consonants.

Meanwhile, based on the manner of articulation, Indonesian plosive obstruent and fricative are divided into voiced and unvoiced consonants. However, in the consonant system according to Moeliono et al. (2017), the consonants 'j' and 'c' are included in the plosive obstruent consonants, while Chaer (2009) stated that those two consonants are affricative consonants, with 'j' as a voiced sound and 'c' as an unvoiced sound. In this case, Chaer (2009)'s opinion is more appropriate because the consonants 'j' and 'c' are pronounced with the top of the tongue attached to the gum, and palatal, and then released quickly. The rapid release process indicates that the consonants 'j' and 'c' are affricative consonants.

In terms of fricative consonants, Indonesian only has one voiced fricative consonant, namely 'z' and five unvoiced fricative consonants, namely 'f, s, ʃ, x, H'. These unvoiced fricative consonants vary in points of articulation from dental to glottal, even though some of these consonants are sometimes misarticulated.

(a) syak /ʃak/ sak /sak/
(b) syarat /ʃarat/ sarat /sarat/

Word examples in (a) and (b) are minimal pairs that have different meanings. However, due to pronunciation difficulties, Indonesian speakers often pronounce 'ʃ' as 's' which of course should be avoided. The 'ʃ' sound can only appear at the beginning of a word.

One of the most prominent consonant systems in Indonesian is the pair of voiced and unvoiced sounds. These consonants are 'b' and 'p', 'd' and 't', 'j' and 'c, 'g' and 'k', and 'z' and 's'. This can be seen from the following examples:

(c) pola /pola/ bola /bola/
(d) dari /dari/ tari /tari/

(e) agar /agar/ akar /akar/
(f) jari /jari/ cari /cari/
(g) zeni /zəni/ seni /səni/

The minimal pair of voiced and unvoiced indicates that the sound is not just an allophone, but is a phoneme.

Comparison

Indonesian and Korean consonants can be compared according to the point of articulation and the manner of articulation. Although these two languages have some similar consonants, there are differences in the point of articulation and the categorization of the manner of articulation.

First, the consonants č (ㅈ), č' (ㅉ), and $č^h$ (ㅊ) are apico-alveolar consonants, while their comparison in Indonesian, which are consonants j and c are palatal consonants. The difference in the point of articulation of the two is indeed very subtle, but to get the proper pronunciation, it must be pronounced according to the original language. Even though Indonesian students pronounce č (ㅈ), č' (ㅉ), and $č^h$ (ㅊ) as palatal consonants, it does not really affect the meaning.

Second, Indonesian has a labio-dental consonant 'f', while Korean has no dental consonant at all. The consonant 'f' is usually paired with the consonant p^h (ㅍ), as in the world 'sofa' /^{so}ʊ^{f}ə/ which becomes 소파 /sop^ha/. Even in Indonesian, the consonant 'f' is often influenced by the mother tongue, so it if often replaced by the sound /p/, such as the word /fakultas/ which is pronounced as /pakultas/.

Third, both Korean and Indonesian have a glottal fricative consonant /h/ but have different constraint. The consonant /h/ in Indonesian can appear at the beginning, middle (between vowels), and the end of the words. Meanwhile in Korean, the consonant /h/ has limitation appearance which is at the end of the word[8]. At the end of a word, the consonant /h/ is pronounced depending on the consonant that follows it, as in the example of the word /nəhnɨnta/ → [nənnɨnta] where /h/ is pronounced as /n/ because of the effect of the consonant /n/ in front of it. Indonesian consonant /h/ is also sometimes not pronounced when they are placed at the end of a word, as in the example of the word /boleh/ → [bole].

Fouth, Korean does not have voiced and unvoiced sound pairs like those in the Indonesian consonant system. Indonesian has voiced-unvoiced consonant pairs such as 'b' and 'p', 'd' and 't', 'j' and 'c, 'g' and 'k', and 'z' and 's', while the consonants p (ㅂ), t (ㄷ), k (ㄱ), č (ㅈ), and s (ㅅ) are unvoiced sound[9]. Although these consonants do not appear as phonemes, they can appear in allophones as voiced sounds. The phonemic system and phonetic variation of the Korean

[8] /h/ has limited final consonant sound or 받침소리규칙 where there are only sevem sounds allowed in final consonants in Korean, namely ㅂ [p], ㄷ [t], ㄱ [k], ㅁ [m], ㄴ [n], ㄹ [l], ㅇ [ŋ]. BThe sound /h/ cannot appear at the end of the word and is pronounced as /n/, /s'/, and turns into an aspirated sound when met with consonants p (ㅂ), t (ㄷ), k (ㄱ), and č (ㅈ).

[9] Febrina et al. (2016)stated that the sounds 'b, d, g, j' are voiced phonemes that have a distribution at the beginning ang in the middle of words, while unvoiced phonemes p (ㅂ), t (ㄷ), k (ㄱ), and č (ㅈ) have a distribution at the beginning, middle, and end of words. This is in contrast to Cho & Park (2006) which says that voiced consonants do not appear phonemically, even with the voicing process these consonants will turn into voiced consonants. Heo (1985) and most Korean linguistic experts state that phonemically there are only unvoiced consonants in Korean. On the other hand, it is also criticized by Ko (2015) expressing that a phonemic system that only displays unvoiced consonants will cause confusion for Korean language learners.

consonants p (ㅂ), t (ㄷ), k (ㄱ), č (ㅈ) have different perception of pronunciation at the beginning of words which is quite confusing for Korean language learners[10]. For example, the word 부산 [pusan] is sometimes pronounced as [p'usan] or [p^husan]. Even if it appears in the middle of a word, it will experience a voicing process and sounds [b], [d], [j], [g]. On the other hand, this characteristic will also cause a difficulty for Indonesian language learners from Korea to distinguish between voiced and unvoiced consonants. For example, the words /bubuk/ and /pupuk/ will sound the same to Koreans.

Fifth, Korean has fewer fricative consonants than Indonesian. Korean only has 3 consonants, namely s (ㅅ), s' (ㅆ), and h (ㅎ), while Indonesian has 6 consonants, namely f, s, ʃ, x, H, and z. This difference in the number of fricative consonants makes Korean language learners from Indonesia not encounter significant difficulties when pronouncing fricative consonants. However, most foreign students find it difficult to distinguish the consonants s (ㅅ) and s' (ㅆ)[11], as in the word 사다 [sata] and 싸다 [s'ata]. Hence, the contextual relationship of the sentence is needed to distinguish the two consonants.

Sixth, Korean has a classification of fortis and aspirated consonants and Indonesian does not. One of the consonants that is similar is only the consonant /x/ with the consonant ㅋ /k^h/. The classification of lax consonant– fortis – aspirated in Korean is quite complete, which are /p, p', p^h/, /t, t', t^h/, /s, s'/, /k, k', k^h/, /č, č', $č^h$/. Therefore, Korean language learners from Indonesia usually find difficulty in pronouncing fortis and aspirated consonants. Moreover, lax consonants have an allophone which pronounced similar to fortis consonants when they are unvoiced.[12]

Seventh, Korean only has one liquid consonant, namely lateral consonant /l/, while Indonesian has two liquid consonants, namely lateral consonant /l/ and trill consonant /ɾ/. Korean lateral consonant /l/ is weakened and has the allophone // when placed between vowels or at the beginning of a foreign loanword sentence.

(a) /ma<u>l</u>u/ '마루' → /ma<u>ɾ</u>u/ (b) [<u>ɾ</u>adio] '라디오'

In example (a), consonant /l/ placed between vowels is weakened and becomes /ɾ/. Meanwhile, in example (b) ㄹ at the beginning is pronounced /ɾ/ in the English loanword. The

[10] To solve this problem, Ko (2015) presents a table of consonant systems that also contain voiced sounds. In the table, p (ㅂ), t (ㄷ), k (ㄱ), and č (ㅈ) are written as voiced consonants. However, this is quite risky considering that there are fewer voiced consonants than unvoiced consonants (only in the middle of a word) and will make the structure of the Korean language sound change become unequal. See also Kang (2011).

[11] The consonants s (ㅅ) and s' (ㅆ) are actually the same phoneme in the Gyeongbu dialect. The minimal pair of 싸다 [s'ata] which means 'wrapping' and 사다 [sata] which means 'buying' cannot be distinguished in terms of sound in Gyeongbu dialect, but has a high and low intonation difference. Next see Lee (2000).

[12] Based on experiment conducted by Chun & Park (2004), the unvoiced sound of Malaysian has no equivalent in Korean, but tends to be closer to the fortis sound of Korean.

consonant ㄹ also experiences a constraint at the beginning of the word in Korean, so that no Korean words begin with that consonant.[13]

Indonesian learners from Korean will find difficulty in distinguishing the sounds /l/ and /r/. Especially when the consonant /r/ appears at the beginning of a word, students from Korea tend to pronoune it as /l/. This also applies to English language learners from Korea who tend to concentrate their pronunciation on the /l/ sound. Therefore, the pronunciation of 'low' will be easier than 'row'.

3.2 Comparison in Phonotactics

The syllable structure is an important element in a language that determines the limitations or influences on the phonological process. Korean and Indonesian have different syllable structures. This section discusses the syllable structure of each language and the limitations of the syllable structure.

Korean Syllable Structure

Korean has a maximum syllable structure of CGVC[14]. Korean is a language that has a very rigid concept of syllables. The Korean syllable structure system was actually demonstrated during the formation of the Hunminjeongeum[15] in the 15th century. The Hunminjeongeum letters are recognized as syllables. In the book of Haerye, Jejaehae section, it is mentioned that the Korean alphabet is formed based on the principles of initial letters, middle letters, and final letters. It is stated that the first letter and the last letter are the same letter, namely a consonant, and the middle letter is a vowel. According to that, Korean is recognized as a language with a three-part syllable structure[16]. This syllable structure is the same as the syllable structure proposed by Clement & Keyser (1983).

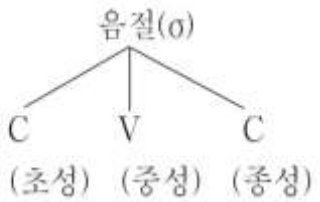

Figure 1. Syllable Structure according to Clement & Keyser (1983) in J. Lee (2007)

The Korean syllable structure has a nucleus in the middle, which is the vowel. The onset and coda consonants on the left and right of the vowel are optional elements, so Korean has the most simple syllable structure which is V, as in the word 아 [a].

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[13] This constraint is called 두음법칙 (Initial Law). Initial Law is a rule regulating sounds that cannot appear at the beginning of a word, which are ㅇ / ŋ/, consonant clusters, ㄹ /l/, and ㄴ /n/ (when placed in front of a vowel ㅣ /i/ or glide). (N. Kim, 2011)

[14] C (Consonant), G (Glide), V (Vocal).

[15] The old name of Hangeul (Korean alphabet) meaning "The Correct/Proper Sounds for the Instruction of the People".

[16] See J. Lee (2007).

The following table summarizes the types of Korean syllable structure.[17]

Table 8
Korean Syllable Structures (J. Shin & Cha, 2013)

Syllable Type	Template	Example
Open syllable	V	아 [a], 오[o]
	CV	나 [na]
	CGV	벼 [byə], 뒤 [twi]
	CVG	늬 [nɨy]
Closed syllable	VC	옷 [ot]
	CVC	박 [pak]
	GVC	약 [yak]
	CGVC	별 [byəl]

Based on the table, it can be seen that Korean has a minimum structure of V and a maximum structure of CGVC. Vowels are an inseparable part of the Korean syllable structure and have the [+syllable] feature. As for glide, it has the [-syllable -consonant] feature so that it is an optional component of the core of the syllable, and is only permitted in structures that precede vowels (J. Shin & Cha, 2013).

The Table 8 above also shows the limitations on the Korean syllable structure system[18]. First, there is no consonant cluster. Either at the beginning or at the end of words, consonant clusters cannot be pronounced in Korean. However, in writing, this consonant cluster can appear at the end of the word but is pronounced as a single consonant only.

(a) 밟다 [papta] 'menginjak' (b) 밟아 [palba] 'menginjak'

The word '밟-' [pap] in writing has a final consonant 랍 [lp]. However, in the word (a) the final consonant undergoes consonant cluster simplification so that ㄹ [l] is not read, and in the word (b) ㅂ [p] the final consonant 랍 [lp] is syllabified with the vowel after it, so the syllable structure is CVC-CV. Consonant clusters in Korean are only read as one consonant or undergo syllabification according to the sound conditions around them.

Consonant clusters that cannot appear at the end of words cause the need for vowel epenthesis when Korean absorbs foreign language words. In this case, the main vowel epentheses are /ɨ/ (ㅡ), and the vowels [u] and [i] which are also used under certain conditions. For example, in the word 'christmas' in English is absorbed as [khɨ+rɨ+sɨ+ma+sɨ]. 'christ' which is a single syllable in English is broken down into three syllables in Korean by including the vowel /ɨ/.

[17] Kang (2011) expressed that a different number of Korean syllable structures, namely 10 structures. In addition to the 8 structures described by J. Shin & Cha (2013), she added two structures, namely CVV and CVVC where these structures can be found in vocabulary with prolonged sound. However, this prolonged sound is slowly obsolete and is usually heard clearly in regional dialects, so the author is more agree with the 8 syllable structure system.

[18] About Korean's syllable constraint, M. Oh (1992) stated that there are three constraints, (1) consonant cluster cannot appear on onset, (2) Only plosive and sonorant which allowed to appear on coda, and (3) fricative cannot appear on coda. These three constraints are on the same state with the opinion on this paper.

Furthermore, Korean has limited sounds that cannot appear in coda. There are 16 consonants that can be written on the coda, but there are only 7 sounds that are allowed to be voiced at the end of the word, namely ㅂ [p], ㄷ [t], ㄱ [k], ㅁ [m], ㄴ [n], ㄹ [l], ㅇ [ŋ]. This causes the sounds [s], [s'], [č], [č'], and [h] do not appear in the coda.

Lastly in the research by Andhika entitled "*A Cross-language Study on the Korean Phonological Phenomena by Indonesian Speakers*" in 2017, when diphthong ㅢ [ɨy] appears as a nucleus, it cannot be followed with the final consonant.[19]

Indonesian Syllable Structure

Indonesian has 11 syllable structures (Chaer, 2009). The simplest syllable structure is V, and the most complicated syllable structures are CCVCC and CCCVC. The structures are summarized in the table below:

Table 9

Indonesian Syllable Structures (Chaer, 2009)

No.	Syllable Type	Example
1	V	[i] in [i+ni]
2	CV	[la] in [la+ut]
3	VC	[am] in [am+bil]
4	CVC	[but] in [se+but]
5	CCV	[kla] in [kla+sik]
6	CCVC	[trak] in [trak+tor]
7	CVCC	[teks] in [kon+teks]
8	CCCV	[stra] in [stra+te+gi]
9	CCVCC	[pleks] in [kom+pleks]
10	CCCVC	[struk] in [struktur]
11	VCC	[eks] in [eks+por]

The syllable structure listed in table 9 is the current syllable structure used in Indonesian. However, among them, the structures of numbers 1-4 are the original syllable structures of the Indonesian language, the rest are syllable structures derived from foreign languages. Although in writing, the structure of numbers 5-11 can be in accordance with the syllable structure, and in daily pronunciation, the epenthesis /ə/ is often added.

(a) [prak+tek] → [pə+rak+tek]

(b) [ad+mi+nis+tra+si] → [ad+mi+nis+tə+ra+si]

In examples (a) and (b), epenthesis /ə/ is included to adjust the pronunciation to the Indonesian syllable structure, although Indonesian speakers can still pronounce it without epenthesis. This epenthesis is found in words taken from foreign languages, especially English. However, the opposite phenomenon appears in the original Indonesian vocabulary with the CV syllable where V is filled by the vowel /ə/. The vowel /ə/ is actually obliterated.

(c) [kə+la+pa] → [kla+pa]

When the word [kəlapa] is pronounced quickly, the vowel /ə/ is obliterated. In that example, there is resyllabification where [kə+la] which previously had two syllables and two nucleus

becomes one syllable [kla] with one nucleus. It means that although the syllable structure of numbers 5-11 is a structure from loanwords, example (c) proves that consonant clusters can appear in the syllable structures of Indonesian.

Table 9 also shows that Indonesian has 4 open syllable structures and 7 closed syllable structures. This means that consonants as coda are permitted and dominant in the Indonesian syllable structure.

Comparison

Korean and Indonesian have open and closed syllable structures with vowels as the nucleus. However, there are some points regarding the differences in the syllable structure of the two languages.

Firstly, whether or not consonant clusters are allowed. Korean does not allow consonant clusters in its syllables, while Indonesian allows consonant clusters, especially in foreign language absorption vocabulary. Korean consonant clusters cannot appear at onset or coda, so they must undergo consonant cluster simplification or resyllabification.

Secondly, there are differences of vowel epenthesis /ə/ in loanwords. Indonesian and Korean both have vowel epenthesis in foreign language loanwords. In foreign loanwords, Korean includes vowel epenthesis /ɨ/ (—) as the main vowel, and vowels [u] or [i] as epenthesis under certain conditions. Epenthesis is mandatory in Korean to match the Korean syllable structure. Meanwhile, Indonesian has a vowel epenthesis /ə/ in foreign loanwords. However, this epenthesis is not mandatory and is only used to make the pronunciation easier. This shows that the Korean syllable structure is rigid si that when absorbing a foreign word, the word must be adapted to the Korean syllable structure. On the other hand, Indonesian syllable structure is more flexible.

Thirdly, there is a coda constraint on some Korean consonants. It is found in consonants [s], [s'], [č], [č'], and [h]. In contrast, Indonesian does not have a coda constraint. The coda constraint in Korean should be considered when teaching Korean to Indonesian students.

3.3 Implication in Pronunciation Learning

Based on the discussion in subsections 3.a and 3.b, there are several implications for learning pronunciation, especially Korean pronunciation for students from Indonesia.

First, the differences in phonemic systems in the two languages can be considered to be taught at the beginning of Korean learning. Korean learning usually starts with Hangul. However, learning Hangeul without initially learning a contrast between Korean and Indonesian will make students questioning some limitations in Korean. This different phonemic system will also help students to identify their pronunciation errors.

Second, when the differences in phonemic systems have been conveyed, an explanation regarding the Korean phonological process can be easily conveyed. Korean phonological process is very different from Indonesian, so to understand this, students must know the phonemic system and syllable structure of Korean. This phonological process should be presented in large categories first, for example nasalization, palatalization, and so on. Using this method, the learner can avoid memorizing the pronunciation rules one by one.

Third, since Korean phonological process cannot be taught at once, pronunciation learning must be integrated with learning the four language skills (listening, speaking, reading, and writing)

and grammar. Therefore, a comprehensive syllabus is needed so that pronunciation, especially the phonological process, can be taught one by one and does not burden students.

Fourth, instructor must use various learning methods. At the beginning, the combination of listening and speaking skills can be used for learning methods. The classic 'hear and repeat the instructor's words' method can be used as the basis of this pronunciation learning. Furthermore, linguistic approach can be used for pronunciation learning beside language skill approach. Based on contrastive analysis of both language's phonemic system above, instructor can use linguistic approach to explain bigger concept of phonological process than explain it one by one.

Fifth, consider similarity and difference of both phonemic system, instructor can analyse pronunciation error of Indonesian KFL learners in order to create suitable pronunciation assessments. Pronunciation assessments must be carried out frequently by instructors, especially at the beginning of learning Korean when students are still fully absorbing the learning content. When this process is incomplete at the beginning, even though the student has entered the intermediate or advanced level, there will still be pronunciation errors.

4. CONCLUSION

This paper has discussed the contrastive analysis of the Korean and Indonesian phonological systems. Generally, the consonant and vowel systems of Korean and Indonesian have similarities in terms of the points of articulation. However, there are also significant differences between the sound systems of the two languages.

Korean has more monophthongs and diphthongs than Indonesian. Among that, what needs to be concerned is the comparison of Indonesian vowels ə and Korean vowel ɨ, Korean vowels ə (ㅓ) and o (ㅗ) and Indonesian vowel o, as well as Korean vowels e (ㅖ) and ɜ (ㅐ) and Indonesian vowel e. In addition, Korean does not have schwa, while Indonesian has it. In terms of diphthongs, Korea and Indonesian are both dominated by rising diphthongs.

In terms of consonants, Indonesian and Korean have quite different classifications. Indonesian has voiced and unvoiced sound pairs, while Korean only has unvoiced consonants. Korean consonants classification is divided into lax, fortis, and aspirated consonants which are not found in Indonesian. Indonesian has more fricative consonants than Korean.

In terms of syllables, Korean has a more rigid syllable structure than Indonesian and has some limitations. This can be seen from whether or not epenthesis vowel is required in foreign language absorption words in both languages.

The contrastive analysis of the phonological systems of the two languages has implications for teaching pronunciation, where the contrastive explanation of the two languages can be considered to be taught to students. However, this requires further research, especially related to the analysis of pronunciation errors and the effectiveness of teaching methods which cannot be written in this article. This article also only discusses the contrastive phonemic system and syllable structure, not yet discussing the suprasegmental elements and phonological processes which can be conducted in the future research.

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