A Study on the Korean and Chinese Pronunciation of Chinese Characters and Learning Korean as a Second Language

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Abstract

Sino-Korean words have their etymological roots in Chinese characters. Previous studies showed that the correspondent relation between Chinese and the Korean pronunciation of Chinese characters facilitates the reading of Sino-Korean words by Chinese learners of Korean as a second language (L2). This study quantifies such correspondence at the syllable level by calculating the degree of correspondence in Korean-Chinese syllables. The degree of correspondence between Korean and Chinese syllables was examined. Results show that among the 406 Chinese character families in Sino-Korean words, 22.7% have an average correspondent consistency lower than 0.5 and 33.3% are equal to or higher than 0.5 but lower than 1. Suggestions for teaching and learning Korean as an L2 are proposed.

1 Introduction

Due to cultural interactions in history (Ebrey, 1996), Korean shares a large number of Sino-Korean words with Chinese, which are etymologically rooted in Chinese characters but have their Korean pronunciation (Wang et al., 2016). Traditionally written in logographic Chinese characters, Sino-Korean words are now written in *Hangul*, the Korean alphabet, which maps a basic grapheme to a single phoneme and combines phonemes into a syllable in a "square-like shape" (Pae, 2018; Wang et al., 2003; Pae et al., 2018). Nevertheless, 70% of the contemporary Korean vocabulary belongs to Sino-Korean words (Cho & Chiu, 2015). They serve as special sources for Chinese native (L1) speakers to learn to read Sino-Korean words in Korean as a second language (L2) or a foreign language (FL) (Im & Lee, 2008; Guo, 2018).

The significant role that vocabulary plays in L2 reading is well documented in literature (e.g., Ouellette, 2006). Given the large number of Sino-Korean words in the lexical repertoire, it is worthwhile to examine the degree of correspondence between the Chinese and Korean pronunciation of Chinese characters. This will consequently facilitate teaching, learning, and reading of Sino-Korean words for the large population of L2 Korean learners in China, considering that there has been a growing population of Chinese learners of Korean in recent years (Gao, 2010).

2 Literature Review

Comparisons between the Chinese and the Korean pronunciation of Chinese characters have been conducted at the phonemic level. Li (2003) revealed the correspondent relation between the pronunciation of Chinese characters' initial consonants in Chinese and Korean. For example, he found that the Chinese characters with the initial consonants *b*, *p*, and *f* are pronounced as the initial consonants ㅂ(*b*) and ㅍ(*p*) in Korean. He believed that such correspondence would "facilitate the study of Chinese phonetic history and relations between Korean and Chinese language and literature" (Li, 2003, p. 94). However, very few studies have explored the correspondence between the Korean and Chinese vowels or that between the

Korean rhymes and Chinese finals with regards to pronunciations of Chinese characters (Li, 2005; Yang, 2015).

Im and Lee (2008) is one of the several studies (Moon, 2005; Guo, 2008) that attempted to quantify the correspondent relation between the Chinese and the Korean pronunciation of Chinese characters. Based on the selected 824 Chinese characters for Korean education as an L2 or FL, Im and Lee (2008) scored three types of correspondent relations: 1) Korean initial constants vs. Chinese initial consonants, 2) Korean vowels in open syllables vs. Chinese vowels, and 3) Korean rhymes in closed syllables vs. Chinese finals. They found that certain Korean phonemes have a high correspondent rate with their Chinese counterparts. For example, the Korean initial consonant ㄱ(*g*) has a 76.9% correspondent rate with its Chinese counterparts *j* and *g*; the Korean vowel ㅑ(*ya*) has a 100% correspondent relation with the Chinese vowel *ie* and *e*. The authors argued that such correspondent relation could facilitate the meaning inference of unlearned Sino-Korean vocabulary for Chinese learners of Korean as an L2 (Im & Lee, 2008).

To our knowledge, Guo (2018) is the only study that conducted comparisons between the modern Chinese and Korean syllable types of the pronunciations of Chinese characters used in both languages at the syllable level. Based on the 3,500 frequently used Chinese characters in Mainland China and the 3,500 frequent Chinese characters (*Hanja*) used in South Korea, Guo identified four types of syllables that are used to represent Chinese characters' pronunciations in both languages: V, CV, VC, and CVC[1]. The author discovered that the Chinese syllables of V type (e.g., *ai*) has a correspondent rate of 62% to the Korean syllables of V type (i.e., 아(*ae*)). The Chinese syllable of CV (e.g., *gu*) type has a 64.6% correspondent rate to the CV type (e.g., 고(*go*)) syllables and a 30% correspondent rate to the CVC type (e.g., 곡(*gok*)) of syllables in Korean. The author also concluded a correspondent rate of 81.8% between the VC type of syllables between the two languages and a 92.5% correspondent rate between the CVC type of syllables between the Chinese and Korean pronunciations of Chinese characters.

Both Li's (2003) and Im and Lee (2008)'s comparative analyses were conducted at the phoneme level, rather than at the syllable level. And even though Guo (2018)'s study addressed comparisons at the syllable level, it only specified the correspondent rate between syllables' structural types in the two languages instead of specific syllables. All these may not help Chinese learners of Korean learn to read Sino-Korean words as an L2 because "native speakers (or readers) of a nonalphabetic language (e.g., Chinese) tend to pay little attention to the intraword components and use whole-word processing in recognizing a word" (Akamatsu, 2003, p. 210). In addition, because "particular characteristics of L1 word recognition processes may remain in the course of developing L2 reading skills or strategies" (Akamatsu, 2003, p. 224), it is highly possible that Chinese learners of Korean as an L2 will apply their word processing strategies in Chinese when reading Korean. Thus, a better understanding of the correspondent relation between Chinese and Korean pronunciation of Chinese characters at the syllable level would be necessary.

3 Research Significance and Questions

It is of great significance to quantify the correspondence between the Chinese and the Korean pronunciations of Chinese characters at the syllable level because: first, it documents the contemporary pronunciations of Chinese characters in the two languages to understand their syllabic phonological correlations, which have not been previously examined; second, it serves as an important guideline for curriculum design and learning strategies for teaching and learning Korean as an L2, especially for L1 Chinese learners; third, such quantified relations can be used for the psycholinguistic research concerning word reading and processing in L2 Korean. Thus, the present study aims to answer the following research questions:

1. What are the mapping distribution and correspondence at the syllable level in the Korean syllables and the Chinese characters adopted in Korean?

2. What are the determining factors in such distribution and correspondence?

[1] In these syllable types, C means consonant and V means vowel.

4 The Present Study

4.1 Research Material

The research material consists of the 1,800 frequently used Chinese characters in South Korea, which are from the official *Basic Hanja for Educational Use* (교육용기초한자 (教育用基礎漢字)) published by the Ministry of Education and Human Resources Development of the Republic of Korea.

4.2 Research Method

The present study replicated Kim and Shin (2015)'s research method and concepts. First, based on the list of the 1,800 Chinese characters, we formed *Chinese character families* (CC families). A CC family consists of all the Chinese characters with the identical pronunciation in Korean language. Second, for each family, we listed all Chinese characters and clustered them into groups based on their Chinese pronunciations without considering tones. Third, in each CC family, we counted the following categories: the number of Chinese characters (CC), the number of Chinese syllables or Korean-Chinese syllable correspondent pairs (K-C pairs), and the number of Chinese characters with the same Chinese pronunciation.

In addition, this study calculated another two important indices. We borrowed the first from Kim and Shin (2015) and named it as the Korean-Chinese syllable pair correspondent rate (*K-C rate*), which is the result of division of the number of Chinese characters with the same Chinese pronunciation by the total number of Chinese characters in a CC family. This correspondent rate indicates the frequency or the possibility that a Korean syllable corresponds to each of its correspondent Chinese syllable. A higher correspondent rate means that a Korean syllable is more likely to correspond to a certain Chinese syllable.

Another index is the average consistency (*AveCon*) of CC families (Kim and Shin, 2015). It is calculated as the mean of the Korean-Chinese syllable pair correspondent rates of all the Chinese characters in a CC family. This index signals the extent to which a Korean syllable corresponds to all its correspondent Chinese syllables consistently. The higher this index is, the more consistent the correspondence between Korean and Chinese syllables is.

Korean Syllable	CC members	Chinese syllable[2]	K-C pair correspondent rate (*K-C rate*)
제 (*je*[3])	弟, 第, 帝, 堤	*di**	0.29 (= 4/14)
	祭, 際, 濟	*ji*	0.21 (=3/14)
	製, 制	*zhi*	0.14 (=2/14)
	題, 提	*ti*	0.14
	除	*chu*	0.07 (=1/14)
	諸	*zhu*	0.07
	齊	*qi*	0.07
Number of Chinese Characters (CC): 14			
Number of Chinese syllables: 7			
Average Consistency 0.18= (0.29×4 + 0.21×3 + 0.14×2 + 0.14×2 + 0.07 + 0.07 +0.07) ÷ 14			
*indicates *powerful* Chinese syllable			

Table 1. Information of the 제(*je*) Chinese character family

We take the 제(sound: *je*) family in Table 1 for illustration. This Korean syllable has 14 correspondent Chinese characters (i.e., CC=14), which means that all these 14 members are pronounced identically as *je* in Korean. In addition, this family has seven correspondent Chinese syllables (i.e., *di*, *ji*, *zhi*, *ti*, *chu*, *zhu*, *qi*), suggesting that the 14 Chinese characters are pronounced differently in Chinese. It also shows that this family has seven Korean-Chinese syllable correspondent pairs (hereafter *K-C pair*). For the Chinese syllable *di* or the 제(*je*)---*di* pair, the number of its Chinese characters is four, thus its correspondent rate is 0.29. The Chinese syllable *di* has the greatest number of family members, and

[2] In this study, Chinese syllables are written in *Hanyu Pinyin Romanization* used in People's Republic of China.
[3] In this study, Korean syllables are romanized next to *Hangul* according to the *Revised Romanization of Korean* used in Republic of Korea.

this study defines such syllable as the *powerful Chinese syllable* of the family.

5 Results

5.1 Descriptive Statistics

A total of 406 different Korean syllables corresponded to the pronunciations of the 1,822 Chinese characters [4] in Korean language. There were 406 Chinese character (CC) families in total. On average, each CC family had 4.5 Chinese characters. The 사(*sa*) family, the largest CC family, had 32 Chinese characters members, followed by the 수(*su*) family and the 기(*gi*) family, as shown in Table 2. Besides, 98 CC families had only one Chinese character member. Seventy-five families had two members, and 53 families had three members.

As shown in Figure 1, Pearson's correlation test showed that the number of Chinese characters in each CC family and the number of CC families were negatively correlated (r = -0.711, p < 0.001). In other words, the larger a family was, the fewer such CC families were there in Korean language.

CC family	Number of CC	Chinese syllable and Chinese characters members (K-C rate)
사(*sa*)	32	si*:寺四絲思已私斯司似祀(0.34) shi:師仕士使事史(0.19) she:舍射蛇捨社(0.16) xie:謝邪斜寫(0.13) ci:詞賜辭(0.09) cha:査(0.03) sha:沙(0.03) zha:詐(0.03)
수(*su*)	27	shou*: 手受收守授壽首獸(0.30) shu: 數樹輸殊(0.15) sui: 雖遂隋(0.11) shui:水睡(0.07) xiu:修秀(0.07) xu:需須(0.07) chou:愁(0.04) qiu:囚(0.04)
		sou:搜(0.04) shuai:帥(0.04) chui:垂(0.04) shei: 誰(0.04)
기(*gi*)	25	qi*:起氣其期欺棄祈奇騎豈器旗企(0.52) ji:幾既己基記技忌紀機飢畿寄(0.48)
*indicates *powerful* Chinese syllable		

Table 2. Chinese character families that have more than 25 members

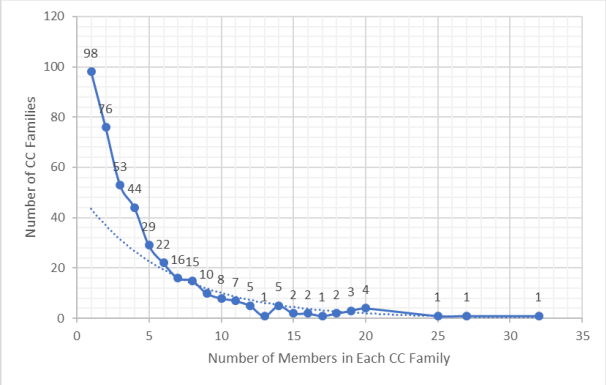

Figure 1. Correlations between the number of members in each CC family and the number of CC families

Our analysis also showed that each CC family had 2.06 correspondent Chinese syllables, or 2.06 K-C pairs on average. The 수(*su*) family had the greatest number of Chinese syllables, followed by the 조(*jo*) and the 사 (*sa*) family, as in Table 3. Also, 179 CC families had only one correspondent Chinese syllable. One hundred and twenty-seven families had two, while 48 of them had three in each family.

The Pearson's correlation test showed that the number of Chinese syllables in each CC family and the number of CC families were negatively correlated (r = -0.771, p = 0.009), as shown in Figure 2.

CC family	Number of Chinese syllables (K-C rate)
수(*su*)	12: shou*(0.3), shu (0.15), sui (0.11), shui (0.07), xiu (0.07), xu (0.07), chou (0.04), qiu (0.04), sou (0.04), shuai (0.04), chui (0.04), shei (0.04)

[4] In this study, we counted the heteronyms in Chinese (多音字) as independent items. For example, the Chinese characters 模 has two sounds (*mo* and *mu*) in modern Mandarin Chinese, and thus we counted them as two independent Chinese characters in the 모 (*mo*) Chinese character family. As a result, the total number of Chinese characters became 1,822 in this study.

조(*jo*)	9: zhao*(0.17), zao*(0.17), zu*(0.17), diao (0.11), tiao (0.11), chao (0.11), zhu (0.06), cao (0.06), niao (0.06)
사(*sa*)	8: si*(0.34), shi (0.19), she (0.16), xie (0.13), ci (0.09), sha (0.03), zha (0.03), cha (0.03)
	*indicates *powerful* Chinese syllable

Table 3. CC families with more than 8 Chinese syllables

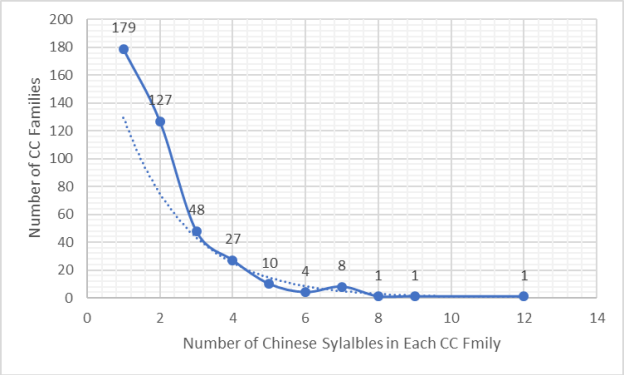

Figure 2. Correlation between the number of Chinese syllables and the number of CC families

5.2 Korean-Chinese syllable pair correspondent rate (*K-C rate*)

The 406 CC families had 846 Korean-Chinese syllable correspondent pairs (*K-C pairs*), among which 179 (21.2%) pairs had a correspondent rate of 1, suggesting a one-on-one correspondent relation between Korean and Chinese syllables. Among the 179 pairs, 98 of them contained only one Chinese character for each pair (e.g., 객(*gaek*)--客(*ke*)); 38 of them contained two Chinese characters for each pair (e.g., 곤(*gon*)--困坤(*kun*)); 16 of them had three Chinese characters for each pair (e.g., 민(*min*)--民憫敏(*min*)). The 위(*wi*)--*wei* pair had 14 Chinese characters (i.e., 位危為偉威緯胃圍委衛違慰謂偽). The results in Figure 3 indicated that for these 179 pairs whose correspondent rate equalled to 1, the number of Chinese characters in each pair and the number of such pairs were also significantly negatively correlated (r = -0.650, p = 0.042).

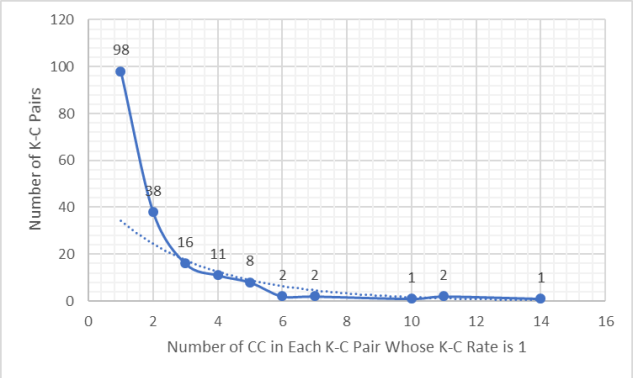

Figure 3. Information of K-C pairs whose correspondent rate (*K-C rate*) is 1

There were 667 K-C pairs (78.8%) with a correspondent rate less than 1, of which 212 (25.1%) had a correspondent rate higher than or equal to 0.5 and 455 (53.8%) had a correspondent rate lower than 0.5. When the correspondent rate reached 0.5 or above, the number of K-C pairs decreased sharply.

K-C rate	[0-0.1)	[0.1-0.2)	[0.2-0.3)	[0.3-0.4)	[0.4-0.5)
Number of K-C Pairs	64 (7.6 %)	119 (14.1 %)	135 (16.0 %)	102 (12.1 %)	35 (4.1 %)
Sub-total	455 (53.8%)				
K-C rate	[0.5-0.6)	[0.6-0.7)	[0.7-0.8)	[0.8-0.9)	[0.9-1)
Number of K-C pairs	120 (14.2 %)	53 (6.3 %)	27 (3.2 %)	12 (1.4 %)	0
Sub-total	212 (25.1%)				
K-C rate	1				
Number of K-C pairs	179 (21.2%)				
Sub-total	179 (21.2%)				

Table 4. Distribution of the 846 K-C pairs and their correspondent rate (*K-C rate*).

Parts of the K-C pairs with a correspondent rate higher than 0.8 or lower than 0.05 are presented in Table 5.

Korean-Chinese pairs	K-C rate	Number of Chinese Characters (CC) in K-C pair	Number of CC in CC family
위(*wi*)---wei*	1.00	14: 位危為偉威緯胃圍委衛違慰謂偽	14
시(shi) ---shi*	1.00	11: 時市詩示始試是施視侍矢	11
원(*won*) ---yuan*	1.00	11: 圓遠怨願原園元員援源院	11
관(*gwan*) ---guan*	0.89	8: 關觀官管館冠貫慣	9
리(*ri*) ---li*	0.89	8: 里理利梨吏李裏離	9
수(*su*)---chou	0.04	1: 愁	27
수(*su*)---chui	0.04	1: 垂	27
사(*sa*)---cha	0.03	1 查	32
*indicates *powerful* Chinese syllable			

Table 5[5]. Parts of the K-C pairs with the highest and lowest correspondent rate.

5.3 Average Consistency (*AveCon*) of Chinese character families

This study calculated the average consistency (*AveCon*) for all the 406 Chinese character (CC) families. The CC families with the highest and lowest average consistency were listed in Table 6.

CC family	Number of CC	Number of Chinese syllables	*AveCon*
위(*wi*)	14	1	1.00
시(*shi*)	11	1	1.00
리(*ri*)	9	2	0.80
관(*gwan*)	9	2	0.80
복(*bok*)	8	2	0.78
조(*jo*)	18	9	0.18
제(*je*)	14	7	0.18
전(*jeon*)	12	7	0.17
소(*so*)	15	7	0.16
수(*su*)	27	12	0.15

Table 6. The five CC families with the highest *AveCon* and the five with the lowest *AveCon*.

In Table 7, 179 CC families (i.e., 44.1% of the total) had an *AveCon* of 1, meaning that the Chinese characters members in each of these families had identical Mandarin Chinese pronunciations. Among the 179 families, 98 families only had one member while the rest 81 contained more than one member. There were 135 CC families (33.3%) with an *AveCon* above or equal to 0.5 but lower than 1.0. In addition, 92 Chinese character families, which accounted for 22.7% of the whole, had an *AveCon* lower than 0.5.

In addition, the Pearson's correlation tests demonstrated that a Chinese character family's average consistency is negatively correlated with the number of Chinese syllables or the number of K-C pairs in this family (r = -0.821, p < 0.001) and is positively correlated with the powerful Chinese syllable's K-C rate in this family (r = 0.980, p < 0.001).

AveCon	[0-0.1)	[0.1-0.2)	[0.2-0.3)	[0.3-0.4)	[0.4-0.5)
Number of CC families	0	8 (2.0 %)	29 (7.1 %)	45 (11.1 %)	10 (2.5 %)
Sub-total	92 (22.7%)				
AveCon	[0.5-0.6)	[0.6-0.7)	[0.7-0.8)	[0.8-0.9)	[0.9-1)
Number of CC families	101 (24.9 %)	28 (6.9 %)	4 (1.0 %)	2 (0.5 %)	0
Sub-total	135 (33.3%)				
AveCon	1				
Number of CC families	179 (44.1 %)				

[5] In the first column of this table, Korean syllables are listed on the left side of hyphens while their correspondent Chinese syllables are listed on the right side.

Sub-total	179 (44.1%)

Table 7. Distribution of the 406 CC families' average consistency.

6 Discussion

The present study discovers that the 1,822 Chinese characters used in Korean are represented by 406 Korean syllables. It has been suggested that Korean alphabets can form more than 1,600,000 syllables, among which only 2,350 are in frequent use (Pae, 2018). The 406 Korean syllables used for Chinese characters in Korean account for a small proportion (i.e., 17.3%) of all the frequently used Korean syllables. On one hand, this may facilitate the differentiation between Sino-Korean words and non-Sino-Korean words by Chinese learners of Korean as an L2. On the other hand, this results in a large number of homophones in Sino-Korean words which may cause confusions in reading.

The number of family members is an important factor to be considered when teaching and learning Korean as an L2 for Chinese L1 speakers because family with more members has a stronger ability to create Sino-Korean words with different meanings. For example, the 사(*sa*) family can create the following Sino-Korean words and this Korean syllable corresponds to different pronunciations and meanings in Chinese: 십사(十四), 망사(網紗), 상사(上司), 봉사(奉仕), 유사(類似), 제사(祭祀), 교사(教師), 여사(女士), 천사(天使), 경사(慶事), 경사(傾斜), 기숙사(寄宿舍), 발사(發射), 역사(歷史), 회사(會社), 묘사(描寫), 황사(黃砂), 검사(檢查). Learners may easily become confused when seeing these unlearned Sino-Korean words that end with the Korean syllable 사(*sa*) if they apply the reading strategy that corresponds Korean syllables to Chinese characters. It would facilitate their learning and word processing if they pay exclusive attention to the 사(*sa*) family, its Chinese character members and correspondent Chinese syllables.

The Korean-Chinese syllable correspondent rate (*K-C rate*) also plays an important role in teaching, learning, and reading Sino-Korean words in Korean as an L2. As demonstrated in Section 5, K-C pairs have different levels of correspondent rate across different pairs. One hundred and seventy-nine Korean-Chinese syllable pairs (K-C pairs) have a correspondent rate of 1, among which 98 pairs only contain one Chinese character. These 98 K-C pairs are the exact 98 Chinese character families that have only one member in each family. For the remaining 81 K-C pairs whose correspondent rate is 1 but contain more than one Chinese character, learners of Korean as an L2 may need to pay special attention when learning them. Nevertheless, a K-C correspondent rate that equals to 1 can always facilitate learner's reading and learning because when seeing the Korean syllable in such K-C pairs, learners only have one Chinese syllable candidate to correspond to.

The rest 667 K-C pairs may bring complicated situations for Chinese learners of Korean as an L2 because they have a correspondent rate lower than 1, meaning that the CC families which these K-C pairs belong to have more than one Chinese syllable and it becomes a problem as to which Chinese syllable candidate should the Korean syllable correspond to. One hundred and two of the 663 pairs have a consistency higher than 0.5 but lower than 1, and this indicates that when reading the Sino-Korean words containing these Korean syllables, readers may correspond them to their correspondent Chinese syllables that have the highest correspondent rate (K-C rate). For example, when a reader sees the Korean syllable 분(*bun*), she or he is more likely to think of the Chinese syllable *fen*, because the K-C pair 분(*bun*)---*fen* has a high correspondent rate of 0.86. It is less likely for the reader to think of the Chinese syllable *ben* since the 분(*bun*)---*ben* pair has a low correspondent rate of 0.14.

For the 110 K-C pairs with a correspondent rate of 0.5, readers may have two equal candidates. For example, when a reader reads a Sino-Korean word containing the Korean syllable 감(*gam*) (e.g., 감독(監督)하다, meaning: to supervise), it is possible that she or he corresponds it to either the Chinese syllable *gan* or *jian*, because both the 감(*gam*)---*gan* pair and the 감(*gam*)---*jian* pair have the same correspondent rate (i.e., 0.5). It is worth exploring that except for the K-C correspondent rate, what other factors, such as word frequency, may affect a reader's decision.

The 455 K-C pairs with a correspondent rate lower than 0.5 may cause more difficulties in word processing for Chinese learners of Korean as an L2, because readers are less likely to correspond the target Korean syllable to the Chinese syllables with a low correspondent rate (e.g., 분(*bun*)---*ben* pair in the Sino-Korean word 분주(奔走)하다, meaning: to be busy with).

The average consistency of CC families is the third factor to be considered when learning, teaching, and reading Sino-Korean words. This index indicates the extent to which a Korean syllable in a CC family corresponds to its correspondent Chinese syllables consistently. Our analysis demonstrates that if a CC family has more Chinese syllables, its average consistency tends to be low (r = -0.821, p < 0.001). This makes sense because once a Korean syllable has more than one correspondent Chinese syllable, the one-to-one correspondent relation is disturbed and weakened. A one-to-more correspondence has a weaker consistency than a one-to-one correspondence. Average consistency is also strongly affected by each family's powerful syllable and its K-C correspondent rate (r = 0.980, p < 0.001). For example, both the 관(*gwan*) family and the 인(*in*) family have two correspondent Chinese syllables and nine family members but the 관(*gwan*) family has a higher average consistency of 0.80 while the 인(*in*) family's average consistency is only 0.51. This is because the powerful Chinese syllable in the 관(*gwan*) family, *guan*, has a K-C correspondent rate of 0.89, which is more "powerful" than that in the 인(*in*) family, *yin*, whose correspondent rate is 0.56.

The present study argues that the unlearned or unfamiliar Sino-Korean words that contain Korean syllables of high average consistency are easier for Chinese learners of Korean to access the meanings because such Korean syllables tend to have fewer correspondent Chinese syllables and more "powerful" powerful Chinese syllables. Readers experience fewer obstacles deciding which Chinese syllables the Korean syllables should correspond to. For example, for the Sino-Korean word 관리(*gwan-ri*; Chinese character: 管 理 ; meaning: management), both the two Korean syllables have an average consistency of 0.80. It is highly possible that Chinese learners of Korean will correspond 관(*gwan*) to its powerful Chinese syllable *guan*, and 리(*ri*) to its powerful Chinese syllable *li*, and thus obtain the correspondent Chinese pronunciation of the Sino-Korean word as *guan-li* (Chinese characters: 管 理 ; meaning: management) and then access the meaning. On the contrary, the Sino-Korean words that are composed of Korean syllables of low average consistency may be difficult for Chinese learners of Korean. This is because such Korean syllables tend to have multiple correspondent Chinese syllables or have comparatively "weak" powerful Chinese syllables so that readers may experience more difficulties when deciding which Chinese syllable candidates they need to correspond to.

Based on the analysis in this study, we put forward the following suggestions with regards to teaching, learning and reading new Sino-Korean words for Chinese learners of Korean as an L2:

First, when teaching or learning Sino-Korean words, it would be beneficial for Chinese L1 users if Chinese characters are provided together with the Sino-Korean words that are written in *Hangul*;

Second, it would be beneficial to make use of the Korean syllables that have a correspondent rate of 1 and an average consistency of 1 (i.e., 객(*gaek*), 곤(*gon*), 민(*min*), 위(*wi*), 시(*shi*), 원(*won*), 의(*wi*));

Third, special attention should be paid to Korean syllables that have a high average consistency and their powerful Chinese syllables. (e.g., 리(*ri*), 관(*gwan*), 거(*geo*), 복(*bok*), 분(*bun*), 부(*bu*), 환(*hwan*));

Fourth, Korea syllables with lower K-C correspondent rates and lower average consistency require exclusive attention. Educators and learners are suggested to develop various strategies to memorize and read Sino-Korean words that contain such Korean syllables (e.g., 조(*jo*), 수(*su*), 제(*je*), 정(*jeong*), 전(*jeon*)).

7 Limitations

The present study does not take the frequency of Chinese characters and that of Sino-Korean words in Korean into account when calculating K-C correspondent rate and average consistency. It is worth exploring in the future how the frequency of Chinese characters and Sino-Korean words in Korean affect the K-C correspondent rate and Korean syllable's average consistency.

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