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A Comparison of the Phonological and Morphological Awareness between Mandarin and Korean–Mandarin Speakers on English Language Learning

By

Huijing Jin

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Contents

Abstract

This study compared Korean–Mandarin bilinguals and Mandarin monolinguals who were learning English to understand whether bilinguals have an advantage in their awareness of phonology and morphology. The original contribution of this research is that it broadens third language (L3) acquisition research by comparing the phonological and morphological awareness of bilingual and monolingual teenagers. The study measures whether bilinguals have advantages in the phonological and morphological awareness of English as an L3. The bilingual participants in the present study were notable because they were simultaneous Korean–Mandarin bilinguals rather than sequential bilingual language learners. Cenoz (2000) explained that sequential language learners obtained languages sequentially. However, simultaneous bilingual learners acquire two languages (L1 and L2) simultaneously and then learn an L3. In the current study, the bilingual participants were junior high school students. They acquired Mandarin and Korean from birth and then commenced learning English in primary school. Mandarin monolingual speakers acquired Mandarin from birth and started learning English at the same age as the bilingual participants in primary school.

This study proposes that bilinguals have an advantage in acquiring English phonological and morphological awareness. Accordingly, this study theorises that there are positive phonological and morphological effects from previous languages on the target language. It also shows the effects of similarities and differences among the three languages—Mandarin, Korean and English—from the perspective of phonology, morphology and language transfer.

This research aspires to improve language teachers' and students' awareness of trilingualism, especially focusing on teachers fully utilising the learners' previous language knowledge to learn a second or a third language. There are also implications for teachers'

instructional strategies in the English as a foreign language classroom. The study also aims to explore the cross-linguistic influence and positive transfer from Mandarin and Korean to English. The research analyses the linguistic similarities between Mandarin, Korean and English to discuss the possibilities of the facilitative effect of bilingual learners' prior language experience on L3 learning. The study researches the causes and factors that affect positive transfer.

The data were collected from a public Mandarin monolingual junior high school and a public bilingual Mandarin–Korean junior high school in China. Altogether, 271 participants were included in the dataset: 111 in the Mandarin monolingual group and 160 in the Korean–Mandarin bilingual group. All participants answered a language background questionnaire. The monolingual participants completed four language tasks (two for English and two for Mandarin). The bilingual participants completed six language tasks (two for English, two for Mandarin and two for Korean).

The *t*-test results indicated no significant difference in Mandarin phonological and morphological awareness between the two groups. Analysis of covariance was used to compare the English phonological and morphological awareness. The results showed that bilinguals performed significantly better than monolinguals in phonological and morphological awareness. Bilingual participants seemed to have benefited from their previous knowledge of Korean in learning English as L3, which indicates a bilingual advantage.

In the L3 language acquisition literature, scholars' arguments concentrate on how L1 and L2 interact with L3. Four compelling models are discussed in this study: the Cumulative-Enhancement Model (CEM), the L2 status factor model, the Typological Primacy Model and the Linguistic Proximity Model. This study confirmed the CEM: bilinguals' previous language experience facilitated their achievement of higher scores in English phonological and morphological awareness tasks than monolinguals. Korean, Mandarin and English, a different

language combination to the combination in Flynn et al. (2004), obtained identical results to the CEM. Bilinguals performed better in their other language (Mandarin phonological awareness), which influenced their English phonological awareness (Flynn et al., 2004; Jessner, 1999).

The current study also aimed to share opinions of English teachers working in bilingual schools about improving the understanding of bilingual learners' language experience so they can teach English more effectively. English teachers and policymakers should investigate the students' prior language experience, focus on the similarities between Mandarin, Korean and English, and adjust their pedagogical approach to English teaching. This study has implications for English teachers in bilingual schools to be aware of the positive transfer of phonology and morphology from previously acquired languages. The findings from this study will also benefit future research on minority education in China.

Keywords: third language acquisition, phonological awareness, morphological awareness, English learning, Mandarin, Korean, ethnic Korean–Chinese, language transfer

Declaration

I certify that this thesis:

1. does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university;

2. and the research within will not be submitted for any other future degree or diploma without the permission of Flinders University; and

3. to the best of my knowledge and belief, does not contain any material previously published or written by another person except where due reference is made in the text.

Signed.....

Date.....

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List of Abbreviations

ANOVA	analysis of variance
ANCOVA	analysis of covariance
CEM	Cumulative-Enhancement Model
CI	confidence interval
IQ	intelligence quotient
L1	first language
L2	second language
L2SFM	second language status factor model
L3	third language
L4	fourth language
LAD	language acquisition device
LASS	Language Acquisition Support System
LPM	Linguistic Proximity Model
M	mean
SBREC	Social and Behavioural Research Ethics Committee
SD	standard deviation
SE	standard error
SEM	standard error of the mean
SES	socio-economic status
SS	sum of squares
TPM	Typological Primacy Model
V2	verb-second

Chapter 1: Introduction

Third language (L3) acquisition is a relatively new research field compared to first language (L1) acquisition and second language (L2) acquisition (Cenoz & Gorter, 2011; Jessner, 2008). In this study, L3 acquisition refers to the assumed situation in which the learner has already acquired or is acquiring two languages (García-Mayo, 2012). L3 acquisition research focuses on topics such as whether previously acquired languages interact with the target L3 (Bardel & Falk, 2007; Flynn et al., 2004; Rothman, 2010a; Rothman et al., 2013) and whether a person with two prior languages has an advantage over someone who has one prior language when learning another language (Andreou, 2007; Kang, 2012; Wang, Yang & Cheng, 2009). The current literature on issues of phonology and morphology in L3 acquisition was carefully reviewed. Before proceeding further, some key terminologies need defining and disambiguating.

1.1 Key Terminology

Mandarin refers to the standard dialect of Chinese. Not all Chinese speakers use Mandarin because the Chinese language has many dialects. However, all study participants were Mandarin speakers.

According to Krashen (1987), *learning* and *acquisition* are different: *learning* refers to the language learning process that occurs consciously, usually through formal instruction and comprehension, while *acquisition* is an unconscious language learning process that mainly occurs through exposure.

In describing the L3 learned after the L1 and L2, some researchers (Irnanda, 2018; Jessner, 1999; Wrembel, 2015) use the term *third language acquisition*, while others (Rothman

et al., 2019) use *L3 acquisition*. This study uses the term L3 acquisition to indicate the language learned after the two previous languages to align with the latest research in L3 acquisition.

When considering L3 acquisition, it is inevitable to think that the previously acquired language will affect an L3 or the learning of an additional language. *Cross-linguistic influence* is frequently mentioned by researchers when discussing the effects of the previous languages on L3 learners(De Angelis, 2007). Cross-linguistic influences aim to explain how previously acquired linguistic knowledge affects the production, comprehension and development of a target language and under what conditions the effects may occur (De Angelis, 2007).

Consideration was given to defining the two groups that participated in this study. Functionally speaking, participants in this study who had two previous languages and were learning their L3 can be called trilingual learners. However, when considering proficiency in their L3, English, trilingual learners are indeed elementary-level English speakers. Therefore, study participants with two background languages were called *Korean–Mandarin bilinguals* or *Korean–Mandarin bilingual learners*. In contrast, their peers were called *Mandarin monolinguals* or *Mandarin monolingual learners*.

Determining the language acquisition sequence is frequently discussed in L3 acquisition studies. Typically, the language people acquire first is called the *mother tongue* or L1. Ellis (1997) stated that "the way in which people learn a language other than their mother tongue, inside or outside of a classroom" (p.3); this is considered the process of L2 acquisition. The language obtained after that is known as L2 (Ellis, 1997), and languages acquired after L2 are named sequentially; that is, the third, fourth and *n*-th languages are termed L3, L4 and L*n*. This raises the question of whether infants who acquire three languages simultaneously from birth are L1 or trilingual speakers. Many researchers (Byers-Heinlein & Werker, 2009; Chevalier, 2012; Quay, 2012) have examined infant participants as trilingual learners in their

research. Cenoz (2000) noted that although L2 acquisition and multilingual acquisition share some commonalities, the diversity and complexity of multilingual acquisition cannot be neglected. Cenoz demonstrated that L2 acquisition indicates the process of acquiring an L2 after acquiring the L1. It also refers to the acquisition of an L2 in the process of the L1 acquisition. When considering L3 acquisition, there is greater diversity because languages may be acquired in a different order, which may affect the outcomes (Cenoz, 2000). The first case is that three languages are simultaneously acquired when infants grow up in a multilingual environment. The second situation is that the acquisition of the three languages happens sequentially. The third possibility is that L1 was acquired before the simultaneous acquisition of L2 and L3. The fourth possibility is that there was concurrent acquisition of L1 and L2 (i.e., they were acquired simultaneously), then L3 learning occurred. In this research, the participants belong to the fourth situation. The bilingual teenagers of the test group in this study acquired two L1s (Korean and Mandarin Chinese) from birth and later learned English as an L3.

This study focuses on how being monolingual or bilingual affects learning an L2 or L3, in this case, English. What is of interest here is whether having one or two previous language(s), particularly when they are typologically different, affects L3 acquisition. Several linguists (Bardel & Falk, 2007; Flynn et al., 2004; Rothman, 2010a; Rothman et al., 2013) explored whether the previously acquired language knowledge of bilinguals would interact with L3 development and change a learner's understanding of languages during the process of acquiring the L3. This study focuses on the aspects of phonological and morphological awareness. *Phonological awareness* is the foundation for developing speaking ability and is an indicator of reading skills (Wang et al., 2006). *Morphological awareness* involves word recognition and influences reading skills (Chen et al., 2009; Cho et al., 2008).

Jessner (1999, p. 201) believed that 'multilingualism is not multiple monolingualism'; that is, prior L1 and L2 knowledge and learning experience will not necessarily guarantee that learning an additional language will be easier. For example, Korean–Mandarin bilingual learners of English have language experience with two languages before they learn English. However, simply adding their previous language experience would not enhance the L3. Adding Mandarin and Korean may have a '1 + 1 = 2' effect, which will show the facilitative effect of transfer. However, a non-facilitative effect may occur on L3 English learning where, for example, the phonology of L1 and L2 is incompatible with English. In such cases, previous experience makes it harder for the learner to pronounce the unique or near-neighbour sounds of English.

1.2 Background and Contributions of the Study

No studies have been identified that have examined the morphological awareness and phonological awareness of ethnic Korean–Chinese people in L3 learning. Instead, most scholars have explored, from pedagogical and policy-related perspectives, ethnic Korean–Chinese education and its current challenges (Kim & Kim, 2005), including learners' attitudes towards trilingual education (Gao, 2009), ethnic language maintenance (Gao, 2010) and teachers' training and development (Zhang et al., 2015).

However, research has examined language transfer involving English phonological and morphological awareness where the transfer occurred from Mandarin to English or from Korean to English. The features of the Chinese Pinyin system make language transfer from Mandarin to English possible, and researchers (Dixon et al., 2012; Li et al., 2012) have proved the positive phonological transfer from Mandarin to English. Wang et al. (2009) explored cross-linguistic transfer from the perspectives of phonology, orthography and morphology. They found cross-language facilitation in Chinese–English reading acquisition at phonological

and meaning-processing levels. They also discovered cross-language phonological and morphological transfer between Mandarin and English but no significant cross-language transfer in orthography.

In Korean learners of English, a quantitative analysis by Yeon et al. (2017) found that Korean orthography did not transfer to promote English spelling. Several researchers (Chen et al., 2009; Cho et al., 2008; Zhang et al., 2014) have found that awareness of the compound structure in an L1 is a strong predictor of developing reading skills in L2 English. Further, Zhang and Koda (2014) investigated the interrelationships between Chinese and English morphological awareness using compound and derivational awareness and L2 English reading comprehension. They also aimed to provide evidence of the transfer of compound and derivational awareness in Chinese to facilitate reading comprehension in L2 and vice versa and indicate whether the linguistic distance between L1 and L2 would affect the morphological awareness transfer. Zhang et al. (2021) found that morphological awareness contributed to both Chinese and English reading comprehension, and Choi et al. (2018) found bi-directional cross-language transfer of morphological awareness to word reading in L1 Chinese and L2 English.

This research discusses whether Korean–Mandarin bilinguals have advantages in English phonological and English morphological awareness compared to Mandarin monolinguals. The original contribution of the research is that it broadens the L3 acquisition research by comparing phonological and morphological awareness of trilingual and bilingual teenagers. It measured whether bilinguals who obtained two language systems have phonological and morphological awareness advantages in learning English as an L3. The study participants were a unique group of simultaneous (two L1s) bilinguals with the language backgrounds of Mandarin and Korean. The bilingual teenagers in junior high school acquired Mandarin and Korean from birth, then commenced English learning in primary school

education. This bilingual group will be compared to a monolingual Mandarin group that also learned English. The monolingual teenagers learned Mandarin from birth and started learning English in primary school.

This study compared the orthography, syntax, phonology and morphology of Mandarin, Korean and English. Future researchers can use the comparison findings to conduct further research on the three languages. In the phonology part, English consonants and vowels were compared with Mandarin and Korean to identify the similarities and differences between the three typologically different languages.

Most L3 learning studies of phonological and morphological awareness have been on languages in the Indo–European family (Cenoz & Gorter, 2011; Rothman, 2015). This is probably the consequence of the majority of the world's most frequently used languages, such as English, Spanish, and French, being in this language family. Thus, there is a larger supply of resources and research participants for examinations on these languages. However, Mandarin and Korean are typologically different languages. The extent to which L1 phonological and morphological awareness influences the learning of English, another typologically different language, is still unknown. This study explored the facilitative effects of Mandarin and Korean by measuring English phonological and morphological awareness in Korean–Mandarin L1 teenagers in junior high school.

By presenting the advantages of acquiring a heritage language, parents may change their attitudes towards an excessive emphasis on English learning. Parents in the Korean-Mandarin schools prefer their children to learn English instead of their heritage language may be due to the following reasons.

Unsurprisingly, many studies discuss English as the L3 in L3 acquisition. It is widely accepted that English plays an important role as a global language in communication. Due to

the large English-speaking population, the level of English mastery determines how to communicate with English speakers effectively. Additionally, learning English gives children more options when choosing universities, and, after graduation, a higher English level increases the chance of success in the Chinese job market. Therefore, ethnic Korean–Chinese parents in China tend to emphasise learning English rather than their home languages, even from the toddlers' early stages of language learning.

However, too much emphasis on English learning promotes the idea of abandoning ethnic languages. In China, children learn an ethnic language from birth and learn Mandarin (the community language) at a later age. They typically begin learning English when they start school. Learning three languages concurrently in primary school adds an extra burden on ethnic children compared to their peers who learn only two languages in the process of schooling. Even though a significant effort may be made to learn three languages, the academic results for the three languages may be unsatisfactory. Therefore, some parents would prefer to arrange for their children to study in a mainstream primary school that provides two-language learning (Mandarin and English) rather than an ethnic primary school that teaches three languages (Korean, Mandarin and English). In that case, ethnic children can lose their ethnic language to obtain more competing education resources in mainstream primary schools.

There are several studies on English learning in ethnic groups in China, especially in the Korean ethnic group. Pioneer scholars have explored ethnic Korean–Chinese education from the following aspects: the current challenges of ethnic Korean education (Kim & Kim, 2005), learners' attitudes towards trilingual education (Gao, 2009), ethnic language maintenance (Gao, 2010), teachers' training and development (Zhang et al., 2015) and language transfer (Zhang, 1998). Among them, Zhang (1998) focused on ethnic Korean Chinese primary school students who were learning English. Zhang proved a double-positive

transfer from Korean and Chinese to English: one positive transfer was from the Korean–English comparison, while the other positive transfer was gained from the Chinese–English comparison. However, Zhang did not present which linguistic items were tested and how they affected English learning. Therefore, it is uncertain whether phonological or morphological awareness of Chinese and Korean positively influenced learning English. Without a clear explanation, policymakers, education providers and parents cannot understand the benefits of learning an ethnic language.

The results of the current study will enhance teachers' understanding of the advantages and disadvantages of bilinguals' language background and inform how to teach a trilingual language learner. Parents might not abandon ethnic language learning opportunities so easily, and policymakers would provide more support to ethnic schools. In addition, trilingual learners would know their advantages and be more confident in learning three languages. Finally, the research would provide a protocol for researchers in other ethnic groups to conduct similar research to determine the advantages of learning three languages compared with bilingual learners from phonological and morphological awareness aspects.

Several researchers (Chen et al., 2009; Cho et al., 2008) have found that awareness of compound structure is a strong predictor of developing English, Chinese or Korean reading skills. Lexical compounding words are widely used in Korean, partly because of words borrowed from Chinese (Sohn, 2006), but compound words are not limited to borrowed words. The compound structure has been investigated for its positive effect from Chinese or Korean to English (Chen et al., 2009; Cho et al., 2008). Therefore, the current study focuses on derivational and inflectional morphological awareness in English.

1.3 Research Aims and Hypotheses

The Korean–Mandarin bilingual learners in the study faced challenges while learning English. Korean–Mandarin bilingual learners had 15 language lessons each week, distributed evenly across the three languages, which occupied 37.5% of the week's study load (normally 40 lessons per week). The students devoted ample time to developing their knowledge of the three languages, but the outcomes were not equal to their effort. As an English teacher with 14 years of teaching experience, the researcher taught Mandarin to Korean–English bilinguals (Korean international students who were learning Mandarin in China) and English to Korean–Mandarin bilingual learners. It became apparent when contrasting the English language proficiencies between the two groups of students that English proficiency differed, especially for speaking and listening skills, even with the same language combinations. This prompted the question: do different L1s or L1 combinations affect learning an L3? Or was it caused by the lack of understanding of the student's language background?

Therefore, the results of this study could be used to provide information to English language educators, parents and caregivers to assist in English learning. Further, the study findings may have implications for policymakers, language teachers and parents on the advantages had by bilingual learners compared to their monolingual peers when learning English.

From the theoretical perspective, the study aims to fill a gap in the trilingual research area with a new language combination: Mandarin, Korean and English. In the current study, bilingual participants had mastered Mandarin and Korean simultaneously before primary education and then started learning an L3 in primary school. This study compared the phonological and morphological awareness of bilingual and monolingual learners to investigate the advantages held by bilingual learners. In the literature, there is scarce research

that has investigated the minority groups in China, especially ethnic Korean–Chinese people. Further, few empirical studies have explored trilingualism and the similarities between Mandarin, Korean and English that may facilitate language transfer. This study explored the facilitative effects of bilinguals' previous languages—Mandarin and Korean—on English.

1.3.1 Research Questions

The study aimed to determine whether Korean–Mandarin bilinguals have an advantage in English phonological and morphological awareness compared to Mandarin monolinguals. Further, the study examined correlations between Mandarin (Mandarin/Korean) and English phonological awareness and Mandarin (Mandarin/Korean) and English morphological awareness.

The main research questions are:

1. Do Korean–Mandarin bilingual learners have better English phonological awareness than Mandarin monolingual learners?
2. Do Korean–Mandarin bilingual learners have better English morphological awareness than Mandarin monolingual learners?

1.3.2 Hypotheses

It was expected that bilingual learners would perform better than monolingual learners in English phonological awareness and morphological awareness tasks because of (a) the morphophonemic similarities between Korean and English; (b) the phonological and morphological similarities among the three languages; and (c) interaction between learners' language proficiency and the morphological awareness. This thesis discusses the factors associated with bilingual learners' advantages in English phonological and morphological awareness. Two general hypotheses are as follows:

H1: Korean–Mandarin bilinguals will perform better in the English phonological awareness tasks than Mandarin monolinguals.

H2: Korean–Mandarin bilinguals will perform better in the English morphological awareness tasks than Mandarin monolinguals.

1.4 Theoretical Concerns

In L3 language acquisition, scholars' arguments concentrated on how L1 and L2 interact with L3. Four compelling models will be discussed in this study: the Cumulative-Enhancement Model (CEM) (Flynn et al., 2004), the second language status factor model (L2SFM) (Bardel & Falk, 2007), the Typological Primacy Model (TPM) (Rothman, 2010a) and the Linguistic Proximity Model (LPM) (Cenoz & Hoffmann, 2003).

The CEM asks whether only the L1 plays a role in developing the L3 or both L1 and L2 affect L3 acquisition (Flynn et al., 2004). Flynn et al. (2004) demonstrated that L3 transfer could be from any language system already possessed by learners. Prior language knowledge will influence new language acquisition, which shows that language learning is cumulative. Flynn et al. (2004) emphasised that a facilitative effect can come from any previously acquired or learned languages—either from the L1 or the L2—and multilingual transfer could only be facilitative. Thus, language learning is a cumulative process, and the previously acquired languages can either have a positive effect on the acquisition of the new languages or remain neutral for transfer if non-facilitative. This model does not make predictions for non-facilitative influence.

Bardel and Falk (2007) proposed the L2SFM, which posits that L2 is more likely to be transferred than L1 in the initial stage of L3 acquisition. Bardel and Falk (2012) stated that L2SFM is important in studying language acquisition by adults in formal environments (e.g.,

in classrooms) due to the higher cognitive similarities between the L2 and L3 when compared to the L1 and L3.

The TPM indicates that L3 transfer is affected by the typological proximity of the target L3 compared to the other previously acquired linguistic systems (Rothman, 2010a). The transfer will happen unconsciously from the prior language, which is similar to L3, and that language will be the source of transfer for L3. Rothman (2010a) noted that typological proximity could be the strongest factor for multilingual syntactic transfer. According to the TPM, the transfer can be facilitative or non-facilitative.

Cenoz and Hoffmann (2003) ascribe transfer to typology, stating that transfer is related to whether the form is typologically universal or not. Cenoz (2001) presented that speakers tend to borrow more terms from the language that is closer in type to the target language. Therefore, the speakers' linguistic knowledge influences the amount of language transfer.

LPM was developed based on CEM and TPM, considering that similarities among languages will be the major factor in transfer, not the sequence of the language acquired (Westergaard et al., 2017). LPM indicates that bilinguals would benefit from prior language knowledge when learning an L3, regardless of whether they had two L1s or an L1 plus an L2. According to LPM, all prior languages are active during the L3 learning process, and cross-linguistic influence depends on the similarities of each linguistic property and the properties of the L3(Westergaard et al., 2017). Westergaard et al. (2017) said the cross-linguistic influence can be facilitative or non-facilitative.

In addition to these models in L3 acquisition, this study also examined language transfer from previously acquired languages to the target language, English. Cross-linguistic influences are frequently discussed in L3 acquisition research. Božinović and Perić (2021) studied the role of previously acquired languages (Croatian as L1 and English as L2) in German/Spanish L3

acquisition and cross-linguistic influences. Their study investigated language typology relationships, formal similarity, and transfer and error production. Božinović and Perić (2021) analysed similarities and differences from various perspectives in Croatian, English, German and Spanish. They confirmed that lexical and grammatical similarities between L2 English and L3 German and Spanish influenced L3 learning.

These theories and findings are the basis of the current study. This study sought to add to the existing research by involving participants with language combinations (Korean, Mandarin and English) to confirm the findings of previous research.

1.5 Thesis Outline

The outline of the thesis is as follows. Chapter 2 presents the theoretical background for the current study regarding the current theories on language development, language transfer, phonological awareness and morphological awareness. An overview of the home languages of participants is presented, with contrasts between Mandarin, Korean and English, while the rationale and research questions are discussed in detail. Chapter 3 details the research's hypotheses and methodology, including the research design, participant recruitment, experiment procedure, questionnaires and language tasks. Chapter 4 explains the procedure for data analysis and discusses the quantitative and qualitative results. Chapter 5 provides a general discussion in response to the research questions. Further, the implications for future English language teaching in ethnic Korean schools are provided and the limitations discussed. Finally, Chapter 6 concludes the research.

Chapter 2: Literature Review

This chapter reviews language development theories, monolingual development and L1 acquisition literature. This will be followed by a review of L2 and L3 acquisition theories. Next, the thesis will present language transfer–related theories in language acquisition, mainly focusing on the four major models in the L3 acquisition field. Then, the chapter will examine research on phonological and morphological awareness among Mandarin monolinguals and Korean–Mandarin bilinguals. It will also demonstrate an overview of the home languages of participants, explaining the contrasts between Mandarin, Korean and English. Further, the literature on the current English learning situation of ethnic Korean–Chinese people and other ethnic minorities in China will be discussed, as will factors that are known to influence language learning. The chapter will close with a presentation of the research questions.

2.1 Language Development

2.1.1 Monolingual Development

L1 acquisition has a long and solid research background. Many researchers have been devoted to exploring the process of a child acquiring a language from birth, which appears to be very complex. Therefore, L1 acquisition usually refers to people's acquisition of a language—in most cases, their mother tongue—from infancy (Fäcke, 2014). The mother tongue usually refers to the language of the learner's ethnicity and community and is, therefore, also called the native language (Tulasiewicz & Adams, 2005). Generally speaking, the mother tongue is usually the L1 to be contacted and acquired after birth; hence, it is also called L1.

In the 1940s and 1950s, the prevailing theory was behavioural psychology, which profoundly affected the study of L1 acquisition. Behaviourism holds that acquiring knowledge is based on direct experience and material obtained through objective, observable experiments.

Specific external stimuli produce physical and verbal responses. Behaviourism highlights the external role conditions play in acquiring native languages. Behaviourism believes that the child's brain was originally a blank slate, and children learn through stimulation.

> The behaviourist theory of stimulus-response learning, particularly as developed in the operant conditioning model of Skinner, considers all learning to be the establishment of habits as a result of reinforcement and reward. (Rivers, 1968, p.73)

The prominent proponents of behavioural theory in language acquisition research were Leonard Bloomfield and Burrhus Frederic Skinner. Skinner believed that language was learned by nurture. He was regarded as the father of operant conditioning (stimulus, response, reinforcement; the response becomes a habit), which indicates that children acquire their mother tongue by imitating adults, and language is learned through stimulus, reward and punishment (Skinner, 1938). There were some strengths and weaknesses in Skinner's theory. Imitation plays a crucial role in language development and language acquisition, but children do not only learn through imitating utterances around them. Consider children's mistakes in using language since these mistakes reveal that they are not merely imitating what they had previously heard but also applying rules. Moreover, children usually cannot repeat an utterance containing a structure that they have not begun using. Finally, a critical period exists during the process of acquiring an L1, so if a child does not acquire a language in a critical period, their linguistic abilities will not develop fully.

Unlike Skinner, American linguist Noam Chomsky proposed that humans are born with a built-in language acquisition device (LAD). The LAD enables the human brain to understand language principles and form grammatical structures, which is why a child can learn any human language. Chomsky explains that children use these imprinted linguistic structures to produce sentences accurately and rapidly. Children only need to learn new vocabulary and apply the

linguistic structures from the LAD to form sentences. The key concept in nativist theory is that humans are born with the ability to develop language. Children must be exposed to the natural language to activate the device. Once the LAD is activated, children will realise the structure of the language and connect it to the innate knowledge of rules about languages called universal grammar. According to Chomsky, universal grammar is 'a component of the human mind, physically represented in the brain and part of the biological endowment of the species' (Chomsky, 2002, p. 1). Chomsky described universal grammar as the basis of all human languages.

One of the most important theories in L1 acquisition is Eric Lenneberg's critical period hypothesis, which explains that language acquisition is an innate process that is determined biologically (Lenneberg, 1967). Lenneberg assumed that the structural reorganisations within the brain were developed only between roughly the age of two and puberty. Lenneberg stated that if the child did not learn the language before puberty, the language could never be learned fully and functionally. According to Lenneberg, L1 learners should receive exposure to their L1 before puberty for the best acquisition results. Lenneberg contends that the critical period for learning an L1 would apply to acquiring an L2. While many people have been able to master the syntax and vocabulary of an L2 after puberty, not many achieve native-speaker fluency compared to L1 learners or bilinguals who start at a younger age. Lenneberg's works are still one of the most well-regarded psycholinguistic arguments for language acquisition.

Conversely, interactionist theory highlights the interaction between children and their caregivers. The Language Acquisition Support System (LASS) proposed by Jerome Bruner (1977) supports the role of caregivers in children's linguistic development in a social context; thus, children acquire a language by interacting with caregivers. LASS is a term coined in response to Chomsky's LAD. LASS refers to the importance of a child's social support

network, which works with innate mechanisms to encourage or suppress language development (Bruner, 1977).

Every child has a social support network, particularly during the years of the language explosion (roughly ages 2–5), so differences in the LASS significantly explain differences in language acquisition, according to Bruner's model. Part of the LASS is another key component of Bruner's explanation of how the most effective learning occurs—the 'spiral curriculum' (Bruner, 1977, p. 13). Bruner asserts that the infant discovers some correspondence between what it is doing in the outer world and certain models or templates that it has already mentally absorbed. Bruner rarely found something that is beyond the learner. Instead, the discovery incorporates an internal restructuring of previously learned concepts to better align those concepts with the encounter's regularities, which the learner has had to accept. Bruner used the spiral curriculum to argue against the modes of teaching that deem some subjects too difficult for learners to grasp before they were ready.

In Bruner's view, learning is more successful with early exposure and subsequent scaffolding of more-complex concepts that occur over earlier developing ones. L1 acquisition is a natural process of acquiring a language without guidance. In the target language environment, the learner gains a language naturally and unconsciously and is easily exposed to the relevant culture. The learner uses the target language to communicate in daily life. The purpose of learning a language is to use it to communicate with other members, integrate with them and become part of the community (Walinga, 2010). Therefore, it is easy for the learner to focus on the flexible use of language in the learning process.

2.1.2 Multilingual Development

L2 acquisition is related to L1 acquisition, but learning an L2 differs from learning an L1 in many aspects. Age is often discussed in comparing L1 and L2 language acquisition. L1

acquisition occurs at an early age for learners, but in most cases, L2 acquisition occurs when learners are older (Dulay & Burt, 1974). It was also suggested that the cognitive abilities of L2 learners are more developed than when they were learning their L1. Previous experience in language learning helped L2 learners understand the concept of a word or sentence. Ellis (1997) defined L2 acquisition as how people learn a language other than their mother tongue, inside or outside a classroom. L2 acquisition research is also related to the aspects of language being learned, the features of language learners and learners' learning processes (Ellis, 1994).

Important ideas in L2 acquisition research are input, output and the interaction hypothesis. Steven Krashen's theory was closely related to the naturalistic approach. Krashen (1987) proposed several hypotheses, for example, comprehensible language input, affective filter (emotional state while learning) and the distinction between language learning and language acquisition. Swain developed the language hypothesis by focusing on the output of a language (Swain, 1989). Swain hypothesised that through language production, language learners notice patterns and communication skills and then internalise this knowledge. Long (1981) developed the interaction hypothesis, a combination of an input and output hypothesis, which emphasises the importance of providing learners with ample authentic opportunities for the negotiation of meaning. According to Long (1981), inauthentic interaction occurs when learners encounter problems in communication. Their negotiation of the problem provides them with feedback on what needs to be modified to make it comprehensible. Therefore, the language in an authentic interaction is not derived from a textbook but emerges from the immediate communication needs of the learners.

Much has been explored in L2 acquisition, and it is well documented. In contrast, L3 acquisition is still in the initial stages of research. Several scholars (Amaro & Rothman, 2010; Cenoz, 2001; Cenoz et al., 2001b; Rothman, 2010a) began to differentiate L3 acquisition from

L2 acquisition, and with the growing body of research, L3 acquisition has been recognised as an independent research field. Researchers are increasingly exploring diverse aspects of L3 acquisition, such as inhibitory control, language maintenance, caregivers' roles, the role of the mother tongue, teacher training and cross-linguistic transfer.

Some researchers have explored inhibitory control in L3 acquisition (de Bruin et al., 2014; Guo et al., 2013; Linck et al., 2012; Madrazo & Bernardo, 2018; Poarch & van Hell, 2012). The inhibitory control model explains that every word contains a language tag that shows which language it belongs to (Green, 1998). If the non-targeted words are activated in the lexical access course, they are inhibited by the non-target word tag. This process enables the words in the target language to be produced. If there were a more significant discrepancy in language dominance, language switching would be more associated with inhibitory control (Green, 1998). Green (1998) indicated that better inhibitory-control ability predicted less switch cost time when switching between highly unbalanced languages and a more switch cost time in two less-dominant languages.

Linck et al. (2012) researched the role of domain-general inhibitory control by using an individual differences approach in trilingual language switching. They investigated the relationship between domain-general inhibitory control and a trilingual speech production language-switching task. The participants were 56 native-English speakers whose L2 and L3 were French and Spanish. Participants were adults aged around 21 years who had enrolled in a public university in Ontario, Canada (a bilingual English–French province). The native English–speaking participants had higher proficiency in French (L2) than Spanish (L3). The measurements included the picture-naming task and the Simon task. In the picture-naming task, participants needed to use one of their three languages required by the background colour (blue, red or yellow background) to name the pictures shown on the computer screen. The picture-

naming task results showed that participants' reaction times were faster in English L1 than in their L2 or L3. Further, the switch cost in L3 was smaller than in L1 or L2, which were more dominant languages. Therefore, the authors concluded that better inhibitory control predicted smaller switch costs.

In the same study, the L3 naming task schema more strongly inhibited the L1 than the L2 (Linck et al., 2012). They presented that inhibitory control was connected to language-switching abilities, especially in L3→L1 switching or L1→L3 switching but not in L2→L1 switching or L1→L2 switching. The results proved that inhibitory-control abilities and language-switching capabilities have strong connections. The authors also found that inhibitory control was associated with naming latencies in L3, which differed from the emerging results on bilingual cognitive benefits in the literature. Many studies have demonstrated that bilinguals outperformed monolinguals in conflict and non-conflict resolution tasks (Bialystok et al., 2012; Ware et al., 2020).

Hsu (2014) compared monolingual, bilingual and trilingual adults to analyse how they produce languages differently through cognitive control mechanisms. Hsu measured Mandarin response latencies, errors and self-repairs of Mandarin monolinguals, Hakka–Mandarin bilinguals and Hakka–Mandarin–Minnan trilinguals. Eighty-one participants attended the experiment, including 28 monolinguals, 53 bilinguals and trilinguals aged 22–30. The research included two read-aloud experiments, reading Mandarin and speaking Minnan or Hakka. Experiment 1 was a non-preprogrammed task presented on a computer screen, and Experiment 2 was a preprogrammed task printed on an A4 paper. Bilingual and trilingual adults outperformed monolingual adults in Experiment 1, which presented inhibitory-control abilities of bilinguals and trilinguals. In Experiment 2, trilinguals showed attention-control advantages during L2 production through error correction. Nevertheless, bilinguals did not present

attention-control advantages compared to monolinguals. Trilingual advantages became obvious when there were higher inhibitory-control demands, and bilinguals' advantages in inhibitory control appeared in more limited contexts.

Madrazo and Bernardo (2018) also examined the function of inhibitory control by comparing bilinguals to trilinguals in the Philippines. The study included 191 participants (136 females) who enrolled in a university; the average age was 17.25 years. The study compared 106 Chabacano–Filipino–English trilinguals (mean age 16.89 years, 77 females) to 85 Filipino–English bilinguals (mean age 17.71 years, 59 females). The measurements include language proficiency tests (both oral and written) and Simon Arrow tasks. The study found that trilinguals were more accurate and more efficient than bilinguals. Therefore, trilinguals showed advantages in inhibitory control in more cognitively demanding control tasks requiring both interference suppression and response inhibition.

If three languages are activated during the tasks, additional control enhancements are required with tasks that require higher inhibitory-control abilities. Madrazo and Bernardo (2018) noted that trilingual advantages may be affected by other factors, such as intelligence and socio-economic status (SES). As Bornstein and Bradley (2003) explained:

> The term socioeconomic status has historically denoted the relative position of individuals, families, or groups in stratified social systems where some societal values (e.g., occupational prestige, education, economic resources, power, information) are not uniformly distributed. The complex processes of social stratification, in turn, hierarchically classify people according to their access of those values. (Bornstein & Bradley, 2003, p. 2)

Maintaining the home language is another topic that has drawn researchers' attention in L3 acquisition. Trilinguals had three language options. It was a complicated task for the

trilinguals and their caregivers to choose from three languages and produce one language to communicate and retaining infrequently activated language was also a task for them (Braun & Cline, 2014). Mieszkowska et al. (2017) compared the vocabulary size of trilinguals, bilinguals and monolinguals. The results indicated that parents' support is essential for migrant children to maintain languages other than the community language. Trilinguals and bilinguals received less language input than monolinguals because the total language input is allocated to two or three languages for bilinguals and trilinguals. Four groups were included in Mieszkowska et al.'s (2017) research: Polish monolinguals, English monolinguals, bilinguals and trilinguals. The bilinguals were migrant toddlers who spoke English as their primary language and Polish as their home language. Fourteen trilinguals were migrant toddlers with two home languages: Polish and other languages (one or more of Albanian, Arabic, Bengali, French, Italian, Macedonian, Russian and Ukrainian). The trilinguals' L3 was English. Participants took expressive and receptive vocabulary tests in their languages. That is, Polish monolinguals, bilinguals and trilinguals took standardised picture-naming and word-recognition tests in Polish. English monolinguals, bilinguals and trilinguals attended English expressive vocabulary tests. Parents of bilinguals answered the questionnaires in the Polish version, and the contents covered the home and majority language input of the bilinguals and trilinguals. The results showed no significant differences among monolinguals, bilinguals and trilinguals for English receptive and productive vocabulary tests. In Polish, bilinguals and trilinguals obtained similar vocabulary scores. Bilinguals and monolinguals had a similar receptive vocabulary in Polish. Nevertheless, trilinguals had smaller receptive vocabularies than bilinguals or monolinguals. Concerning productive vocabulary in Polish, monolinguals scored significantly higher than bilinguals and trilinguals. Therefore, Mieszkowska et al. (2017)

concluded that migrant toddlers' community language might take care of itself, but not the home language(s).

Chevalier (2012) researched two two-year-old toddlers' language development in two different families with different exposures to three languages via two longitudinal case studies. One toddler was exposed to Swiss German, French and English in German-speaking Switzerland. The second toddler was exposed to English and Swiss German, and he began to go to French childcare when he was seven months old. The results were derived from each caregiver's monthly recordings; one child under dyadic interactions, and the other had fewer interactions. The findings showed that the caregivers' role in interaction would influence the toddlers' motivation and further affect their exposure to language productivity.

Quay (2012) also explored the language use of two trilingual mothers to their trilingual toddlers, Freddy and Xiaoxiao, who were both born in Japan. Measurements included weekly video recordings of the two participants (at home and in day care), parental questionnaires and interviews before and after the data collection. Freddy's mother spoke English (98%), German (negligible), Japanese (1%) and mixed languages (1%) during the 17 sessions. Xiaoxiao's mother spoke Chinese (94%) during most of the three sessions, English (negligible), Japanese (1%) and mixed languages (5%). The two participants' utterances in their three languages indicated that Freddy was a passive trilingual and Xiaoxiao was an active trilingual because Freddy hardly spoke any German. The conclusion suggested that even a small amount of mixed L2 utterances might provide additional input for the trilingual toddler and encourage active trilingual development. Another reason for the utterance differences between the two trilingual toddlers might be the language combination (one with English and German, another one with Chinese and English), for English was a higher esteemed language than German in Japan. Additionally, personality and sociopsychological factors might be other factors.

Some researchers have focused on the role of the mother tongue in L3 acquisition. Swain et al. (1990) found that trilingual learners' literacy in their mother tongue strongly affects learning French as an L3 in the English–French bilingual program in Toronto. Iamroz (2018) explored teachers' and multilingual students' thoughts on multilingualism and presented the role of the mother tongue when learning English as the L3. Additionally, the teachers' attitudes towards multilingual education were investigated to show how linguistic diversity influenced teaching practice in the English-as-a-foreign-language classroom. The research presented how English language teachers used various teaching methods to meet learners' needs with multilingual linguistic backgrounds.

Swain et al. (1990) conducted qualitative interviews with five teachers from three different schools and nine students (aged 13–16 years) with diverse ethnic backgrounds and different L1s. The multilinguals' L2 was Norwegian, and the L3 was English. Some of the participants had more than one L1. Newly arrived students used their mother tongues as a reference point when learning their L2 and L3. However, teachers only considered the students' L2, Norwegian, when teaching English. Under those circumstances, newly arrived students would be challenged when learning English because they were still at a low level of proficiency in Norwegian. English educators had scarce multilingual knowledge, which affected their teaching strategies and resulted in a lack of multilingual pedagogy training.

Pedersen (2016) also examined English teachers' multilingual competence in teaching multilingual children in Norwegian schools. The research results showed that English teachers did not fully understand multilingualism's complexity during L3 teaching. Further, English teachers lacked sufficient multilingual abilities to teach L3 English to multilingual students.

Metalinguistic awareness is another topic frequently mentioned in L3 acquisition. Metalinguistic awareness is the capacity to identify, evaluate and manipulate language form

(Gombert, 1992; Koda, 2005). According to the target language units that are processed, subcategories of metalinguistic awareness are defined. Phonological awareness refers to knowledge of the phonological units of spoken language (syllables, onset, rimes and phonemes) (Goswami & Bryant, 1990; Tunmer et al., 1988). Understanding morphologically complicated words requires an understanding of morphemes (free morphemes and affixes) and word-formation rules (Kuo & Anderson, 2006). Awareness of acceptable spelling patterns in written language is referred to as neorthographic awareness. Syntactic awareness, discourse awareness and pragmatic awareness refer to metalinguistic awareness on advanced levels of language structures, such as word order, kind of passage structure and acceptable language use in a given scenario, respectively (Grabe, 2009).

Before discussing metalinguistic knowledge, definitions of implicit knowledge and explicit knowledge will be clarified. Implicit knowledge is gained through non-conscious acquisition, while explicit knowledge is obtained through a conscious learning process; therefore, 'the outcome of acquisition is (implicit) *competence* and the outcome of learning is (explicit) *knowledge*' (Paradis, 2009, p. 1). Rothman et al. (2019) explained that the speaker was not consciously aware of implicit knowledge, which enabled the speaker to produce and understand well-formed sentences. They asserted that explicit knowledge was consciously stored in the speakers' memory, and they were aware of its existence.

Metalinguistic awareness refers to a learner's ability to think of and perceive language. It is likely to be among the most important factors that contributed to increasing multilinguals' ability to learn a language, including phonological awareness, word awareness, syntactic awareness and pragmatic awareness (Jessner, 1999). Jessner (1999) noted that language development in two or more languages promoted higher metalinguistic awareness levels, which facilitated language acquisition by developing the cognitive mechanisms in the process of

transferring and enhancement. The introspection study presented the role of metalinguistic awareness by using a systems theory approach and a framework called the Dynamic Model of Multilingualism. The cognitive aspect of language learning affects the trilinguals' performance, explaining why L3 acquisition differs from L2 acquisition. The participants in Jessner's (1999) study were Italian–German bilingual adults learning English as an L3 at Innsbruck University. The respondents thought aloud when they were composing academic writing. The results provided evidence of participants' metalinguistic thinking by using three typologically near languages during academic writing. The data showed that the participants applied strategic skills to compensate for the lack of knowledge. Monolinguals differ from bilinguals in metalinguistic awareness. Jessner (1999) pointed out that acquiring an L3 may further enhance cognitive development and facilitate the L3 acquisition process. Nevertheless, most studies about metalinguistic awareness were on languages of the Indo–European family (examples in Jessner, 1999; Hofer & Jessner, 2019).

Most of the other studies discussed the effects of bilingualism on the acquisition of English as an L3. Cenoz and Valencia (1994) researched the Basque Country to evaluate the effects of Basque and Spanish on English, which was taught as a foreign language. They demonstrated that using an L2 (Basque) as the instruction language positively affected L3 (English) acquisition for students whose L1 was Spanish, the dominant language in the community. Using Basque as an instruction language enables native-Basque speakers to acquire positive linguistic outcomes in acquiring an L3 (English).

Pilar and Errasti (2003) measured participants' writing skills (an informal letter and a recipe in Basque, Spanish and English) monthly for three months. They found that students with high proficiency levels in L1 and L2 would benefit most from their bilingualism. The instruction language was Basque, which was the minority language. The adolescents used

Spanish as their majority language and English as a foreign language. The results indicated that all the adolescents are highly competent in Basque and Spanish, but among the participants who used Basque, most obtained higher scores in the L3 of English.

However, not all studies presented the positive effects of trilingualism. Some studies on L3 acquisition reported no differences between bilinguals and trilinguals, which may be caused by methodological differences, such as measuring methods, among studies. Anja (2017) investigated trilinguals and bilinguals who participated in the German–English immersion program, and the results indicated that no significant differences were found by measuring English grammar and reading skills. The study was a one-year longitudinal study. The participants (47 bilinguals in the majority language group and 52 trilinguals in the minority language group) were from a public primary school in Germany that provided a musical and German–English immersion program. The participants in the immersion program were exposed to English and German for about half of their teaching time. The students were measured through the ELIAS Grammar Test 2 (the EGT-2), the Australian Test of Reading Comprehension and the parent questionnaire. The data were analysed using analysis of variance (ANOVA) and linear regression analyses. Anja (2017) concluded that grammar influenced reading comprehension, and there were reverse effects of reading to grammar. The results showed that trilinguals performed similar to their peers in English grammar and reading tests, which indicated that the language background of the children did not influence English grammar and reading comprehension.

2.1.2.1 L3 Acquisition Models

Among the L3 acquisition topics, a compelling topic was understanding how L1 and L2 interacted with the L3 while learning a new language and whether the previous languages would affect L3 acquisition. Some linguists (Bardel & Falk, 2007; Flynn et al., 2004; Rothman,

2010a; Rothman et al., 2013) explored whether the previously acquired language knowledge interacted with L3 development and the changes that resulted in a learner's understanding of languages during the process of acquiring the L3. The evidence in the literature affirmed the idea that previous language experiences could influence L3 learning. Thus, the issue was how previous knowledge influenced the learner's L3 acquisition: is the transfer from the L1 or L2 or from both languages (Rothman et al., 2013). The following section will present four models of L3 acquisition.

2.1.2.1.1 CEM

The CEM asked whether only an L1 played a role in developing an L3 or both the L1 and L2 affected L3 acquisition (Flynn et al., 2004). The CEM was developed from a hypothesis that when acquiring a language, L1 was not more activated than other previously acquired languages. However, Flynn et al. (2004) demonstrated that L3 transfer could be from any language system that learners already possess. Further, prior language knowledge influenced new language acquisition, showing that language learning is cumulative.

Flynn et al. (2004) sought to examine their hypothesis by conducting a study of English restrictive relative clause production in adults and children who were learning English as L3, Kazakh as L1 and Russian as L2. English, Kazakh and Russian are in SVO (subject+verb+object) order. Kazakh has a head-final, left-branching structure, like Japanese. By contrast, Russian and English are head-initial and right-branching languages. Therefore, the participants' L2 shared characteristics with the L3. Flynn et al. (2004) debated that if there was an influence on L3 English from prior languages, it should be from L2 Russian, not from L1 Kazakh. The results showed that L2 Russian could influence the development of clause production structures in L3 English acquisition, and previous language acquisition experience would benefit any subsequent language acquisition. They proposed the CEM, which was

supported by the study, explaining that any previous linguistic knowledge of a language either enhanced successive language acquisition or remained to be not obtained, stating 'Language learning is cumulative. All languages known can potentially influence the development of subsequent learning. The learner's L1 does not play a privileged role in subsequent acquisition' (Flynn et al., 2004, p. 5).

Flynn et al. (2004) emphasised that a facilitative effect can come from any previously acquired or learned languages, either the L1 or L2, and the multilingual transfer was only facilitative: 'Where appropriate, other languages known can enhance subsequent language acquisition. This claim contrasts with models that either implicitly or explicitly characterise subsequent language learning fundamentally in terms of a deficit model (e.g., negative transfer, and interference)' (Flynn et al., 2004, p. 5).

Thus, language learning was a cumulative process, and the previously acquired languages either positively affected the acquisition of new languages or remained neutral for transfer if non-facilitative. This model did not predict non-facilitative influence.

2.1.2.1.2 L2SFM

Bardel and Falk (2007) proposed the L2SFM, which states that L2 is more likely to be transferred than L1 in the initial stage of L3 acquisition. To prove the hypothesis, Bardel and Falk (2007) recruited two groups of participants. One group involved five participants (all females, L3 Swedish learners aged 21–23 years). Another group consisted of four participants (one female, three males) with either Dutch or Swedish as L3 learners. The target languages, Dutch and Swedish, are verb-second (V2) languages, which means when considering word order, negation is after the verb in the main sentence. The study compared two groups of participants by measuring sentence negation placement. One group's L1 was a V2 language, but their L2 was not. By contrast, the other group's L2 is a V2 language; however, their L1

was not. All participants were new to the L3 language, so they were in the initial stage of L3 learning. Bardel and Falk (2007) aimed to test the syntactic transfer status, which focused on the hypothesis of L2 dominant transfer. Results revealed that at the beginning stage of L3 acquisition, syntactic structures are transferred more easily from the L2 than from the L1. Bardel and Falk (2012) stated that the L2SFM was important to studying adult language acquisition in formal environments (e.g., in classrooms) due to the higher cognitive similarities between the L2 and L3 than the L1 and L3.

The L2SFM is more focused on the sequential language learner. In other cases of the language learning process—for example, in learners who acquired two L1s at an early age, like the simultaneous language learners in this study—it was complex to determine which language was an L1 and which was an L2. These learners had acquired two language systems before learning their L3. Therefore, L2SFM does not apply to this thesis.

2.1.2.1.3 TPM

Typology is theorised to refer to 'language distance' (Božinović & Perić, 2021, p. 12). Cenoz et al. (2001a) concluded that if an L2 and an L3 were typologically related, the connection between the L2 and L3 would be stronger than between an L1 and L3 that were not typologically related. Cenoz and Hoffmann (2003) ascribed transfer to typology, saying that transfer was related to whether the form was typologically universal or not. Speakers tended to borrow more terms from the language that was closer in type to the target language (Cenoz et al., 2001a). Therefore, the speaker's linguistic knowledge influenced the amount of language transfer.

TPM indicates that L3 transfer is affected by the typological proximity of the target L3 compared to the other previously acquired linguistic systems. The transfer happens

unconsciously from the prior language that is similar to the L3, and that language was the source of transfer for the L3.

Leung (2003) first proposed that typologically related language was more likely to transfer to an L3 in the early stages of L3 learning. This proposal was based on the experimental results of 84 Cantonese–English bilingual undergraduate students who were learning French as their L3. The participants were divided into three groups: L3 French beginners (L3 initial state), L3 French intermediate learners (L3 development or transitional state) and L3 French advanced learners (towards the L3 steady state). The measurements were an elicited written production (composition) task on [± past], another elicited written production (sentence completion) task and a grammaticality preference task. The findings demonstrated that in the initial state of L3 learning, the full transfer to L3 French was from L2 English, which was a typologically similar language compared to L1 Cantonese.

Using the same principle, Rothman (2010a) proposed an L3 acquisition model called TPM, which hypothesised the initial wholesale transfer from the typologically closest language in terms of cognitive economy. Rothman (2015) argued that:

> If the transfer is essentially reflexive to avoid redundancy in the acquisition and thereby lessen the cognitive burden of an additional grammar, it should then obtain as early and completely as possible to be maximally useful towards these fundamental goals. (p. 184)

Rothman (2010a) defined TPM as follows:

> Typological Primacy Model: Initial State transfer for multilingualism occurs selectively, depending on the comparative perceived typology of the language pairings involved, or psychotypological proximity. Syntactic properties of the closest (psycho)typological language, either the L1 or L2, constitute the initial state

hypotheses in multilingualism, whether or not such transfer constitutes the most economical option. (p. 112)

The TPM was a modified version of the CEM, but the TPM differs from the CEM by indicating the possibility of non-facilitative transfer, which is based on typological proximity. To test the TPM, Rothman (2010a) recruited 60 participants, including 33 native-Spanish or native–Brazilian Portuguese speakers in the control group. L3 learners were divided into two groups: one group included 12 learners (Italian as an L1, English as an L2 and Spanish as an L3), while the other group included 15 native-English speakers (English as an L1) with Spanish as an L2 and Brazilian Portuguese as an L3. The L3 participants completed linguistic history background questionnaires that explored their L2 and L3 experience, a cloze test and a general grammar test to assess L3 participants' L2 and L3 proficiency. The study used a semantic interpretation task and a context-based collocation task to test the participants' syntactic and semantic properties of the Romance determiner phrases. From the task results, Rothman (2010a) concluded that typological proximity could be the strongest factor for multilingual syntactic transfer.

To test the TPM, Rothman (2010b) measured word order and relative clause high and low attachment preference at the beginning stage of transfer in L3 Brazilian Portuguese. The study found that the transfer was from Spanish to Brazilian Portuguese as an L3, not from English. The study involved 61 participants divided into five groups: 10 English speakers, 10 Brazilian Portuguese speakers, 10 Spanish speakers, 15 L3 native-Spanish speakers and 16 L3 native-English speakers. The results showed that in both L3 groups, the transfer was from Spanish, regardless of whether Spanish was the participants' L1 or L2. As Spanish and Brazilian Portuguese are from the same Romance language group, which belongs to the Indo–European language family, Spanish is a typologically closer language to L3 Brazilian

Portuguese than English. The study findings supported the TPM but did not support the CEM or the L2SFM. According to the TPM, the transfer was either facilitative or non-facilitative.

2.1.2.1.4 LPM

LPM was developed based on the CEM and TPM, considering the similarities among languages were the major factor in transfer, not the sequence of the language acquired (Westergaard et al., 2017). The LPM is defined as follows:

> L*n* acquisition involves incremental property-by-property learning and allows for both facilitative and non-facilitative influence from one or both previously acquired languages. Crosslinguistic influence occurs when a particular linguistic property in the L*n* input reveals abstract structural similarity with linguistic properties of the previously learned languages. (Westergaard et al., 2007, p. 670)

This definition of the LPM revealed that bilinguals would benefit from prior language knowledge when learning an L3, regardless of whether they had two L1s or an L1 plus an L2. To test the LPM, Westergaard et al. (2017) investigated cross-linguistic effects in L3 English learning among three participant groups: 46 Norwegian monolinguals, 31 Russian monolinguals and 22 Norwegian–Russian 2L1 bilinguals. The linguistic phenomena related to V2 word order in Norwegian and the corresponding residual V2 property of English were measured using a grammaticality judgement task. The results suggested that Russian had a significant facilitating effect on L3 English, although Russian was involved in a different typological group to English and Norwegian. By contrast, the study also showed the non-facilitative effect from Norwegian to L3 English. Therefore, according to the LPM, all prior languages were active during the L3 learning process, and cross-linguistic influence depended on the similarities of each linguistic property and the properties of the L3. Westergaard et al. (2017) said cross-linguistic influence was either facilitative or non-facilitative.

This review of the models suggests that in the initial stage of L3 learning, an L1 was not necessarily the default source of the transfer. The CEM advocated that linguistic acquisition was cumulative; previously acquired languages had a facilitative effect on the learners' additional language learning. The TPM was a modified version of the CEM, which discussed the source of the transfer. An L3 took advantage of its similarities with the prior language knowledge and chose the one beneficial to L3 learning, regardless of whether it was L1 or L2.

2.2 Language Transfer

The previous section on the models of prior language learning essentially comprised a larger concept called language transfer, where the knowledge of an L1 or L2 affected how the L3 was processed. Cross-language transfer was affected not only by the identified factors (e.g., typology, linguistic distance) but also by other factors, such as L2 status in acquiring an L3. Some scholars posit that typology plays a decisive role in cross-linguistic transfer (Cenoz et al., 2001a; Hammarberg, 2001; Rothman, 2010a).

Researchers regularly mention cross-linguistic influences while exploring L3 acquisition. Božinović and Perić (2021) studied the role of previously acquired languages (Croatian as L1, English as L2) in German or Spanish L3 acquisition and focused on cross-linguistic influences. The study investigated language typology relationships, formal similarities and differences, and transfer and error production. Due to the large portion of English vocabulary sourced from Romance and Latinate languages, Božinović and Perić argue that the strongest L2 (English) influence was detected in the lexicon. Conversely, Croatian, German and Spanish were morphologically similar and had more-complex inflectional morphology than English (Božinović & Perić, 2021). They confirmed that lexical and grammatical similarities between L2 English and L3 German and Spanish influenced L3 learning.

Cross-linguistic transfer may happen among different alphabetic languages as they rely on common phonological processes and fundamental alphabetic principles (Li et al., 2012). Li et al. (2012) researched English and Chinese phonological awareness effects on English reading achievement and whether the naming speed interacted with English reading achievement. The study also presented evidence of cross-linguistic transfer in Chinese-English immersion students. The researchers randomly selected 159 students from grades 2 and 4 from three schools in China—96 were from English immersion programs, and the other participants were from non-immersion programs. English measurements included the Cambridge Young Learners English test for reading and writing, English sound detection and a rapid automatised naming test. Chinese measurements contained the mathematics achievement in Chinese, Chinese sound detection, Chinese tone detection and a rapid automatised naming test. The results showed that English phonological awareness significantly predicted participants' English reading achievement, and the effect increased in grade 4 participants. This result may be due to the grade 4 students' learning of spelling and phonology, which increased their attention to sounds and letters and more strongly related to their English phonological awareness. The naming speed and mathematic results showed that students from both grades in English immersion and non-immersion programs performed equally. The study presented no clear evidence for cross-linguistic transfer resulting from the proposed 'great differences between Chinese and English' (Li et al., 2012, p. 443).

Language transfer may occur during the first few months of L3 acquisition or even longer when the learners have lower proficiency in the target language (Rothman et al., 2019). Rothman et al. (2019) demonstrated that investigating the beginning of L3 acquisition is essential to understanding how a trilingual acquires an L3. A good understanding of L3 acquisition commencement, then moving to the whole process of L3 acquisition (i.e., from the

beginning point of L3 acquisition to intermediate and advanced stages of developing the target language) helped build a clearer understanding of the L3 acquisition process.

Rothman et al. (2019) presented several reasons for considering how L3 acquisition began. First, if the grammar of L1 or L2 (or both) is transferred partially or completely after exposure to L3, the consequences were more obvious during the initial stages of L3 acquisition than in the other stages. Second, the beginning status of transfer predicts the implications for the L3 interlanguage from the initial to advanced stages of acquiring the target language. Other reasons were associated with the nature of the transfer. If the L1 or L2 matched the target language, the L1 or L2 (or both) promoted the L3 learning with facilitative effects. Otherwise, the mismatching led to non-facilitative results or showed off-target performance. In the transfer facilitation model (Koda, 2008), metalinguistic awareness was an effective demonstration of language competency, essentially a transferrable skill in information processing across languages. If a reader developed L1 metalinguistic awareness and a similar language processing skill was required in an L2, then this ability facilitated L2 reading (Zhang et al., 2016). Accordingly, learners' well-developed L2 metalinguistic awareness benefitted their L1 reading development (Zhang et al., 2016).

Yang et al. (2017) used meta-analysis to investigate the cross-linguistic transfer between Chinese and English of four factors: phonological awareness, decoding skills, vocabulary and morphological awareness. They found moderate meta-correlations between Chinese L1 phonological awareness and English L2 phonological awareness (n = 3,001, aged 3–13 years). Their findings for morphological awareness showed negligible correlations between the L1 and L2 morphological awareness (n = 1,070, aged 5–12 years). The significant cross-linguistic transfer between Chinese and English occurred in phonological awareness, decoding and vocabulary, but not morphological awareness. The authors concluded that the

linguistic distance between the L1 and L2 did not hinder the two languages' development, and there was a positive transfer from one language to another.

Research has studied cross-linguistic transfer between Mandarin Chinese and English, particularly in terms of phonology, orthography and morphology. Shu et al. (2000) and Wang et al. (2005) examined phonological and orthographic processing in primary school students. Shu et al. (2000) found that the phonetic awareness of the participants developed continuously during primary school education. Wang, Yang and Cheng (2009) investigated English and Chinese word-reading skills as well as phonological, orthographic and morphological awareness in primary school Chinese–English bilingual students (mean age of 6.81 years). The results showed that Chinese onset awareness contributed to English real-word and pseudoword reading. Chinese tone awareness was transferred to English real-word reading. The researchers discovered cross-language phonological transfer from Chinese to English but not in reverse. Cross-language morphological transfer happened in both ways, but no significant cross-language transfer was found in orthography.

The cross-language phonological transfer probably occurred because of the similarities between the home and target languages. Learning the Chinese Pinyin system may facilitate the phonological transfer from Chinese to English (Wang et al., 2005). Wang et al. explained that the Chinese onset matching skill was highly related to English onset and rime matching skills. Lin et al. (2018) also tested onset and rime in addition to phoneme awareness, compound structures and polysemy for primary students whose mean age was eight. The findings revealed that Chinese rime awareness significantly affected English reading comprehension. Moreover, Chinese rime awareness directly affected English word reading, and Chinese compound structure awareness indirectly affected English word reading through the awareness of English compound structure.

This doctoral study compared monolingual and bilingual speakers. In the literature, only a few researchers (Nan, 2009; Zhang, 1998, 2001; Zhang et al., 2015) have studied language transfer among ethnic Korean–Chinese participants. Zhen'ai Zhang is the very person who began to do the research in this area. Zhang (1998) proposed a teaching and learning model in China that emphasised the positive effects of Mandarin and Korean on learning English. The model was intended to use a 'double-positive transfer' based on the contrastive analysis developed by Fries (1945) and Lado (1957). Lado (1957) wrote:

> In the comparison between native and foreign language lies the key to ease or difficulty in foreign language learning … Those elements that are similar to [the learner's] native language will be simple for him [sic], and those elements that are different will be difficult. (pp. 1–2)

Cross-linguistic transfer can also be found between Korean and English in phonological, orthographic and morphological awareness (Yeon et al., 2017) or one perspective of the above awareness. Yeon et al. (2017) examined whether Korean phonological, orthographic, morphological and metalinguistic awareness contributed to English spelling skills. Pseudoword spelling and vocabulary were the English tasks. Korean phonological awareness tasks included an initial phoneme detection task and a final phoneme detection task. The Korean orthographic awareness tasks were orthographic choice and homophone choice tasks. The Korean morphological awareness tasks were morphological relatedness tasks and morphological derivational/decomposition tasks. They found that Korean metalinguistic awareness significantly contributed to English spelling among 287 Korean children in grades 4, 5 and 6 (mean age = 10.8 years). Korean morphological awareness and Korean phonological awareness played unique roles in English spelling.

Korean monolingual learners took advantage of Korean metalinguistic awareness while learning English. Kang (2012) found that Korean–English bilingual children had an advantage over monolingual children in performing Korean and English phonological awareness tasks. However, Korean orthography did not promote English spelling, possibly due to the orthographical differences between Korean and English. Like language transfer from Mandarin to English, morphological awareness in derivational and compound morphemes of Korean significantly contributed to English vocabulary and reading comprehension (Bae & Joshi, 2017).

2.3 Comparison of Bilinguals and Monolinguals Learning an L3

As discussed in Chapter 1, in this study, 'bilinguals' refers to those who had acquired two L1s (Korean and Mandarin Chinese) from birth before learning English as an L3 in primary education. 'Monolinguals' refers to students with one L1 (Mandarin) and have been learning English since primary school.

With this background, the following questions have been asked:

- Is learning an L3 the same as learning an L2 for bilinguals?
- Is it easier for bilinguals than monolingual learners to learn English?

With these questions in mind, publications were sought that compared bilingualism to trilingualism or multilingualism. As discussed, L3 acquisition has been considered part of L2 acquisition, so the differences between bilingualism and trilingualism have been neglected. Since the 1980s, more researchers have investigated the differences among monolinguals, bilinguals and trilinguals. In the late 1980s and early 1990s, several researchers presented that multilinguals were more flexible in using learning strategies than monolingual learners (McLaughlin & Nayak, 1989; Nation & McLaughlin, 1986). Bild and Swain (1989) highlighted that bilinguals acquired higher scores on French proficiency tests than monolinguals. Brohy

(2001) also demonstrated the acquisition of French as an L3 by Romansch–German bilingual participants. The bilinguals were compared with the German-speaking monolinguals. The results indicated that by measuring French acquisition, bilinguals obtained higher scores than monolinguals.

Trilingual learners were frequently compared to bilinguals or monolinguals when espousing the advantages of learning an additional language. When induction courses began in Canada in the 1960s, it was widely accepted that learning an L2 harmed children's language development (Baker, 1993). However, the belief of the detrimental effects of bilingualism was corrected as an exception, not a rule (Brohy, 2001; Jessner, 1999).

In the late 1980s and early 1990s, several researchers agreed that multilingual learners were more flexible in using learning strategies than monolingual learners (McLaughlin & Nayak, 1989; Nation & McLaughlin, 1986). Bild and Swain (1989) presented that bilinguals acquired higher scores on French proficiency tests than monolinguals. Brohy (2001) also demonstrated the acquisition of French as an L3 by Romansch–German bilingual participants. The bilinguals were compared with the German-speaking monolinguals. The results indicated that by measuring French acquisition, bilinguals obtained higher scores than monolinguals.

Bilinguals were frequently compared to monolinguals using variables like intelligence (Peal & Lambert, 1962), metalinguistic awareness (Bialystok, 1991), cross-linguistic transfer and vocabulary (De Houwer et al., 2014), all of which positively affected bilingualism. For example, Peal and Lambert (1962) tested 10-year-old participants from six French schools in Canada. Any 10-year-old child was included in the experiment, regardless of their school grade. Each participant was asked to complete a questionnaire that collected information about the language history and their father's occupation. Participants needed to complete three tests (Measures of Intelligence, Measures of Attitude, and Achievement Measures) to establish

whether they were balanced bilinguals. SES—an important variable—was considered when analysing the data. The verbal and non-verbal intelligence test results showed that bilinguals performed significantly better than monolinguals in both tests. De Houwer et al. (2014) tested vocabulary production and comprehension by comparing 31 firstborn bilinguals (Dutch and French) and 30 firstborn monolinguals (Dutch). They indicated that lexical comprehension advantages of bilinguals at 13 months, whereas, at 20 months, monolinguals had advantages for Dutch comprehension. No significant differences were found between bilinguals and monolinguals for word production at 13 months or 20 months.

Most other studies have discussed the effects of bilingualism on the acquisition of English as L3. Cenoz and Valencia (1994) researched the Basque Country to evaluate the effects of Basque and Spanish on English, which was taught as a foreign language. They demonstrated that using an L2 (Basque) as the instruction language positively affected L3 (English) acquisition for students whose L1 was Spanish, the dominant language in the community. Using Basque as an instruction language enabled native-Basque speakers to acquire positive linguistic outcomes in acquiring an L3 (English). Cenoz and Valencia used regression analyses involving cognitive, sociostructural, sociopsychological and educational variables to conclude that literacy in two languages facilitated L3 acquisition. The results showed that intelligence, motivation, age and exposure were good predictors of English achievement. Positive linguistic outcomes were found in the immersion of the native language reinforcement (Basque) for Spanish-speaking and Basque-speaking students.

Sanz (2000) used hierarchical multiple regression analysis to show that Catalan–Spanish bilingualism positively affected English as L3 learning processes from a cognitive perspective. The study involved 201 participants (77 bilinguals and 124 trilinguals), 62% of whom were males. The participants were from two private high schools in Spain that shared

government-generated standards, regulations, goals and educational approaches. Catalan–Spanish bilinguals completed the questionnaires to show their daily usage of Catalan and Spanish. Almost half were born into bilingual families. The Spanish monolinguals lived in a monolingual area and had been exposed to only one language. The measurements were a questionnaire, the Raven's Progressive Matrices Test (intelligence), exposure to English (formal and informal exposure), motivation to learn English, attitudes towards the British and United States population and the varieties of English. The Spanish monolinguals answered the questionnaires and other tests in Spanish, while Catalan–Spanish bilinguals used Catalan. The results showed a positive relationship between Catalan–Spanish bilingualism and English as an L3, which aligned with the findings in English-speaking Canada (Swain et al., 1990) and Basque Country (Cenoz & Valencia, 1994).

However, not all studies demonstrated the positive effects of trilingualism. Some studies on L3 acquisition reported no differences between bilinguals and trilinguals, which may be caused by differences between studies, such as measuring methods. Anja (2017) investigated trilinguals and bilinguals who participated in the German–English immersion program, and no significant differences were found in English grammar and reading skills.

Zhang (1998) argued that Korean–Chinese bilinguals could utilise their knowledge of Korean and Mandarin Chinese to adopt a variety of flexible strategies to compare Mandarin Chinese and English or Korean and English. From this, trilingual learners may form a double-positive transfer and reduce negative transfer, which will help them fulfil the elementary stage of learning English. English education, which is learned based on Korean and Chinese learning experience, has its advantages, but the most fundamental point is that for this benefit to arise, bilinguals must understand their first two languages correctly.

Zhang (2001) conducted an experiment to prove the existence of double-positive transfer with 48 grade 3 primary school students. Participants from two different primary schools (one was an ethnic Korean primary school, and the other one was a Chinese monolingual primary school) were equally divided into four groups (two from the ethnic Korean primary school, two from the Chinese monolingual primary school). The study did not mention whether one of the participants' learning languages was Mandarin Chinese, but, according to the curriculum guide, the teaching language was assumed to be Mandarin. The duration of the experiment was four months, with 40 teaching hours. The teaching contents for the four experimental groups were the same and included alphabet learning; phonetic transcription and pronunciation; vocabulary learning; simple structures; the usage of *do*, *be* and *have*; and everyday conversation patterns. The teaching contents, schedules and assessments were the same for each group and only differed in teaching strategy. The results showed that Korean–Chinese bilinguals had an advantage in learning English compared to Chinese or Korean monolingual speakers, confirming the possibility of using the double-positive transfer to promote English learning. Though the research presented the double-positive transfer of children in primary education, Zhang did not mention what specific linguistic aspects—such as phonology, morphology, syntax, semantics and pragmatics—were tested during the experiment to reflect the positive transfer. Further, Zhang did not mention whether phonological or morphological awareness positively affected language transfer from Chinese or Korean to English. Therefore, the current study aimed to investigate the possibility of transfer from Mandarin and Korean to English from the perspectives of morphological awareness and phonological awareness.

In the literature, when searching for the articles on the topics of language transfer involving phonological and morphological awareness is considered separately from Mandarin

to English or from Korean to English. For the combination of Korean and Mandarin L1s, whether phonological and morphological awareness of L1s influenced English learning was unknown.

2.4 Phonological Awareness

This section briefly introduces English phonology, phoneme and phonological awareness. Next, it assesses the English phonological awareness, Mandarin phonological awareness and Korean phonological awareness literature.

A phoneme is the smallest sound unit that does not have a meaning but may cause a meaning change in a language (Brown & Brown, 2005). For example, the English phoneme /t/ occurs in words like *hat*, *cat* and *kit*. Dixon et al. (2012) defined phonological awareness as 'the ability to analyse and manipulate units of sound in speech' (p. 372). Phonological awareness includes the conscious competence to identify and manipulate sound structure in oral language (Liberman & Shankweiler, 1985). This includes syllables (suprasegmental features), onsets and rimes (structural units of a syllable) and phonemes (a segmental feature). Syllabic awareness is the ability to be aware of the syllable composition of spoken words. A syllable is a unit of speech sound that contains a vowel, with or without consonants, usually composed by onset and rime. The onset is the initial consonant or consonants in a syllable, and the rime contains the vowel and the remaining consonant(s) in that syllable. For example, the word *silver* has two syllables: *sil* and *ver*. In the syllable *sil*, /s/ is the onset and /il/ is the rime. In the syllable *ver*, /v/ is the onset and /er/ is the rime. Onset and rime awareness is the onset and rime identification in a syllable. Phoneme awareness means that one can divide a syllable into a sequence of the smallest speech units. For instance, in the word *mind*, there are four phonemes: /m/, /i/, /n/ and /d/. Various tasks that reveal phonological awareness skills are sound blending, phoneme deletion, onset and rime detection, and sound oddity.

Phonological awareness in L1 has proven a strong predictor of English reading competence (Blachman, 1984; Gottardo et al., 2001; Wang et al., 2006) across different language backgrounds. Blachman (1984) studied two groups: one group consisted of 34 children from public kindergarten (mean age of 5.74 years), and the other group contained 34 children from grade 1 (mean age of 7.08 years). Participants from both groups obtained general cognitive index test results. Stimulus materials were the McCarthy Scales of Children's Abilities, rapid automatised naming, the Liberman tapping task, and rhyme production. The results showed that rapid naming of letters and phoneme segmentation skills were strongly related to the reading achievements of grade 1 children.

Gottardo et al. (2001) examined participants' phonological, syntactic, reading and orthographic processing skills to assess the correlation between phonological awareness of Cantonese (one of the dialects of Chinese) and English. The researchers used standardised word reading, pseudoword reading and arithmetic problem-solving tests to test English reading. English phonological awareness was tested using rhyme detection, phoneme detection, phoneme deletion, rapid automatised naming and pseudoword repetition measurements. Chinese reading was tested using word recognition, pseudocharacter reading and orthographic–phonological discrimination. Chinese rhyme detection, tone detection, rapid automatised naming and pseudoword repetition were also measured. The 65 participants (31 boys and 34 girls, mean age of 9.9 years) lived in Canada and had Cantonese as their L1 and English as their L2. Gottardo et al. concluded that children's phonological skills in Cantonese (L1) and English (L2) were related to English reading. The Chinese rhyme detection task was a unique predictor of English reading, and the English phoneme deletion task could predict participants' English reading abilities.

Wang et al. (2006) tested whether bilinguals' cross-language phonological and orthographic skills interacted with English reading ability during biliteracy acquisition. The participants were 45 Korean–English bilingual children (aged 6–8 years) in Washington, DC. Most participants' parents were first-generation Korean immigrants, and their home language was Korean. Children studied Korean at a Korean school and English at public schools. The measurements contained a questionnaire and English and Korean tasks. The researcher used a series of English tasks (onset-rime detection, phoneme deletion, orthographic choice, real-word naming, pseudoword naming) to measure English phonological awareness and orthographic skills. Korean tasks were the onset-rime detection task, phoneme deletion task, orthographic choice task, real-word naming and pseudoword reading, and a non-verbal ability test. The results demonstrated that phonological awareness skills in Korean and English, two alphabetic languages, were related. Korean onset detection, rime detection and phoneme deletion were strongly related to English parallel tasks. Korean phonological awareness skills contributed to English phonological and reading skills. Despite the Korean Hangul and English orthographic systems sharing alphabetic principles, they differ in visual forms. Therefore, there was limited orthographic skills facilitation with each other.

Phonological awareness was fully investigated in bilingualism by comparing bilinguals and monolinguals (Kang, 2012). Phonological awareness greatly affected L2 acquisition when the target language was phonologically and orthographically different from the learner's L1 (Kang, 2012). Among the hypotheses, there was sufficient evidence to prove bilingualism provided an academic advantage over monolingualism. For example, Kang (2012) investigated phonological awareness in 70 Korean–English bilinguals (aged 5–6 years old) and 56 Korean monolinguals. The study measurements were phoneme awareness tasks (rime awareness) in both English and Korean, syllables and body awareness in Korean, and vocabulary, letter

identification, word reading and pseudoword reading. The results indicated bilingual children had greater Korean and English phonological awareness than monolingual children. Although bilinguals had less exposure to L1 Korean than monolinguals, bilinguals still outperformed monolinguals. Bilingual children did significantly better on L1 Korean pseudoword reading, but there were no differences in Korean word-reading skills.

Dixon et al. (2012) also posed that a bilingual's orthographic depth of L1 and its syllabic complexity may influence the development of English phonological awareness. They recruited 284 participants in Singapore (168 Mandarin Chinese speakers, 71 Malay speakers and 45 Tamil speakers) with a mean age of 72.29 months. The bilingual participants did not have explicit L1 use because most families in Singapore use mixed languages instead of only using their ethnic languages or English at home. Most (55%) of families used ethnic language to communicate with children, but 31% used mixed languages (ethnic language plus English). Participants developed basic sight word-reading and prewriting skills in English and ethnic languages from the age of three. They learned their ethnic language literacy through various approaches customed with the characteristics of the ethnic languages. For example, Mandarin Chinese learners acquired whole-word memorisation only in kindergarten and learned the Pinyin phonetic system in grade 1. The study measured outcomes using elision, blending words and sound-matching tests. The findings demonstrated that despite the likelihood of phonological awareness transfer from the ethnic language to English, English vocabulary remains crucial for bilinguals to build English phonological awareness. Lower overall levels of English vocabulary (compared with United States monolingual norms) had no effect on the influence of vocabulary on English phonological awareness. This link existed between groups with ethnic languages that varied in orthographic complexity and with varying ethnic language

literacy education. The results indicated that bilingual children's English vocabulary related to their mothers' education would predict their English phonological awareness.

Li et al. (2012) explored whether English and Chinese phonological awareness and naming speed were related to English reading achievement. The participants were 159 students, 79 from grade 2 and 80 from grade 4. Among these, 96 students were from English immersion programs (49 from grade 2, 47 from grade 4), and 63 participants were from non-immersion programs (30 from grade 2, 33 from grade 4). The participants were from three different schools in Dongguan, Guangzhou and Xi'an. The English measurements used the Cambridge Young Learners English test for reading and writing. The initial and final sound detection were used to assess English phonological awareness. The researchers applied a continuous number-naming task to test participants' naming performance. Chinese (Mandarin) measurements included Chinese sound detection (initial and final sound detection), Chinese tone detection, and Chinese rapid automatised naming task. The results showed that English phonological awareness and naming speed predicted English reading achievements for Chinese students in the English immersion program. However, the study found no clear evidence for cross-linguistic transfer, implying that it could be due to the differences between Chinese and English.

Andreou (2007) undertook two English phonological awareness tests among 30 grade 4 trilingual and bilingual students whose mean age was nine years and nine months. The 15 trilingual participants' language background was Albanian as L1, Greek as L2 and English as L3. The trilinguals had learned English for approximately three months, and their home language was Albanian. The other 15 participants were native Greek speakers who had learned English as L2 for three months, and their parents were native Greeks. Both bilinguals and trilinguals took two English phonological awareness tests: a same–different matching test and

a rhyming test. The results indicated that trilinguals significantly outperformed bilinguals in both tests, which meant the trilinguals' English (L3) phonological awareness was better than the bilinguals. The researcher found that the trilinguals' advantage in English phonological awareness increased their ability to distinguish between the three languages and make language choices that enhanced the sensitivity of the phonological units of words.

2.5 Morphological Awareness

This section introduces English morphology, including some key terms, and defines morphological awareness. Next, it presents how previous research has assessed English, Mandarin and Korean morphological awareness.

Morphology studies how words are formed. Understanding word formation in morphologically driven languages, such as Korean, was essential. A morpheme is the smallest unit of a language that provides meaning and cannot be divided further (Cho, 2020), for example, *of*, *go* and *book*, which have one morpheme each. If we add the plural morpheme to *book*, we will receive two morphemes in *books*. The example, *books*, consists of two types of morphemes: a bound morpheme and a free morpheme. *Book* is a free morpheme with meaning, and '-s' is a bound morpheme that is not meaningful. *Disestablishment* comprises three morphemes: *establish* is a free morpheme, and 'dis-' and '-men' are bound morphemes.

Affixes are bound morphemes. A prefix is an affix attached before a free morpheme; an affix that appears after a free morpheme is a suffix, and an infix is within a free or bound morpheme (Cho, 2020). For example, in *disestablishment*, *establish* is the free morpheme. The negative prefix 'dis-' is attached before the free morpheme, and '-ment' is a suffix that comes after the free morpheme and turns the verb *establish* into the noun *establishment*. Derivational affixes such as '-ment', '-ism', '-ness', 'dis-', and 'un-' change the grammatical category of a word and form new words (see Table 2.1). Inflectional suffixes ('-s', '-ed', '-ing', '-er', '-est',

etc.) represent relationships between different parts of a sentence, and they do not change the category of a word (see Table 2.1).

Table 2.1

Examples of inflectional affixes and derivational affixes

Inflectional affixes	Derivational affixes			
Plural nouns: -s	Nouns	Verbs	Adjectives	Adverbs
Possessive nouns: -'s	-ant	-ate	-able	-ly
Present tense third-person singular: -s	-er	-en	-al	-ward
Past tense verbs: -ed	-hood	-ise	-ful	-wise
Past participle: -en	-ment	etc.	-y	etc.
Present progressive: -ing	-ness		-ous	
Comparatives: -er	-tion		etc.	
Superlatives: -est	etc.			

A clear and accurate definition of morphological awareness will provide better guidance for the elements tested in the experiment. Apel (2014) proposed a definition of morphological awareness that considers morphological awareness and morphological production:

> Morphological awareness includes (a) awareness of spoken and written forms of morphemes; (b) the meaning of affixes and the alterations in meaning and grammatical class they bring to base words/roots; (c) how written affixes connect to base words/roots, including changes to those base words/roots; and (d) the relation between base words/roots and their inflected or derived forms. (Apel, 2014, p. 200)

Researchers (Chen et al., 2009; Cho et al., 2008; Zhang & Koda, 2014; Zhang et al., 2014) used a variety of tasks to measure morphological awareness development and its contributions to reading ability. Major types were production tasks, judgement tasks and analogy tasks, and several subvarieties were apparent in each task.

Several researchers (Chen et al., 2009; Cho et al., 2008; Zhang & Koda, 2014; Zhang et al., 2014; Ke & Xiao, 2015; Shen & Crosson, 2023) found that awareness of compound

structure was a strong predictor of developing an L2, namely English reading skills. For example, Zhang and Koda (2014) investigated the contribution of Chinese compound and derivational awareness to Chinese and L2 English reading comprehension. They also aimed to provide evidence of the transfer of compound and derivational awareness in Chinese to facilitate reading comprehension in the L2 and vice versa, and determine whether the linguistic distance between the L1 and L2 would affect the morphological awareness transfer. The study participants were 245 (136 boys, 109 girls) grade 6 students from a public primary school in north-eastern China. The average age of participants was 12.1 years. The participants' L1 was Mandarin Chinese, and they commenced L2 learning from grade 3 with the frequency of four classes per week. Instruments included a questionnaire and several tasks to test the correlation between morphological awareness and reading abilities. The tasks included morphological relation tasks, affix choice tasks, compound structure tasks, morpheme discrimination tasks, picture selection tasks for vocabulary knowledge, and story comprehension tasks. All tasks were tested in Chinese and English. The authors concluded that Chinese compound awareness was a unique contributor to English reading comprehension, suggesting that L1 compound awareness facilitated the reading comprehension of L2. Therefore, L2 learners' metalinguistic awareness of the L1 could be a good resource for developing L2 literacy abilities. However, English compound awareness did not have a cross-linguistic effect on Chinese reading comprehension. When non-verbal intelligence and vocabulary knowledge were considered, derivational awareness showed no significant influence from one language to another.

Ku and Anderson (2003) researched 412 Taiwanese and 256 American public school children in grade 2 (131 Taiwanese, 65 American), grade 4 (145 Taiwanese, 62 American), and grade 6 (136 Taiwanese, 129 American) to explore the development of morphological awareness in Chinese and English. In each grade, two classes of participants were from

working-class families, and the other two classes were from middle-class families. The measurements included six tests: the recognize morphemes test, the discriminate morphemes test, the judge pseudowords test, the select interpretations test, the select vocabulary test and the reading comprehension test. The results showed that both Chinese-speaking and English-speaking students developed morphological awareness along with their grade levels. The study proved that morphological awareness was strongly related to vocabulary knowledge and reading abilities, which explained that understanding the internal structure of words would promote reading development. Chinese students had better compound morphological awareness than derivational morphological awareness, reflecting that there are fewer derivatives than compounds in Chinese.

Few researchers have shown negative effects of L1 morphological awareness on L2 acquisition. Vernice and Pagliarini (2018) concluded that Italian L1 participants outperformed Arabic–Italian L2 participants in morphological awareness ability and reading skills tests. Vernice and Pagliarini (2018) experimented with 53 grade 1–5 participants from a public primary school in Milan, Italy, whose mean age was eight years and two months. The participants were divided into the Arabic–Italian bilingual group and the Italian monolingual group. Furtherly, the monolingual group consisted of two subgroups: L1 beginning readers and L1 competent readers. In the bilingual group, children started to learn the L2, Italian, from the age of three. The parents of the bilinguals completed a simple questionnaire (including parents' jobs and educational levels) to inform the researcher of the participants' exposure time to Italian. The study tested whether exposure length could affect participants' performance in the morphological and reading tasks. Participants performed morphological awareness and lexical tasks, which included the nominal derivational morphological comprehension task, two types of morphological production tasks, and a lexical comprehension task. Meanwhile, reading

speed, accuracy and comprehension scores were collected from the Italian standardised tests: MT-2 reading tests and word and non-word reading tests.

Through these tasks, Vernice and Pagliarini concluded that the L1 Italian beginning readers' morphological awareness seemed to influence word recognition and showed a higher effect on comprehension processes in the upper grades of primary school. In contrast, the data for competent readers showed no contribution of morphological awareness to reading fluency. The researchers also found that derivational morphological awareness predicted reading fluency in children in grades 1 and 2. However, it appeared to only support reading comprehension in grade 3.

Gómez (2009) compared monolingual English speakers to English language learners whose L1 was Chinese or Spanish and found that the characteristics of their L1s influenced English language learners' morphological awareness. The participants were 244 children, including 114 grade 4 and 130 grade 7 students. There were 78 monolinguals, 76 Chinese-speaking English language learners and 90 Spanish-speaking English language learners. English was the instructional language for both monolinguals and bilinguals. The questionnaire responses showed that most English language learners spoke their mother tongues at home. Experimental tools included a family questionnaire, non-verbal reasoning, verbal short-term and working memory, phoneme segmentation–deletion test, the Peabody Picture Vocabulary test, the test of morphological structure, the test of morphological sensitivity, the compound awareness test, word reading and reading comprehension. The researcher conducted four studies, one of which measured derivational awareness and compound awareness. From the aspect of derivational awareness, Spanish-speaking English language learners outperformed Chinese-speaking English language learners. However, Chinese-speaking English language learners performed more like native-English speakers on compound awareness than Spanish-

speaking English language learners. The authors suggested that children's morphological awareness in L1 was related to English word reading (L2), derivational awareness and compound awareness. The extent of English exposure was only associated with Chinese-speaking English language learners' derivational awareness, not with Spanish-speaking English language learners. Morphological awareness was not related to participants' grade.

Labelle (2019) examined whether derivational morphological awareness, word reading and vocabulary knowledge were related to English reading comprehension. The participants were 85 linguistically diverse students from grades 6–8. Fifty-six participants had home languages of Spanish, Portuguese, Chinese, Haitian Creole or Cape Verdean Creole and were learning English as L2. Twenty-nine participants were English monolingual speakers. The study presented that morphological awareness predicted English reading comprehension for bilinguals. English monolinguals' morphological awareness uniquely predicted English reading comprehension. Vocabulary knowledge was also a strong predictor of English monolinguals' reading comprehension. Another finding was that SES was a significant predictor of English reading comprehension.

Labelle (2019) also analysed L2 English reading comprehension based on the bilinguals' L1 background. Among findings, Chinese–English bilinguals had the highest English reading comprehension performance compared to other L2 English reader groups, but no reading variables had positive correlation with English reading comprehension. The study did not find a moderating effect of L1 background on the relationship between morphological awareness and L2 English reading comprehension, with and without SES and district variables.

While researching children who speak several languages, Kuo and Anderson (2006) found that inflectional morphological knowledge was acquired before derivational and compound morphological knowledge, and inflectional morphology knowledge continued to

develop during primary education. Morphological awareness gradually became an important reading predictor when children reached the upper grades. Kuo and Anderson proved that morphological awareness was associated with phonological awareness, syntactic awareness and vocabulary knowledge.

Leonet et al. (2020) recently analysed the English morphological awareness development of fluent bilingual students by testing 104 participants (mean age of 10.67 years) in the Basque Country. Among participants, 51.9% considered Spanish their L1, 26.9% considered Basque their L1, and 21.2% treated both Basque and Spanish as their L1. The results were obtained through a background questionnaire, morphological awareness test, translanguaging questionnaire and focus group discussion. The experimental group with translanguaging pedagogies, which aimed to use their multilingual resources, acquired higher morphological awareness scores than the control group, who were taught with their regular program.

2.6 Overview of Home Languages of Research Participants

This study compares bilinguals' phonological and morphological awareness to monolinguals to investigate whether there are any advantages for trilinguals while learning English. After understanding the characteristics of the participants' home language, it is easier to understand how the study explores the possibilities of language transfer among three languages (for monolingual learners, there are two languages).

2.6.1 Mandarin Chinese

Chinese is the most popular language in the Sino-Tibetan family and is widely spoken worldwide. Almost a quarter of the world's population speaks Chinese as their L1 (Hua, 2002). With the growth of immigration, the number of Chinese speakers increased rapidly outside China. However, not all Chinese speakers use Mandarin Chinese; there are many Chinese

dialects. According to modern Chinese linguistic convention (Han, Arppe, & Newman, 2013; Han et al., 2016; Hua, 2002), the following spoken varieties are recognised dialects in China:

- *Mandarin*, also known as *Putonghua*, is a standardised language variety based on the phonological and grammatical system of the Northern dialect (Beijing dialect-Pekingese) varieties. The Chinese government has promoted Mandarin in mainland China since the 1950s. As a result, it is the major dialect used in mass media and schools in mainland China. The vocabulary of Mandarin is mainly extracted from the northern, central and southwestern dialects of China.
- *Northern dialect* (Pekingese) is the dialect spoken in the urban area of Beijing. Although Pekingese is the phonological basis for Mandarin and is highly like the standard dialect in China, there is no difficulty distinguishing Pekingese and Mandarin.
- *Wu* (Shanghainese) is spoken in the lower Yangtze River region, including urban, metropolitan centres such as Shanghai, which has the second large number of speakers in China. The standard variety is *Hu*. The vocabulary and expressions of Shanghainese are from southern Jiangsu and northern Zhejiang. Sometimes Shanghainese is referred to as *Wu* in English.
- *Yue* is the main language spoken in Guangdong province in mainland China. One variety of *Yue* is Cantonese, which serves as a standard variety of dialects, along with Mandarin in Hong Kong and Macau. Cantonese is also a well-known Chinese dialect spoken by overseas immigrants, so sometimes Cantonese is misused to refer to Chinese. Like other dialects, Cantonese is one of the dialects of Chinese, which can be easily distinguished from Mandarin or other dialects phonetically.

- *Min Nan* (Southern Min) is spoken in the southern part of Fujian, as well as in Taiwan and Hainan islands.
- *Min Bei* (Northern Min) is spoken in the northern part of Fujian (Hokkien) province on the western side of the Taiwan Strait.
- *Gan* is spoken primarily in the south-eastern inland provinces.
- *Kejia* (also known as *Hakka*) was originally spoken by people from small agricultural areas, and it is now scattered throughout south-eastern China.
- *Xiang* is mainly spoken in the south-central region of mainland China.

In the current study, Mandarin Chinese was measured, not other varieties of Chinese dialects. Mandarin is another name for modern standard Chinese.

The Chinese Pinyin (Phonetic System of the Chinese Language) is officially used to mark the pronunciation of Mandarin Chinese; it is a kind of Mandarin phonetic transcription of Chinese characters and transcribes Mandarin Chinese sounds into the Roman alphabet. The Phonetic System of the Chinese Language was endorsed at the 60th meeting of the Plenary Session of the State Council on 1 November 1957 and approved at the Fifth Session of the First National People's Congress on 11 February 1958. The Phonetic System of the Chinese Language contains the alphabet, the initials, the finals, the symbols of tones and the syllable-dividing mark.

The Chinese Pinyin writing system:

- has 26 internationally common letters without adding new letters
- limits the use of additional symbols (only two additional symbols are used)
- does not try to change pronunciation
- uses *y*, *w*, and a soundproof symbol (') to show soundproofing
- uses four double letters *zh, ch, sh* and *ng*

- uses four tone symbols to indicate the four types of tones: *Yinping* (high and level tone), *Yangping* (rising tone), *Shangsheng* (falling-rising tone) and *Qusheng* (falling tone).

Adopts the general alphabetical order of Latin letters, and the names of Chinese Pinyin letters are determined. The features of the Chinese Pinyin system make the language transfer from Mandarin to English possible, and many researchers (Lin et al., 2010) have proven positive transfer from the phonological perspective.

Lin et al. (2010) investigated whether Chinese Pinyin could assist Mandarin-speaking Chinese children in Chinese reading acquisition. The research included 296 kindergarten children in Beijing, China, with a mean age of 77 months. The research used an invented Pinyin spelling method to determine whether the children could accurately record what they heard. The results showed the importance of children's early Pinyin skills, and the skills helped them develop Chinese reading. Chinese students learn the Chinese Pinyin spelling system before learning English. The study indicated that phonological awareness in Pinyin enabled phonological transfer from Chinese to English.

Lin et al. (2018) stated that 'a Chinese syllable is traditionally analysed into onset and rime' (p. 111). In the syllables *ba1* and *san3*, /b/ and /s/ are the onsets (the initial consonant), /a1/ and /an3/ are the rimes (the vowel or the vowel plus the final consonant). There are four lexical tones in Chinese. The syllable *yi* has four meanings, possibly, when attached to various tones: *yi1* 一one; *yi2* 移 move; *yi3* 椅 chair, *yi4* 易 easy. The Chinese monosyllable is a mono-morpheme, and the tones differentiate it. The monosyllabic structure is restricted to nine patterns that can occur in Chinese, so many monosyllabic homophones exist. Changing the tone of a syllable is one way of phonological modification, like the example of the syllable *yi* above. The retroflexed ending method is, for example, adding an '-r' sound to a syllable (头儿

tour2) leader. As stated by Tiee (1979), 'the process of phonological modification by means of the tonal system and the retroflexed ending has long been unproductive' (p. 245). In modern Mandarin Chinese development, inflectional and derivational affixes become productive. The inflectional forms are limited, whereas derivational affixes are large in number (see Tiee, 1979).

Morphemes are the smallest meaningful units, which can be divided into free morphemes and bound morphemes. For example, in Mandarin, the character 一 /yi1/ (one) is a free morpheme, and if a prefix 第 /di4/ is added, it will become an ordinal numeral 第一 (first). When a suffix (such as 的 /de/) is added to a morpheme, a noun 和平/he2/, /ping2/ (peace) will turn into an adjective 和平的 /he2/, /ping2/, /de/ (peaceful).

A language does not contain enough words and morphemes to represent all the objects, events or ideas; therefore, some words have more than one meaning. In English, *bright* means sunshine, which also can refer to a smart person. Similarly, in Chinese, homonyms also exist that have multiple meanings. 长, with the sound /chang2/, has several meanings:

1. the distance between the two ends, length (used as a noun)
2. large in length, as opposed to *short*; refers to space, but also refers to the time (used as an adjective)
3. advantages, specialised skills (used as an adjective)
4. do something very well (used as a verb).[1]

[1] The character's explanation has been adapted from *Xinhua Dictionary*, an authoritative modern Chinese normative dictionary of the People's Republic of China, edited by the Chinese Social Sciences Academy Languages Institute and published by the Commercial Press. The 12th edition is available in August 2020.

长/chang2/ is also a polyphonic character. With the same character, the pronunciation changes, as does the meaning. 长 with the pronunciation of /zhang3/ has five more meanings:

1. be born, grow up (used as a verb)
2. add ((used as a verb)
3. first in the ranking (used as an adjective)
4. higher in seniority in the family, or older (used as an adjective)
5. host, person in charge of the agency, organisation, etc.

There is one morpheme syllable word, two morpheme syllable words and multi-morpheme syllable words (for more information, see Taylor & Taylor, 2014).

2.6.2 Korean

In this study, the phonological and morphological awareness in Mandarin, Korean and English were analysed with a focus on Korean phonology and morphology. *Hunminjeong'eum* (the original name for Hangul, the Korean alphabet) demonstrated two design ideas: one is that the consonants of Hangul look like vocal organs of pronunciation; another is that the vowels of Hangul are based on *Cheonji'in* (천지인), which refers to the sky (천), earth (지) and human (인), the three elements of philosophy. Due to these features, Korean is considered a simple language to learn. Hangul (한글) is the recent name of the official writing system of the Republic of Korea (South Korea), and it is called *Chosŏn'gŭl* (조선글) in North Korea. In the early twentieth century, the pioneer Korean linguist Chu Sigyŏng (주시경, 1876–1914) coined the Hangul, and *ŏnmun* 언문 ('vernacular writing') was known as the Korean script. *Hunminjeong'eum Haeryebon* (훈민정음 해례본) is the original name for the Korean alphabet, which was invented by King Sejong the Great in 1446. Before *Hunminjeong'eum* was introduced, Chinese characters were used as a writing system. Due to the difficulty of

learning Chinese characters, many lower-class people could not read or write. Therefore, a new alphabet system was needed. Cho (2020) describes the historical background of Korea and more details about the Korean writing system in *Korean: A linguistic introduction*.

Korean Hangul has various systems of Romanisation. Appendix A lists the five best-known Romanisation systems for Korean Hangul. Cho (2020) used the McCune–Reischauer system for Korean words and the Yale system for linguistic examples. In this thesis, Cho's Korean Romanisation method has been followed.

Some features of Korean orthography that must be noted: 'Korean Hangul is an alpha-syllabic language, which has the characteristics of both alphabetic and syllabic writing systems' (Yeon et al., 2017, p. 432). Although Hangul is not in the Roman alphabetic script, it shares the general alphabetic principle with alphabetic languages. Hangul presents consistent and reliable grapheme–phoneme correspondence and shares syllabic characteristics. Hangul is composed of squared blocks (e.g., 한글 /hangul/), not in the linear horizontal sequences (e.g., ㅎㅏㄴㄱㅡㄹ) common in alphabetic writing systems (e.g., English), but grouped into syllable blocks (음절 /umjul/). Syllable blocks demonstrate unique characteristics. The complete set of Korean Hangul letters, as prepared by Taylor and Taylor (2014), is presented in Table 2.2. Cho (2020) showed 19 consonants and 10 basic vowels (as few as seven) (see Table 2.3) in the modern standard (Seoul) Korean, which was categorised by the articulation place and manner of articulation. Korean Hangul syllable blocks contain initial, medial and final positions, arranged top to bottom (e.g., 문 /mun/), left to right (e.g., 마 /ma/) and comprising four letters (e.g., 흙 /heuk/) of the Korean alphabet. The following are some of the primary syllable structures: CV (consonant+vowel) (e.g., 마 /ma/), CVC (consonant+vowel+consonant) (e.g., 문 /mun/), and CVCC

(consonant+vowel+consonant+consonant) (e.g., 흙 /heuk/). Many syllable blocks represent a CVC syllable, with the initial consonant and vowel on the top and the final consonant at the bottom (Park, 2008; Taylor & Taylor, 2014).

For example, 불고기 /pul-go-gi/, which means grill or BBQ, has seven phonemes and shows in three syllable blocks, 불, 고 and 기, rather than a linear horizontal sequence of seven letters, ㅂㅜㄹㄱㅗㄱㅣ. In the example, the first syllable 불 consists of three graphemes (ㅂ, ㅜ and ㄹ) that correspond to three phonemes; the second syllable 고 consists of two graphemes (ㄱ and ㅗ) that correspond to two phonemes. The third syllable in the word is 기, which consists of two graphemes (ㄱ and ㅣ) that correspond to two phonemes. Because of these syllable block characteristics, Korean Hangul is considered an alpha-syllabic orthography rather than just alphabetic (Taylor & Taylor, 2014).

Table 2.2

Complete Han'gŭl letter array

Consonant					Vowel			
Single 14		Doubled 5		Compound 12	Basic 10		Compound 11	
k, g	ㄱ	kk	ㄲ	ㄳ	a	ㅏ	ae	ㅐ
n	ㄴ			ㄵ	ya	ㅑ	yae	ㅒ
t, d	ㄷ	tt	ㄸ	ㄶ	ŏ	ㅓ	e	ㅔ
r, l	ㄹ			ㄺ	yŏ	ㅕ	ye	ㅖ
m	ㅁ			ㄻ	o	ㅗ	wa	ㅘ
p, b	ㅂ	pp	ㅃ	ㄼ	yo	ㅛ	wae	ㅙ
s	ㅅ	ss	ㅆ	ㄽ	u	ㅜ	oe	ㅚ
(-ng)	ㅇ			ㄾ	yu	ㅠ	wo	ㅝ
ch, j	ㅈ	tch	ㅉ	ㄿ	ŭ	ㅡ	we	ㅞ
ch'	ㅊ			ㅀ	i	ㅣ	wi	ㅟ
k'	ㅋ			ㅁ			ŭi	ㅢ
t'	ㅌ			ㅄ				
p'	ㅍ							
h	ㅎ							

Note. Adopted from Taylor & Taylor (2014, p. 184).

A one-syllable block (e.g., 밥 /pap/, cooked rice) can be a word, and two or more syllable blocks also make a word (e.g., 밥상 /pap-sang/, table). Phonemes map to letters consistently on individual syllable blocks (음절 /umjul/, level), but pronunciation changes according to the phonological rules when combining one or more syllable blocks (어절 /eojul/, level). The initial phoneme and grapheme combination rules are straightforward. However, the final phoneme and grapheme combination rules are more complex because seven consonant phonemes (i.e., ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ and ㅇ) are combined into 19 consonant phonemes, occurring in the final consonant positions. For example, the final consonants in 갓 /gat/, 갇 /gat/, 갔 /gat/ and 갖 /gat/ are different, but they are pronounced the same because the consonants ㅅ, ㅆ and ㅎ are pronounced as ㄷ in the final position of a syllable. Besides, in a final consonant cluster combination, the first consonant is not pronounced in 흙 /heuk/. The letter ㄹ /l/ is not pronounced, so the pronunciation of 흙 is the same as 흑 /heuk/. There are other phonological rules, such as coda neutralisation, assimilation of /h/, intersonorant voicing, place assimilation, post-obstruent tensification, Sai-sios, manner assimilations, /n/-insertion and coda cluster reduction (for a review, see Cho, 2020).

Table 2.3

Consonants of Korean and their Hangul representations

	Labial	Alveolar	Alveopalatal	Palatal	Velar	Glottal
Nasal stops	m ㅁ	n ㄴ			ŋ ㅇ	
Lax stops and affricates	p ㅂ	t ㄷ	c ㅈ		k ㄱ	
Tense	pp ㅃ	tt ㄸ	cc ㅉ		kk ㄲ	
Aspirates	ph ㅍ	th ㅌ	ch ㅊ		kh ㅋ	
Lax fricative		s ㅅ				h ㅎ
Tense fricative		ss ㅆ				
Liquid		l ㄹ				

Approximants	w ㅜ/ㅗ	y ㅣ

As shown in Table 2.2, Korean has 21 vowels, 10 basic vowels (e.g., ㅏ, ㅓ and ㅡ) and 11 compound vowels (e.g., ㅖ, ㅒ and ㅐ) (Taylor & Taylor, 2014). Some of the compound vowels, like ㅐ v. ㅒ and ㅔ v. ㅖ, are hard to distinguish, even for native speakers.

In Korean, there are three main types of word formation: derivation, inflection and compounding (Cho, 2020). In derivation, a stem's meaning or grammatical category changes. Cho (2020) explained that when the basic stem is a noun, verb or adjective, the process is called denominal, deverbal and deadjectival derivation, respectively.

In nominal derivation, a noun, verb or adjective can generate a noun by compounding and derivational processes. For example, 욕심쟁이 /yoksim-cayngi/, greedy person, is derived from 욕심 /yoksim/, greed, by adding 쟁이/cayngi/, person, to it. This process is distinct from noun-noun compounding because the second element 쟁이/cayngi/, person, cannot stand alone.

A verb can be derived from a noun, a verb or an adjective. As stated by Cho (2020), 'Korean is well known as an agglutinative language, with a complex system of inflectional suffixes attached to various stem types' (p. 115). An inflectional morpheme is used to create a variant form of a word to signal grammatical information. Several inflectional morphemes exist in Korean, such as 하다, which shows a verb in the present tense; 었다, which shows a verb in the past tense; 을거다, which shows a verb in the future tense; 고 싶다, which shows desire or willingness to do something; 님, an honorifics noun; 는, a token for subject; 를, a token for object; 에, a token for place; and 에, 러, a token for position or direction.

Lexical compounding words are widely used in Korean, partly because of borrowed words from Chinese (Sohn, 2006), and compound words are not limited to borrowed words. The native-Korean word 눈물 /nun mul/ (literally translated as *eye water*, but meaning *eyedrop*) is a compound word. In Korean, like Chinese, nouns are not inflected.

2.6.3 Contrasts Between Mandarin, Korean and English

The bilinguals' languages are from different language groups—Chinese is from the Sino-Tibetan language group, while English is an Indo–European language. Korean typology is controversial, but it is widely accepted that Korean belongs to the Altaic language group (Kim & MacNeill, 2020). Mandarin, Korean and English are three entirely different languages, typologically diverse from each other. Despite their diversity, Korean is influenced by Mandarin and English, phonologically and morphologically. Mandarin has some borrowed words from English, although the number of loan words is smaller than in Korean.

Orthographical contrasts between Mandarin, Korean and English languages will present the differences between the three languages in the writing system. A syntax comparison of the three languages will show similarities between Mandarin and English. For the phonology and morphology section, the focus will be on the similarities between the languages that allow cross-linguistic influence and positive transfer from Korean and Mandarin to English.

2.6.3.1 Orthography

From the perspective of orthography, Korean, Chinese and English have diverse orthographic symbols. Chinese has a relatively opaque sound–symbol correspondence compared to other languages (Ku & Anderson, 2003). Learning to read Korean Hangul and English involves mapping graphemes to phonemes because the two languages' orthographic systems share a fundamental alphabetic principle.

Chinese has a logographic writing system. Mandarin is the standard variety of Chinese. In Chinese, written words and pronunciations are memorised separately. Chinese has a distinct written form compared to English in that Chinese uses strokes to form characters, whereas English uses letters to form words. In alphabetic writing systems, like English, it uses a segmental structure to fulfil phoneme mappings (e.g., /b/-/æ/-/t/ is assembled to make /bæt/). In Hangul, the smallest unit of the writing symbols is a syllable, so Korean is an alpha-syllabic language. For example, 달 /dal/, moon, contains two consonants (ㄷ /d/ and ㄹ/l/) and one vowel (ㅏ /a/). If one of the consonants is changed, the word's meaning will alter. For example, changing the initial consonant in 달 /dal/, moon, from ㄷ/d/ to ㅁ/m/ creates 말 /mal/, horse. In Hangul, the word should be written as a syllable block (e.g., 달) to present the pronunciation and meaning. It should not be written in linear order as isolated symbols (e.g., ㄷ ㅏ ㄹ).

Another difference between alphabetic systems and Chinese is that Chinese is not a linear character. Chinese characters take a square-shaped form. Hangul is also nonlinear, as the symbols are shaped into a syllable block (see the examples in Table 2.4).

Table 2.4

Illustration of Korean, Chinese, and English writing systems

	Chinese	Korean	English
Word	狗	개	dog
Pronunciation	gǒu	/g/ /ɛ/	/d/ /ɔ/ /g/
Meaning	dog	dog	dog

2.6.3.2 Syntax

When considering the grammar of the languages, Korean and Chinese are completely dissimilar. The Chinese language lacks one feature of the Korean language: particle markers.

의, 은, 를 and 에 are particles that are somewhat equivalent to prepositions in the English language. Korean is different from Chinese in tenses, particles, polite form, change of verbs and adjectives, depending on 받침 /batchim/ (the ending sound of the previous word). Chinese is practically 'zero grammar', where sentences are uniquely constructed with Chinese characters that carry their meaning in ninety per cent of cases, with sounds and tenses inferred from context instead of changing the verb's end-form. For example, there are two types of Chinese homonyms: those that share the same characters and pronunciations but have different meanings, such as 生气 /sheng1//qi4/, which means both anger and vitality in Chinese, and those that share the same pronunciations but have different characters and meanings, such as 代价 /dai4//jia4/, which means price or expense, and 待嫁 /dai4//jia4/, which has the same pronunciation but a different character meaning that a girl is waiting to marry. Therefore, pronunciations of some characters in Chinese are inferred from the context. Syntactically, the sentence structure of the three languages is different. For instance,

Chinese: 约翰 爱 玛丽.

John loves Mary

S V O

English: John loves Mary.

S V O

Korean: 죤은 매리를 사랑한다.

John Mary loves

S O V

where S is the subject, O is the object, and V is the verb.

Therefore, while learning English, students tend to choose Mandarin Chinese to understand sentence structure rather than use Korean to analyse sentence structure.

2.6.3.3 Phonology

Mandarin is the most difficult to learn of the three languages because every character represents a sound and meaning. Adopting Chinese Pinyin makes it easier for learners to grasp Mandarin phonology, but learners still need to connect the character and its pronunciation when learning a new character. However, if someone has grasped the Korean phonetic system, they may read out any words in Korean correctly without knowing their meaning. In English, after grasping the phonetic rules, one can read many words, except for some words that do not follow the rules, for example, the loan words that follow the pronunciation of the original words like *café*. Knowing the correct stress of the English words is essential, which is important to forming schwa out of vowels in unstressed syllables and silent syllables.

Similar phonemes exist in Mandarin, Korean and English, enabling the positive transfer from Mandarin to Korean to English. In the initial stage of English learning, learners may realise the similarities between prior language knowledge and English and use these similarities to support their development in English phonological awareness. For example, using Pinyin in Mandarin and the revised Romanisation of Korean enabled the transfer from Mandarin and Korean to English.

2.6.3.4 Consonant Similarity

In L2 acquisition, L2 learners will be affected by their L1 phonological structures through speech contrasts; thus, phonological transfer from L1 plays an important part in L2 phonology (Lin et al., 2014). Although Mandarin, Korean and English have different phonetic systems, they have overlapping sounds, which can be useful for L3 learners to develop English phonological awareness. In Chinese Pinyin, many consonants are pronounced the same as those

in English. Table 2.3 shows the comparison of consonants in Mandarin, Korean and English. In the comparison, British English phonemes were used as fixed items, and then similar phonemes were found in Mandarin and Korean. Each phoneme provided an example. The first column in Table 2.5 shows the English consonants' places of articulation.

Table 2.5

English, Mandarin and Korean consonants comparison

	English IPA	Example	Mandarin	Example	Korean	Example, similar to English
Bilabial	[p]	pie	p	派 /pai4/	ㅍ	풀
Bilabial	[b]	book	b	八 /ba1/	ㅃ	빵
Labiodental	[f]	fish	f	发 /fa1/	—	—
Labiodental	[v]	verb	—	—	—	—
Alveolar	[t]	to	t	甜 /tian2/	ㅌ	토
Alveolar	[d]	day	d	打 /da3/	ㄸ	뚜
Alveolar	[s]	sofa	s	四 /si4/	ㅅ	상
Alveolar	[z]	zoo	z	自 /zi4/	ㅈ	종
Dental	[θ]	thank	—	—	—	—
Dental	[ð]	there	—	—	—	—
Postalveolar	[ʧ]	watch	q	齐 /qi2/	—	취
Postalveolar	[ʤ]	fridge	j	举 /ju3/	—	쥐
Postalveolar	[ʃ]	English	sh	室 /shi4/	—	—
Postalveolar	[ʒ]	television	—	—	—	—
Velar	[k]	cat	k	可 /ke3/	ㅋ	코
Velar	[g]	goat	g	歌 /ge1/	ㄲ	까
Nasals						
Bilabial	[m]	moon	m	妈 /ma1/	ㅁ	모
Alveolar	[n]	name	n	南 /nan2/	ㄴ	눈
Velar	[ŋ]	sing	—	—	ㅇ	응
Postalveolar	[r]	red	r	日 /ri4/	ㄹ	라
Alveolar	[l]	lion	l	老 /lao3/	—	—
Glottal	[h]	hat	h	好 /hao3/	ㅎ	허
Glides						
Labiovelar	[w]	wet	w	闻 /wen2/	—	ㅜ
Palatal	[j]	yawn	y	要 /yao4/	—	ㅖ

Note. The English phonemes were adopted from the British Council phonemic chart.

IPA = International Phonetic Alphabet.

2.6.3.5 Vowel Similarity

English has 19 vowels, including 12 monophthongs and seven diphthongs. Mandarin and Korean have a more complicated vowel system than English. Every syllable in Mandarin is formed by an initial and a final, and finals can be divided into single and plural finals (e.g., ai, ei, ui, ao, ou, iu, ie, üe, er, an, en, in, un, ün, ang, eng, ing and ong).

Table 2.6 shows the vowels comparison among Mandarin, Korean and English. The first column presents the English vowel classification. I tried to find the same or similar sounds to the pronunciation of English vowels in Mandarin and Korean.

Table 2.6

English, Mandarin and Korean vowels comparison

English IPA	Example	Mandarin	Example, similar to English	Korean	Example, similar to English
Monophthongs					
[ɪ]	ship	i	一 /yi1/	ㅣ	이
[i:]	sheep	—	i	—	ㅣ
[ʊ]	book	u	无 /wu2/	ㅜ	두
[u:]	shoot	—	u	—	ㅜ
[e]	left	—	—	ㅐ	대
[ɜ:]	her	—	—	—	ㅓ
[ə]	teacher	e	饿 /e4/	ㅓ	범
[ɔ:]	door	—	—	—	ㅗ
[æ]	hat	—	—	ㅒ	얘
[ʌ]	up	—	a	—	ㅏ
[ɒ]	on	o	哦 /o2/	ㅗ	도
[ɑ:]	far	—	a	—	ㅏ
Diphthongs					
[eɪ]	wait	ei	黑 /hei1/	—	ㅖ ㅣ
[ɔɪ]	coin	—	—	—	ㅗ ㅣ
[aɪ]	like	ai	海 /hai3/	—	ㅏ ㅣ
[eə]	hair	—	—	—	ㅐ ㅓ
[ɪə]	here	—	—	—	ㅣ ㅓ
[əʊ]	show	ou	后 /hou4/	—	ㅓ ㅜ
[aʊ]	mouth	ao	好 /hao3/	—	ㅏ ㅜ

Note. The English phonemes were adopted from the British Council phonemic chart.

Table 2.6 shows that many English vowels can be interpreted through Mandarin and Korean phonemes. Although long vowels, such as [iː], [uː], [ɜː], [ɔː] and [ɑː], are both absent in Mandarin and Korean, learners with previous Mandarin and Korean vowel experience can use existing short vowels in previous language to learn the English vowels. Three diphthongs—[ɔɪ], [eə] and [ɪə]—do not exist in Mandarin but can be transformed from Korean syllable clusters to English phonemes. [ʌ], which cannot be found in Mandarin or Korean, is one of the most difficult sounds to pronounce but the similar sound /a/ can be used to pronounce [ʌ].

From the perspective of word stress, Mandarin Chinese has tones and stress to present changes in a character or word's meaning, which do not differ in phonetic components. Korean does not have tones; it is a non-stress language that presents eminence by pitch range changes and intonational phrasing. In contrast, English is a stress language where pitch accents are related to stressed syllables in eminent words. Pairs of short words in English (e.g., *trusty* and *trustee*) share the same phonemes and can only be distinguished by the stress location.

Korean is a syllable language; the basic syllable structures of Korean are CV, CVC and CVCC, and the individual word stress is not significant. Korean phonological features show that Korean is fundamentally different from English. Korean has many English loan words but follows the phonological rules of Korean (Shin et al., 2012). For example, with the absence of the sound /f/, the English words *file* and *pile* are pronounced the same as [p^{h}ail] in Korean. The /v/ sound is produced as /b/ for the same reason. The syllabic structure of Korean is relatively simple compared with English (Cho & McBride-Chang, 2005).

In English, consonant blends and consonant clusters exist. For instance, common consonant blends are bl, br, cl, cr, dr, fr, tr, fl, gl, gr, pl, pr, sl, sm, sp and st. In the word *splits*, consonant clusters are /spl/ and /ts/. In Korean, 받침 /batchim/, the ending sound of the previous word, includes consonant clusters. For example, in 흙 /heuk/, ㄹㄱ is a consonant cluster.

Unlike Korean and English, Chinese syllables do not have consonant blends or clusters. Mandarin is phonologically different from English in terms of sound inventory, syllable structures and tones to differentiate the meaning of syllables. The tone is a unique feature of Mandarin Chinese.

In Mandarin phonetic transcription, Chinese Pinyin contains /f/, one of the labiodental sounds in English. This provided alternative assistance for ethnic Korean–Chinese learners to realise the sound of /f/ and /v/and to pronounce the sound more precisely than native-Korean speakers. Compared to the English /s/, /z/ and /ʃ/consonants, only the sound like /s/ can be found in Korean. However, in Chinese Pinyin, there are /s/, /sh/, /z/ and /zh/ different consonants to benefit ethnic Korean–Chinese learners to learn the pronunciation of English more easily.

Chinese Pinyin appears to be like the English alphabet. However, Chinese languages have unique phonological features compared to English: the use of tone distinguishes the word's meaning. Mandarin Chinese tones are categorised as high-level, rising, falling-rising, falling and neutral. For example, by writing two letters, 'ma' refers to one word in English, while in Mandarin, by changing the tones, 'ma' can represent different characters and meanings, such as 妈 mā (mother), 麻 má (hemp), 马 mǎ (horse) and 骂 mà (scold). In Korean, the syllable structure 마 /ma/ pronounces the same as in Mandarin Chinese and English.

Wang et al. (2006) suggested that better phonological skills in one language enhanced phonological skills in another language, as illustrated by Korean and English, two alphabetic languages. They have a high correlation with phonological skills. Korean onset detection, rhyme detection and phoneme deletion are highly associated with English onset detection, rhyme detection and phoneme deletion (Wang et al., 2006).

2.6.3.6 Morphology

Chinese and Korean languages are not related, but Korea was heavily influenced by Chinese culture, customs, language, etc. for more than 3,000 years. Koreans used Chinese characters until they were replaced by *Hunminjeong'eum* in the fifteenth century and absorbed many classical Chinese words. Traditionally, Korean words were mainly borrowed from Chinese, and all Koreanised words are based on Chinese characters; however, modern Korean borrows largely from English, and loan words take up to five per cent of the total Korean vocabulary (Sohn, 2006).

Examples:

Words borrowed from Chinese

부모 (Korean word that means *parents*)

父母 (Chinese word that means *parents*)

Words borrowed from English

club [k^hlʌb]

클럽 [k^hlʌp]

Morphemes are the primary mapping symbol when reading in Chinese rather than phonemes, encoded from the orthographic units that show as characters (Kuo & Anderson, 2006). Chinese characters usually represent only one morpheme. Chinese has many more homophones than English (Ku & Anderson, 2003). For example, with the same pronunciation /shi4/, there are plenty of homophones (是, 室, 式, 市, 事, 世, 视, 试, 示, 饰 and 士, and many more). Chinese does not use inflectional morphemes to present grammatical features (tense, a plurality) like English.

In Korean, there are three main types of word formation: derivation, inflection and compounding (Cho, 2020). The Chinese word-formation rules are similar to English. Morphemes in Chinese and English can be classified in terms of the same basic elements. In addition to free morphemes or root words, each language has three types of bound morphemes: (a) inflectional suffixes, which are grammatical morphemes that change a root word's aspect, tense, number or case; (b) derivational affixes, which usually change the part of speech of roots; and (c) bound roots, which must combine with derivational affixes or other roots to form words. Table 2.7 lists examples of the different types of morphemes in Mandarin, Korean and English. Through affixation and compounding, three types of words are formed in each language: inflected words, derived words and compounds.

Table 2.7

Types of morphemes and examples in Mandarin, Korean and English

Morpheme type	Mandarin	Korean	English
Root word	水 /shuǐ/ (water)	술 /swul/	act
	羊 /yáng/ (sheep)	개 /kay/	cap
Bound root	电 /diàn/ (electricity)	아들 /atul/: son	fore-: before
	椅 /yǐ/ (chair)	성 /seng/: -ity, -ic	sub-: under
Inflectional affix	-了 /le/	겠 *-keyss-*: future tense	-s: plural nouns
	-们	쓰/었 *-(a/e)ss-*: past tense	-ed: verbs past tense
Derivational affix	无-	-이/-i/: adverb (-ly)	-ment: nouns
	-化	-꾼 /-kkwun/: noun (master)	-able: adjectives

Despite the similarities in word formation, there are some differences in Korean, Mandarin and English morphology. First, the word-forming method is different among the three languages. Chinese words are divided into single morpheme words and compound words according to word formation, and combining roots is the primary way of word forming in Chinese. In Korean, derivation, inflection and compounding are the three major word-

formation types (Cho, 2020). Second, compared to Korean and English, Chinese has a larger number of bound roots. Chinese bound roots are positionally less restricted than most English bound roots (Packard, 2000). Third, most Chinese characters represent unique morphemes, so characters usually provide the readers with visually distinct and reliable cues for decomposing polymorphemic words (Ku & Anderson, 2003).

The morphophonemic features in Korean and English sometimes make it hard for children to learn to spell words, especially for those beginners to learn to spell. Korean children typically acquire basic spelling skills quickly, most likely because the transparency from sound to symbol in Korean orthography and syllable formation rules are simple (Park, 2008). However, the morphophonemic feature requires children to understand that Korean spelling follows the morphological rule of words rather than the pure phonetic rule (Yeon et al., 2017).

Several researchers (Chen et al., 2009; Cho et al., 2008) have found that awareness of compound structure was a strong predictor indicating the development of English, Chinese or Korean reading skills. Lexical compounding words are widely used in Korean, partly because of borrowed words from Chinese (Sohn, 2006), and compounding words were not limited to borrowed words. The native-Korean word 눈물 /nun mul/ (literally translated as *eye water*, but meaning *eyedrop*), is a compound word. Inflectional and derivational morphology are the basic morphological structure of Korean (Cho et al., 2008). In Korean, like in Chinese, nouns and adjectives are not inflected.

2.7 Literature Related to Ethnic Korean–Chinese People and Other Ethnic Minorities in China

Trilinguals can be found effortlessly in China because of the combination of languages among the minorities: a minority language as the mother tongue (L1), Chinese as an L2 or another L1 (acquiring a minority language and Chinese simultaneously) and English as a

predominant L3. Minority education plays a vital role in China's education, and foreign language education is also an essential part of minority education. At present, minority students' English learning is attracting more attention, with a focus on the various problems and difficulties learners encounter while learning English. As one of the minorities, ethnic Korean–Chinese people (*chaoxianzu* 朝鮮族) in China are mostly located in Yanbian Autonomous Prefecture in north-eastern China.

Ethnic Korean–Chinese students also face educational challenges in acquiring English as an L3 to meet the needs of academic and social mobility. One of the educational challenges is how to maintain the ethnic language, Korean, in the Mandarin-dominant teaching system while also learning a foreign language. Ethnic Korean–Chinese people acquire Mandarin and Korean simultaneously while growing up in a Korean household in China. As required by the language curriculum of the Ministry of Education, English language education begins in grade 3 of primary school nationally and in grade 1 in some major cities. However, Mandarin–Korean bilinguals are often misclassified within China as Mandarin monolinguals due to the lack of understanding of the similarities and differences between the languages.

The literature on English in minority groups in China is scarce, especially concerning ethnic Korean–Chinese people in applied linguistics and social sciences. Further, few empirical studies have explored trilingualism and the correlation among the L1, L2 and L3. In this study, the Korean–Mandarin bilingual group participants were Korean–Mandarin bilingual teenagers who had acquired two L1s. They learned Korean and Mandarin Chinese simultaneously from birth and later learned English as an L3 in primary school.

The combination of learning three languages is determined by the practical circumstances of China. As a multiethnic, multilingual country, China comprises 55 ethnic minority groups (*shaoshu minzu*) in addition to the Han majority. As a minority group, ethnic

Korean–Chinese people reside in various parts of China. The Sixth National Census of China in 2010 recorded an ethnic Korean–population of approximately 1.83 million (see Appendix A). By contrast, the Seventh National Census of China in 2020 showed that the ethnic Korean–Chinese population had increased to more than 1.92 million. More than half of them reside in the Yanbian Autonomous Prefecture), located in Jilin province. Other ethnic Korean–Chinese mainly reside in Heilongjiang and Liaoning provinces.

Ethnic Korean–Chinese students have achieved outstanding educational results (Kim et al., 2014). Most ethnic Korean–Chinese people can speak Korean and Mandarin Chinese fluently unless they or their parents choose to accept education in a Mandarin–English bilingual school. The trilingual education system supports ethnic Korean–Chinese people to maintain their culture and language (Feng & Adamson, 2015).

In the 1970s, most of the junior schools in the north-eastern part of China transferred from Russian to English as the preferred foreign language. However, Korean junior schools chose Japanese, which is thought to belong to the same language family as Korean, as an additional language for ethnic Korean–Chinese students to learn. Students performed excellently, and learning Japanese made ethnic Korean–Chinese students extremely competitive in the college entrance exam. The choice of Japanese played a crucial role in raising the percentage of ethnic Korean–Chinese students in the universities. However, with the development of science and technology, also promoted by globalisation, the curricula and content underwent vital reform in universities. More and more disciplines in colleges and universities recruited a limited number of students who chose Japanese as a foreign language or refused to enrol them. Further, without learning English, it was not easy for ethnic Korean–Chinese people to be competitive in the job market. Due to the requirements of the social and educational environment, from the beginning of the 1980s, ethnic Korean junior schools began

exploring teaching English as L3, but only in experimental classes. Until 1997, only 40% of ethnic Korean middle schools chose English as an additional language (Zhang, 1998).

The trilingual education system seemed somewhat successful in the Yanbian Autonomous Prefecture (Kim et al., 2014). However, outside Yanbian Autonomous Prefecture, maintaining Korean in a community where the main language was Chinese was challenging. Some ethnic Korean children may not be willing to speak Korean to each other or, for convenience, may prefer to communicate with each other in Chinese (more accurately, in Mandarin). Mandarin, the Northern dialect (Pekingese), *Wu* (Shanghainese) and *Yue* (Cantonese) are the major dialects, along with *Min*, *Gan*, *Hakka* and others (Han et al., 2016). Mandarin is the only standard dialect in China.

Ethnic Korean–Chinese people become bilingual by being exposed to both Mandarin and Korean from birth, and this bilingualism makes them more competitive in the job market and raises their chance of employment. Although much effort is poured into learning three languages, with English as the usual L3, the results do not meet the expectations. Therefore, seeking a solution to enhance the learning of three languages and researching the correlations between their relationships would be extremely valuable. Developed from bilingual education, trilingual education for ethnic Korean–Chinese people is still in the initial research stage in China. Scholars have explored ethnic Korean–Chinese education from the following aspects: the current challenges of ethnic Korean education (Kim & Kim, 2005), learners' attitudes towards trilingual education (Gao, 2009), ethnic language maintenance (Gao, 2010) and teachers' training and development (Zhang et al., 2015).

Some researchers have analysed the current status and challenges of ethnic Korean–Chinese people in China. Kim and Kim (2005) researched recent social demographic changes in Yanbian Autonomous Prefecture by analysing the 1990 and 2000 Chinese population

censuses, including fertility, mortality, migration, marriage and population structure. The introduction of the market economy and the establishment of diplomatic relationships between South Korea and China boosted the social demographic changes of ethnic Korean–Chinese people in Yanbian Autonomous Prefecture. The authors presented that the Yanbian Autonomous Prefecture ethnic Korean–Chinese population decreased between the 1990 and 2000 population censuses and appeared to be declining. The researchers depicted the irregular age structure pattern of Yanbian Autonomous Prefecture ethnic Korean–Chinese people as adapting to the changing socio-economic environment of China. Aging was another feature of the Yanbian Autonomous Prefecture ethnic Korean–Chinese people. However, the Yanbian Autonomous Prefecture ethnic Korean–Chinese population's sociodemographic changes did not imply that the ethnic Korean–Chinese population is reducing in China. There are other concentrated ethnic Korean communities in cities or urban areas in China that provide employment and educational facilities.

Ehlert (2008) conducted a qualitative case study to explore the relationships between languages and identities in multilingual contexts. The participants were six multilingual high school teenagers aged 13–18 who resided in Beijing, China. Participants were selected according to key characteristics: participants' education status, language and family background, parents' hometown, and parents' educational background. The study used the social network and the ethnography of communication approaches to fulfil the purposes of the research. The measurements contained participant self-report questionnaires, semi-structured audio-recorded interviews and participant observation. All participants received Korean language education either through a formal ethnic Korean school or were taught at home by their parents. The results indicated that sociopolitical and socio-economic awareness played an important role in the participants' ethnic language maintenance and perceptions of learning

three languages. The participants frequently travelled between various worlds (they were a member of the ethnic Korean–Chinese population, the *ZhongHuaMinZu* and the foreign language–learning community), which added complexity to their identities. Their sense of multilingualism appeared to be strongly connected to the new hybrid identities, which showed the possibility of balancing their multiple languages and cultures. The research findings also showed that multilingual speakers tend to underestimate their multilingual knowledge, and ethnic language proficiency seemed not directly related to their degree of ethnicity.

Gao (2009) studied 27 grade 4 ethnic Korean–Chinese students (10–11 years) from two classes in a bilingual Korean primary school in Liaoning province to investigate their self-perception and educational aspirations. The researcher observed the participants in the class, in the playground and during school assemblies over five months. The participants showed their educational aspirations through self-reports that presented their worries about self-image, and those concerns led to various beliefs on schooling and academic success.

Gao's study divided the participants into three categories from their self-perceptions, which reflected the ethnic Korean–Chinese students' thoughts and attitudes towards learning Korean. Their self-perception also mirrored Korean–Mandarin bilinguals' attitudes towards Korean learning. Therefore, three categories were used to understand Korean–Mandarin bilinguals. The first category was titled 'living up to standards of the model minority'. Studying the Korean language and participating in ethnically relevant extracurricular activities, including Korean music and dance, reinforced participants' sense of being Korean. The students highlighted the importance of measuring up to the standards of the model minority stereotype. They took great pride in their ethnic language and considered it one of the most important symbols in maintaining their ethnic identity.

In the second category, titled ‘Chinese language for a secure future’, students did not reject the significance of Korean identity but showed how it was important to speak Chinese. Proficiency in Chinese enabled them to be accepted more easily in mainstream society. Being accepted in mainstream society was what the participants sought. As one student in the study said, ‘I have to speak Chinese well; otherwise, others would think that I was a foreigner in China’ (Gao, 2009). As an ethnic Korean–Chinese person in China, maintaining the ethnic language was necessary, but proficiency in Mandarin was essential for future work in China.

Participants in the third category, title ‘being experts in all’, recognised the advantages of their half-Han and half-Korean identity for upward social mobility, which they linked to their schooling attitudes. They emphasised the value of trilingualism and had a positive view of the English and Chinese languages. The participants highlighted the importance of working in international companies with their competency in Chinese, Korean and English.

Yi (2014) explored the factors that affected additive trilingual education models in the Inner Mongolia Autonomous Region. Participants were from three primary schools, including 1,624 students and 104 staff from the city school, 900 students and 115 staff from the town school and 778 students and 32 staff from the village school. The measurements were policy document analysis, community profile analysis, school-based field studies, and interviews and questionnaires with teachers, stakeholders, policymakers and parents. The results identified that the city school was a balanced model because the school environment and display showed a mix of Mongolian and Chinese culture and few English posters or mixed words. Students acquired strong competence in Chinese and English without it affecting their mother language. The town school demonstrated a strong Model I accretive model for strongly emphasising the nurturing of students with a robust Mongolian identity. The village school students formed a strong Mongolian ethnic identity and internal knowledge of this language, and they completed

comprehensive reading and argumentative writing tasks in the language. Mongolian was affected in the village school but not as strongly as in the city school.

2.8 Other Factors Known to Influence Language Learning and Ability

2.8.1 Maths Performance

Maths performance was used as an indicator of the participants' cognitive abilities that may influence the results of the participants' English phonological and morphological awareness. Blachman (1984) used the McCarthy Scales of Children's Abilities to determine the participants' general intellectual abilities before assessing their phonological awareness. Blachman found that study participants clustered at the lower end of the average range of intellectual ability, so if the generalisations were beyond the range, they were treated cautiously.

In another study, Madrazo and Bernardo (2018) highlighted that trilingual advantages might be affected by other factors, such as intelligence and SES. If participants had different cognitive abilities, intelligence would be a factor that must be considered. An intelligence quotient (IQ) test may be appropriate because it measures a range of cognitive abilities and provides a score that indicates an individual's intellectual abilities and potential (Fletcher, 2011). The relationship between IQ and cognitive control skills is well established (Blair, 2006; Shamosh & Gray, 2008). However, it was challenging to collect IQ data from the current participating schools. Morsanyi et al. (2018) proved that maths scores, English scores and IQ results were strongly correlated. Therefore, I collected maths results (IQ approximate value) from bilingual and trilingual schools to present participants' cognitive abilities.

2.8.2 Language Use

The participants' language use in a social context was collected in this study because L3 acquisition is firmly associated with the social context, which influences how the participants interpreted things, how they spoke and the contents of their speech (Sanz, 2000).

Kwon and Martínez-Álvarez (2022) suggested that a trilingual child with an older sibling would be benefited from the meaning-maintaining processes in multilingual interactions. In their study, an older sibling acted as a linguistic and cultural mediator to the younger sibling by using multiple resources and the following three practices: '(1) mediating interactions through interlingual and intralingual interpretation and (2) transferring linguistic and cultural knowledge to expand the linguistic and cultural understanding of both her younger sibling and the researcher' (Kwon & Martínez-Álvarez, 2022, p. 55).

As exposure to the languages could influence the performance in fulfilling morphological tasks (Vernice & Pagliarini, 2018), the participants' frequency of using the language was used as an independent variable for analysis of English morphological awareness in the current study.

2.8.3 Parents' Occupation

Parents' occupations were included to investigate the SES on participants' families because it might affect participants' language use (Labelle, 2019; Madrazo & Bernardo, 2018). As discussed, more frequent access to languages will influence the development of phonological awareness. Children from families with higher incomes may benefit from it in language acquisition (Ermisch & Francesconi, 2000; Schildberg-Hörisch, 2016). For example, they will have more opportunities to receive language coaching. However, full-time parental employment reduces the time parents can spend with their children, and children's educational attainment may be affected more by full-time maternal employment when children are aged

0–5 (Ermisch & Francesconi, 2000). Vernice and Pagliarini (2018) collected SES through questionnaires when measuring the relationship between morphological awareness and reading ability. English coaching time was also collected in the questionnaires in this study to determine whether SES interacted with participants' English phonological awareness.

2.9 Summary

This chapter reviewed language development theories, monolingual development and the L1 acquisition literature. The L2 and L3 acquisition theories were discussed in the multilingual development section. Language transfer theories relating to language acquisition were discussed, focusing on the four major models in L3 acquisition that are the basis for the current study. Next, articles on phonological awareness and morphological awareness among bilinguals and trilinguals were reviewed. An overview of the home languages of participants, with contrasts between Mandarin, Korean and English, was then presented. The study aimed to investigate the phonological and morphological awareness correlation between English, Mandarin and Korean. The similarities and differences between Mandarin, Korean and English were analysed, concentrating on phonological awareness and morphological awareness. The examination of the similarities and differences between Mandarin, Korean and English explained the possibilities of language transfer among bilingual and trilingual learners. The chapter described the current English learning situation of ethnic Korean–Chinese people and the literature related to ethnic Korean–Chinese people and other ethnic minorities in China. Finally, the other factors that were known to influence language learning and ability were presented.

Chapter 3: Methodology

This chapter will begin with the hypotheses of the research in response to the research questions. The general hypotheses will be posed. Next, the chapter will detail the methodological aspects of the study, including the research design, research approval, participant recruitment, experiment procedure, questionnaires and language tasks.

3.1 General Hypotheses

It was expected that bilingual learners would performed better than monolingual learners in English phonological and morphological awareness tasks because of (a) the orthographic differences between Mandarin, Korean and English; (b) the morphophonemic similarities between Korean and English; (c) the phonological and morphological similarities among the three languages; and (d) the interaction between learners' language proficiency and the morphological awareness. As a result, two general hypotheses are proposed:

H1: Korean–Mandarin bilinguals will perform better in the English phonological awareness tasks than Mandarin monolinguals.

H2: Korean–Mandarin bilinguals will perform better in the English morphological awareness tasks than Mandarin monolinguals.

With their knowledge of Mandarin and Korean, bilingual learners should have better, or at least equal, performance in English phonological and morphological awareness tasks compared to Mandarin monolingual learners.

The general hypotheses suggest that Korean–Mandarin bilinguals with Mandarin and Korean language backgrounds would have better English phonological and morphological awareness than Mandarin monolinguals.

3.2 Research Design

The experiment aims to compare the phonological and morphological awareness of Korean–Mandarin bilingual speakers of English and Mandarin monolingual learners of English to establish whether Korean–Mandarin bilinguals have advantages over Mandarin monolinguals in phonological and morphological awareness in English as the target language. This study used a mixed method design. The questionnaire embedded open-ended questions that required participants to express their ideas about learning English and the effects of previously acquired language on English learning.

3.3 Research Approval and Recruitment of Participants

Ethics approval was obtained from the Flinders University Social and Behavioural Research Ethics Committee (SBREC), project number 8411. The materials submitted to the SBREC included a signed application form, school principal permission forms, letters of introduction, information sheets, consent forms, student assent forms and the research tools (i.e., questionnaires, the English phonological awareness task, the English morphological awareness task, the Mandarin phonological awareness task, the Mandarin morphological awareness task, the Korean phonological awareness task and the Korean morphological awareness task).

Once the English versions of the principal permission form, letters of introduction, information sheet, consent forms, students assent form and research tools were approved and received conditional ethics approval, these materials were translated. Translated materials were proofread by a person from the National Accreditation Authority for Translators and Interpreters to ensure equivalence of the English and the Chinese versions of the questionnaire (see Dörnyei & Csizér, 2012). The revised application form, Mandarin version of the above

materials and translation accuracy certification form were also submitted to the SBREC. The research commenced after receiving full ethics approval from SBREC.

With limited research funds, the researcher could not collect the data from all the schools that met the research requirements; therefore, clustering and nesting elements were considered. Using a convenience sampling method, the available participating schools were approached to secure the cooperation of one trilingual public school and one bilingual public school. After receiving approval from the Flinders University SBREC, the junior high school headmasters of the experimental and control groups were contacted to discuss the experiment procedure, questionnaires, study duration and required language tasks. After receiving the permission form from both schools, the experiment started.

Participants and their parents or guardians from participating schools received an information sheet and the consent forms. According to the regulations, if the participant's age is less than 18 years, consent should be obtained from the participants' parents and caregivers. The information sheets listed the researchers' contact details, the study description, the purpose and potential risks of the study, and the participants' tasks. Participants were aged between 13 and 14 years. All data were collected within China. To maintain accuracy and full understanding, both participating schools used the Mandarin version of the materials, including the information sheet, consent form, assent form, letter of introduction and questionnaires. Although Korean–Mandarin bilingual speakers were provided with a set of materials in Korean, they also received the Mandarin version of the measurement to ensure consistency with the version used by Mandarin monolingual speakers. Therefore, all the participants completed the same measurement in the Mandarin language. Using the community language, the Mandarin version of the experimental materials ensured an accurate understanding of the experimental process, minimising the participants' anxiety.

All participants completed questionnaires about their family history, linguistic history, educational background, language usage frequency and language proficiency. Tasks were divided by language, and students completed the same language tasks in one session and in the same order. Participants in the Korean–Mandarin bilingual group completed phonological and morphological awareness tasks for three languages (Mandarin, Korean and English). Participants in the Mandarin monolingual group completed phonological and morphological awareness tasks in two languages (Mandarin and English). All paper-based questionnaires and tasks were scanned into computers as digital data and backed up in a SanDisk USB 3.0 flash drive. Paper data were stored safely and securely by the researcher. Due to international travel restrictions, the researcher appointed a research assistant to follow the research procedure designed by the researcher. The appointment letter that detailed the research assistant's requirements and responsibilities, including securing the data collected and storing it safely, was provided to the research assistant.

3.4 Demographic and Linguistic Factors

3.4.1 Demographic Factors

Participants were from two public junior schools in China. In total, 318 grade 8 students commenced the study, and 271 completed the study (see Table 3.1). The study initially included 164 Korean–Mandarin bilinguals from an ethnic Korean high school and 154 Mandarin monolinguals from a standard Chinese high school, both in a metropolitan city in north-east China. Since there are few ethnic Korean schools in this city, the school's name was not disclosed.

Table 3.1

Total number of participants

Category	Collected	Missing questionnaires	Missing English tasks	Missing Korean tasks	Excluded	No. for analysis
Korean–Mandarin bilinguals	164	4	1	1	N/A	160
Mandarin monolinguals	154	3	2	N/A	40	111

Note. N/A = not applicable.

The researcher excluded seven (four from the Korean–Mandarin bilingual group and three from the Mandarin monolingual group) questionnaires that had substantial amounts of missing data. Three participants (one in the bilingual group, and two in the monolingual group) did not complete the English tasks, and one participant in the bilingual group did not finish the Korean tasks. Data from these four participants were retained in the dataset and were marked as missing. Forty cases were also excluded from the study due to anomalous data (see Section 3.15 for more details).

The final number of participants in the Mandarin monolingual school was 111 (58 males and 53 females), and the mean age was 14 years (standard deviation, [*SD*] = 2 months). The final number of Korean–Mandarin bilingual school participants was 160, with 68 male participants and 92 female participants. Their average age was 13 years and 10 months. The final number of participants included in the analysis was 271, with 121 males and 150 females (see Table 3.2). There were 24 more girls than boys in the Korean–Mandarin bilingual group, as shown in Table 3.2.

Table 3.2

Participant demographic factors

Demographic factor	Mandarin monolingual group	Korean–Mandarin bilingual group
Gender		
Female	58	92
Male	53	68
Age (mean years)	14.01	13.87
Siblings?		
Yes	49	67
Older	17	30
Younger	30	36
Older and younger	2	1
No	62	86
No answer	0	7
Lives with grandparents?		
Yes	24	50
No	87	103
No answer	0	7

The Seventh National Census of China in 2020 showed that among the whole population of China, 51.24% were males and 48.76% were females, which showed a nearly balanced population. In Liaoning and Jilin provinces, there were more females than males (according to the Seventh National Census of China, 2020). The participating school was in the Liaoning province, which reflected the gender distribution of the Korean–Mandarin bilingual group.

In the Mandarin monolingual group, 49 (44%) participants had one or more siblings, 17 had siblings older than the participants, 30 participants had younger siblings, and two participants each had two siblings, one younger and one older. By contrast, 67 (42%) participants had a sibling or siblings in the Korean–Mandarin bilingual group, including 30 with older siblings, 36 with younger siblings, and one participant with older and younger siblings. Regarding participants' living situation, 24 (22%) participants in the Mandarin

monolingual group and 50 (31%) in the Korean–Mandarin bilingual group lived with grandparents.

The participants from Mandarin monolingual and Korean–Mandarin bilingual schools had similar community language environments and SES. In the city where data were collected, the schools were zoned, and the students lived near the schools. The two participating public junior high schools were from the same district and were directed by the same District Education Bureau that monitored the educational qualities, teaching schedules and assessments. The two schools used the same Mandarin and English textbooks and conducted teaching following the District Education Bureau syllabus.

To keep up with the latest trends in future education, teachers from the two participating schools attended the same monthly held teaching and research conference organised by the District Education Bureau. The participants from both schools were recruited from grade 8 with a similar age range (children were accepted in primary school in accordance with the entry age regulations of the Ministry of Education in China). Therefore, the participants' demographic and linguistic backgrounds were controlled, which provided highly reliable data. There were nesting and clustering effects because students were nested in classrooms, schools and school districts, showing a natural hierarchical structure (Rhoads, 2016). However, the current research design had no concerns about the possibility of contamination because the study did not involve experiments or interventions.

3.4.2 Linguistic Factors

The participants commenced learning English at the same age (eight years, grade 3) unless they had private English tuition. Mandarin is the primary language in China, and English is a compulsory subject. In this study, no participants were reported to have cognitive,

neurological or sensorial disabilities. According to the headteachers, none of the participants needed exceptional educational support.

The Mandarin monolinguals used Mandarin as their instruction language at school, and Mandarin and English were taught as school subjects. The duration of one regular lesson in bilingual and monolingual schools was 40 minutes. For the Mandarin monolingual group, the students had 10 language lessons a week, five each for Mandarin and English, and about 3.33 hours for each language.

The Korean–Mandarin bilingual participants used Korean as their instruction language, except for the subjects Mandarin and English. Korean–Mandarin bilinguals used Mandarin or Korean as their daily communication language and learned Mandarin, Korean and English as their school subjects. Language classes in the bilingual school added up to 15 lessons a week, totalling 10 hours a week, and were evenly distributed to the three languages, with approximately 3.33 hours for one language. When comparing the bilingual group to the monolingual group, it can be observed that the learning time distribution of each language in a typical week was the same. However, bilinguals were learning one more language, Korean, than monolinguals. So, the learning burden was different between groups.

3.5 Methodology

Before commencing the research, a suitable time for the experiments was negotiated with principals from the Mandarin monolingual and Korean–Mandarin bilingual schools to reduce interference with regular teaching. With both principals' agreement, the experiments began after obtaining consent from participants' parents or caregivers. The participants who returned the consent forms from both participating schools were asked to complete the questionnaires.

Participants in the Mandarin monolingual and Korean–Mandarin bilingual groups completed questionnaires about their family and linguistic histories, educational backgrounds, language usage frequencies and language proficiencies. On a different day, participants in the Korean–Mandarin bilingual group completed the Mandarin phonological and morphological awareness tasks first, followed by the Korean phonological and morphological awareness tasks. After that, Korean–Mandarin bilinguals completed the English phonological and morphological awareness tasks. Korean–Mandarin bilinguals had intervals of at least 40 minutes between different languages to reduce the difficulty of language switching. The researcher arranged the language tasks according to the participants' language acquisition order, so home languages were tested ahead of English. Mandarin and Korean are the native languages of the Korean–Mandarin bilinguals; therefore, the participants completed Mandarin and Korean tasks before English tasks. Mandarin monolingual group participants followed the same steps to finish the Mandarin phonological and morphological awareness tasks and then completed English phonological and morphological awareness tasks. The specific design of the questionnaires and phonological and morphological tasks in the three languages are described in the following sections.

3.6 Language Background Questionnaire

The language background questionnaire was paper based, printed clearly on A4 paper in a readable font size. The Korean–Mandarin bilingual group questionnaire consisted of 28 questions with fill-in-the-blanks, multiple-choice questions and open-ended questions. The Mandarin monolingual group had fewer questions (25 questions) in the questionnaire because they excluded the Korean language background investigation. The researcher used the Korean–Mandarin bilingual group questionnaire as an example, which contained the questions for the Mandarin monolingual group.

Questionnaires for the Korean–Mandarin bilingual group contained 30 independent variables, as summarised in Appendix C. The questionnaire consisted of the following parts (specific questions can be found in Appendix D).

3.6.1 Family History

Question 1 explored parents' and caregivers' main language preferences, which influenced children's daily language input. The next question collected parents' occupations to investigate the SES of the participants' families, which might affect participants' language use (Labelle, 2019; Madrazo & Bernardo, 2018). Children from families with higher incomes may benefit from it (Ermisch & Francesconi, 2000; Schildberg-Hörisch, 2016); for example, they may have more opportunities to receive language coaching. However, full-time parental employment reduces the time spent with their children, and children's educational attainment may be affected more by full-time maternal employment when children are at the age of 0–5 (Ermisch & Francesconi, 2000).

Question 3 aimed to identify parents' highest level of education. Dixon et al. (2012) found out that a mother's education was related to English vocabulary acquisition, which predicted a bilingual's phonological awareness. Therefore, the researcher designed the questions to test whether the mothers' education levels would interact with the Mandarin monolinguals' or Korean–Mandarin bilinguals' phonological and morphological awareness.

3.6.2 Linguistic History

Question 4 was designed to confirm when English learning commenced for both Mandarin monolinguals and Korean–Mandarin bilinguals. English language learning time would vary according to the Ministry of Education policy. That meant that grade 7 students learn English from the age of six (from grade 1), while grade 8 students might learn English at the age of eight (from grade 3). Language proficiency may be affected by two years' absence

of learning English. Therefore, the study questionnaire asked, ‘at what age did you first begin to learn English?’

From Question 5, the questions from the two participating schools differed. For the Korean–Mandarin bilingual participants, the Korean language background and the amount of Korean language usage needed to be recorded for further analysis. So, the fifth question investigated whether Korean–Mandarin bilinguals went to a Korean kindergarten before primary education. As Korean–Mandarin bilinguals, participants’ parents or caregivers might choose Mandarin kindergartens for several reasons, for example, transportation convenience and limited places in the Korean kindergarten. Therefore, it was necessary to ask the bilingual students whether they had been to a Korean kindergarten to estimate Korean language acquisition time.

Questions 6–16 investigated the participants’ language use in the social context because L3 acquisition is firmly associated with the social context, which influences how the participants interpret things, how they speak and the contents of their speech (Sanz, 2000). The social environment includes where the individual was educated or lived and with whom they interacted. The interaction may happen in person, through the internet or through any communication media. The sixth question explored the participants’ home language before the age of six. The seventh question asked about the parents’ or caregivers’ language use with the participants, and the next question asked how the participants responded to their parents or caregivers. Questions 10 and 11 asked whether participants had a sibling because, normally, individuals may interact more with their siblings than parents or caregivers. The participants listed the languages they used when they interacted with their siblings. Participants without siblings jumped to the twelfth question.

Questions 12–14 asked whether participants lived with their grandparents and the language used when communicating at home. Many Korean–Mandarin bilinguals lived with their grandparents. Most ethnic Korean grandparents were proficient in Korean and less proficient in Mandarin; therefore, when the participants communicated with their grandparents, they would use Korean more than Mandarin; that is, participants heard more Korean than Mandarin. The fifteenth question asked what language the participants used in their leisure time, such as when watching TV or movies or interacting with friends. In question 16, the participants calculated the overall language use on a typical day.

Due to exposure to the languages that could influence performance in completing morphological tasks and reading tasks (Vernice & Pagliarini, 2018), the exposure to the three languages was calculated as a percentage to maintain accuracy. Participants selected the proportion of time spent using each language (< 25%, 25%, 50%, 75% and 100%). The language usage of Mandarin and English was explored using the same method. The questionnaire included instructions in bold letters to assist participants in calculating their language usage. Prompts included statements like 'when you choose the percentage of each language, the total ratio of 3 languages cannot exceed 100%'. The exposure time to three languages was collected through the questionnaire to test whether the length of the exposure to each language could affect participants' performance in phonological and morphological tasks.

3.6.3 Elementary School

This part included four questions to examine their language exposure in primary education. In primary and junior high education, the teaching language for the Mandarin monolingual school is Mandarin. In contrast, Korean–Mandarin bilingual school uses Korean for everyday teaching, except for the Mandarin course. The questionnaire collected additional information, such as the language used when the participants spoke to their teachers, classmates

and friends. The participants also advised whether they had after-school English training and the number of hours of training time. The questions in this part explored the participants' English exposure, which may be connected to English proficiency. Further, the English exposure time may affect the students' English phonological and morphological awareness performance.

3.6.4 Linguistic Proficiency

The item 'On a scale from 1 to 5, rate your abilities in Korean, Mandarin, and English' gave participants a chance to rank their language proficiencies in each language. The participants rated their abilities on a scale from one to five, where one was the lowest ranking, and five was the highest in language proficiency, which meant the speaker reached native-speaker language ability. The question estimated the participants' reading, speaking, listening and writing skills in each language. The next question asked about the participants' language preferences, which might also affect their language usage in their daily lives. Questions 23–28 were open-ended questions. Questions 23 and 24 explored whether the students were willing to improve their English language skills and which English language skills they would like to improve. Cenoz and Valencia (1994) showed that intelligence, motivation, age and exposure were good predictors of English achievement. Griessler (2001) also suggested that language learning experience, aptitude, motivation, attitudes and teacher commitment would influence the language learning process. Therefore, the student's motivation to develop English skills was measured. The study investigated the participants' attitudes toward Korean and Mandarin and whether they thought learning Korean or Mandarin was helpful when they learned English.

3.7 Procedures for Collecting Questionnaire Data

The Mandarin monolingual group and the Korean–Mandarin bilingual group had different language background questionnaires due to their language background diversities.

The questions in the questionnaires were extracted and revised from a bilingual background questionnaire for Spanish and English speakers (Montrul, 2012) to meet the need of the current study. For example, in Silvina Montrul's (2012) questionnaire, there was an item named 'country of origin', which was unnecessary for both the Mandarin monolingual and the Korean–Mandarin bilingual groups because, in most cases, the participants lived in China since birth. Korean international students might be an exceptional case in the Korean–Mandarin bilingual school, but they were not included in the study. The students might feel uncomfortable answering questions about their origins. Korean was added to the Korean–Mandarin bilingual group questionnaire to collect the Korean language use frequency and proficiency. Finally, a modified version of the questionnaire was used for the junior school students who had not started high school yet, which meant that high school–related information could not be gathered in the educational background section. The researcher used the modified version of the questionnaires for both participating groups.

Participants learn most subjects in their fixed classrooms in both schools unless they have physical education, information technology and music lessons in different locations, but these classes are with the same classmates. For participants' convenience, they completed questionnaires in their classrooms, ensuring they felt comfortable and focused on completing the questionnaires. For the few students not participating in the experiment, the research assistant consulted with students for alternative arrangements, with students either completing homework in the classroom or going to the library. Core lessons were usually in the morning. Therefore, the questionnaires were completed during one of the afternoon class sessions to reduce disturbance of the normal teaching schedule.

3.8 Testing Instruments

Korean–Mandarin bilinguals undertook Korean, Mandarin and English phonological and morphological awareness tasks. In contrast, Mandarin monolinguals conducted Mandarin and English phonological and morphological awareness tasks, as shown in Table 3.3.

Table 3.3

Language tasks distributed to groups

Language tasks	Duration	Korean–Mandarin bilingual group	Mandarin monolingual group
English phonological awareness task	10 mins	✓	✓
English morphological awareness task	10 mins	✓	✓
Mandarin phonological awareness task	10 mins	✓	✓
Mandarin morphological awareness task	10 mins	✓	✓
Korean phonological awareness task	10 mins	✓	N/A
Korean morphological awareness task	10 mins	✓	N/A

Note. N/A = not applicable.

3.9 English Tasks

3.9.1 Sound Oddity Task (Phonological Awareness)

The sound oddity task is used in this study to test the students' English phonological awareness. It was adapted from Bryant (1985) and modified by several researchers (Li et al., 2012; Zhao et al., 2017). Li et al. (2012) used initial sound detection and final sound detection to measure Mandarin bilingual students' English phonological awareness in English immersion programs in China. The phonological task consisted of two practice items, 10 initial sound detection test items and 10 final sound detection items. The grade 2 group's alpha reliability coefficient for the English phonological awareness task was .85. Students in grade 4 received a lower reliability coefficient (.64. The phonological task consisted of two practice items, ten initial sound items, ten middle sound items, and ten final sound items.

3.9.1.1 Procedure

The tests occurred in the classrooms of both schools. The tester and participants used headphones to limit interruptions from the environment. Both participating schools had English listening tests as part of the English final exams every semester, and the participating schools' facilities were used. Participants listened to the three practice items for each subtest, which allowed a volume check of the headphones, and the understanding of the task was verified. Three practice items were played with a five-second interval between every two test items. The intervals were the same in the main test. Each participant was asked to listen to the recording through headphones. There was one first sound–absence practice test, one middle sound–absence practice test and one final sound–absence practice test. At the end of each practice item, the students could see the practice item's script and the correct answer. Once the students understood the testing procedures and practice items, the tester played the audio material. During the main test, participants answered 30 questions by listening to the recording. The material was played only once without interruption. The test took approximately 10 minutes.

Each item contained four words with the removal of the tested phonemes. By removing the target phonemes, the influence of orthographic awareness was controlled. Participants needed to circle the item that was different to the other two items. For example, the first sound–absence test was '1. _ag, 2. _oss, 3. _ear'. The recording played 'bag, boss, pear', so the participants would circle '3. _ear' to indicate the correct answer. One correct answer counted as 1 point, with a maximum total of 30 points. The participants' English textbooks were the source of the words used in the practice items and test items. Word difficulties were verified with English language teachers in both participating schools. The English phonological awareness task tried to test as many consonants and vowels as possible.

3.9.1.2 Materials

The task consisted of three practice items and 30 test items, including 10 first sound–absence items, 10 middle sound–absence items and 10 final sound–absence items. Testing items were printed on one side of the A4 paper in a readable font size that allowed single-page viewing during the listening task. The students listened to the audio recording during the test. An English speaker with a British accent recorded the English phonological awareness task in a clear voice. Thirty test items were divided into three parts: initial sound absence, middle sound absence, and final sound absence. The participants would know what sound they needed to detect from the straightforward division arrangement on the paper (see Appendix E).

The specific testing items and the target English phonemes in the English phonological awareness task were listed as follows:

Initial sound absence:

(1)	1. pen	2. post	3. book	[p][b]
(2)	1. foot	2. verb	3. fish	[f][v]
(3)	1. zoo	2. sofa	3. salad	[s][z]
(4)	1. red	2. lamb	3. lion	[r][l]
(5)	1. wet	2. very	3. warm	[w][v]
(6)	1. cat	2. cake	3. goat	[k][g]
(7)	1. yawn	2. how	3. hat	[h][j]
(8)	1. nose	2. moon	3. name	[n][m]
(9)	1. again	2. often	3. ago	[ə][ɔ]
(10)	1. thank	2. there	3. think	[θ][ð]

Middle sound absence:

(11)	1. put	2. but	3. cut	[ʌ][u]
(12)	1. leg	2. bed	3. nod	[e][ɒ]
(13)	1. meet	2. party	3. team	[i:][ɑ:]
(14)	1. room	2. duty	3. music	[ju:][u:]
(15)	1. coffee	2. sorry	3. carry	[ɒ][æ]
(16)	1. girl	2. fruit	3. hurt	[ɜ:][u:]
(17)	1. television	2. fashion	3. decision	[ʒ][ʃ]

(18)	1. thirteen	2. water	3. happy	[t][p]
(19)	1. delicious	2. favourite	3. animal	[ɪ][ə]
(20)	1. America	2. information	3. sitting	[ɪ][eɪ]

Final sound absence

(21)	1. day	2. boy	3. toy	[ɔɪ][eɪ]
(22)	1. here	2. near	3. poor	[ɪə][uə]
(23)	1. bay	2. say	3. buy	[eɪ][ɑɪ]
(24)	1. how	2. now	3. so	[aʊ][oʊ]
(25)	1. song	2. madam	3. exam	[m][ŋ]
(26)	1. with	2. mouth	3. north	[θ][ð]
(27)	1. watch	2. reach	3. fridge	[ʧ][ʤ]
(28)	1. happiness	2. business	3. oranges	[s][z]
(29)	1. noon	2. sing	3. can	[n][ŋ]
(30)	1. English	2. quiz	3. Spanish	[ʃ][z]

3.9.2 Written Relatives Task (Morphological Awareness)

The written relatives task aimed to test the students' morphological awareness of the relationship between base words and their inflectional and derivational affixes. The written relatives task was a production measurement used by researchers Carlisle (2000) and Apel et al. (2013). In Apel et al.'s study, Cronbach's alpha reliability coefficient for the morphological awareness task was .85.

3.9.2.1 Procedure

In this test, participants completed 20 sentences by filling in the correct forms of inflected or derived forms according to the base words. The English morphological awareness task was printed on one piece of A4 paper. Before the test, students had time to read the examples and instructions for the test. There were four examples: two derivational affixes practice items, and two inflectional affixes items. For example: '(1) He ____ very fast (run)?'. The correct answer was provided at the end of the question line, written as 'Correct answer: runs'. Therefore, students would know the expected answer.

Once participants understood the testing requirements, the test commenced. The first 10 sentences were designed to measure derivational affixes following the examples' order. The rest of the sentences were used for testing inflectional affixes. The students had 10 minutes to complete the task. If the participants fulfilled the task in less than 10 minutes, it was recommended that they turn over the test paper on the desks and wait until the other students have completed the test. One correct answer earned 1 point, with a maximum total of 30 points. Target words and sentences used in the English morphological awareness test were selected from the participants' textbooks or exercise books. Further, consultations on test contents were conducted with the English teachers from both participating schools to control the orthographical variable.

The following are the testing items in the English morphological awareness task:

(1) Be _____ (care) with the glasses.	careful
(2) Dogs are very _____ (friend) to people.	friendly
(3) My father is a good _____ (farm).	farmer
(4) It was _____ (possible) to sleep because of the noise.	impossible
(5) I _____ (like) walking, and I hate camping.	dislike
(6) "Where are we going?" he asked _____ (polite).	politely
(7) She is such a pleasant, _____ (help) child.	helpful
(8) We are reading a _____ (differ) book this week.	different
(9) Tom is a good boy. He listens to his teacher _____ (careful).	carefully
(10) Some animals are in great _____ (dangerous).	danger
(11) Bruce often _____ (help) his parents do the farm work.	helps
(12) You must practice _____ (speak) English every day.	speaking
(13) Jane is _____ (run) with her mother in the park.	running
(14) May I ask some _____ (question)?	questions

(15) Today is _____ (hot) than yesterday. hotter

(16) Jim has _____ (be) in Dalian for three days. been

(17) It's June 1st, it's _____ (children) Day. children's

(18) Nancy _____ (pick) up strawberries on the farm last week. picked

(19) Lily and Lucy are my _____ (classmate). classmates

(20) January is the _____ (cold) month in the year in Shenyang. coldest

3.10 Mandarin Tasks

3.10.1 Onset–Rime Detection Task (Phonological Awareness)

The Mandarin phonological awareness tasks were similar to the English phonological awareness tests, which aimed to test the participants' abilities to differentiate the phonological units (onset and rime) in syllables. The measurement tool from Lin et al. (2018) was adapted according to this study's needs. Lin et al. (2018) examined the relationship between phonological awareness and reading acquisition by testing bilingual immigrant children from the Washington DC metropolitan area. One of the measurements to test phonological awareness was the 'onset, rime and tone oddity' task. The Cronbach's alpha for onset and rime was .69 and .79, respectively.

The procedures for the Mandarin and English phonological awareness tasks were identical. A native-Mandarin speaker recorded the testing material. The task was recorded as an audio file and backed up on a USB. The task included 15 onset detection tests and a 15 rime detection tests. The tests occurred in the classrooms, and the tester and participants were given headphones to limit interruptions from the environment. The researcher used the same facilities as were used for the English tasks in participating schools.

Mandarin was the participants' native language. Therefore, one example was provided for each subtest. Participants listened to the first practice item for the onset test first to test the

volume of the headphones and their understanding of the task. At the end of each practice item, the students could see the practice item's script and the correct answer expected. Once the students understood the testing procedures and practice items, the tester played the audio material. The test items were played with a five-second interval between every two test items. The time interval was sufficient to allow students to respond.

During the main test, participants answered the 30 questions by listening to the recording. The material was played only once without interruption, and the test took approximately 10 minutes. Each item contained three words with the removal of the tested phonemes. By removing target phonemes, the influence of orthographic awareness was controlled. Participants were asked to circle the item that was different to the other two items. For example, the participants heard '板 (bǎn), 抱 (bào), 喷 (pēn)', and they read '1. _an, 2. _ao, 3. _en' on the answer sheet. The correct answer is '3. _en', so that answer should be circled. One correct answer obtained 1 point, with a maximum total of 30 points. The questions are presented in Appendix F.

The specific testing items in the Mandarin phonological awareness task were listed as follows:

(1)	1. pén	2. pǎo	3. bāo	盆跑包	[p] [b]
(2)	1. fēng	2. wū	3. fāng	风乌方	[f] [w]
(3)	1. sǎ	2. zǔ	3. sān	洒组三	[s] [z]
(4)	1. rén	2. lǎo	3. liáo	人老聊	[r] [l]
(5)	1. gāo	2. kāi	3. gěi	高开给	[g] [k]
(6)	1. yǒu	2. yùe	3. lái	有月来	[y] [l]
(7)	1. nán	2. māo	3. niú	南猫牛	[m] [n]
(8)	1. tiān	2. táo	3. dì	天桃地	[t] [d]
(9)	1. hǎo	2. yòng	3. yòu	好用又	[h] [y]
(10)	1. qì	2. qiǎo	3. xī	气桥西	[q] [x]
(11)	1. zhuāng	2. shàng	3. zhāng	装上张	[sh] [zh]
(12)	1. yì	2. wàn	3. wèn	义万问	[y] [w]
(13)	1. rèn	2. rán	3. lù	任然路	[r] [l]
(14)	1. zhèng	2. cháo	3. zhàng	正朝帐	[zh] [ch]

(15)	1. chī	2. shǒu	3. shào	吃手少	[ch] [sh]
(16)	1. kǎ	2. mó	3. fà	卡魔发	[a] [o]
(17)	1. kè	2. tè	3. dī	科特低	[e] [i]
(18)	1. chē	2. mù	3. chū	车木出	[e] [u]
(19)	1. kāi	2. hǎi	3. běi	开海北	[ai] [ei]
(20)	1. kě	2. kē	3. tǎ	可科塔	[e] [a]
(21)	1. nǐng	2. nóng	3. níng	拧农宁	[ing] [ong]
(22)	1. lái	2. tuī	3. shuí	来退谁	[ai] [ui]
(23)	1. zéi	2. jiù	3. xiū	贼就休	[ei] [iu]
(24)	1. láo	2. tóu	3. dǎo	劳头岛	[ao] [ou]
(25)	1. dūn	2. qún	3. chén	蹲群陈	[un] [en]
(26)	1. nán	2. yán	3. tūn	南延吞	[an] [un]
(27)	1. cháng	2. chéng	3. zhēng	常城争	[eng] [ang]
(28)	1. nèn	2. lín	3. mín	嫩林民	[en] [in]
(29)	1. chóng	2. zhōng	3. chéng	虫中成	[ong] [eng]
(30)	1. háng	2. fàng	3. rēng	行放仍	[ang] [eng]

3.10.2 Derivational Morphology Task (Morphological Awareness)

Some researchers (Chen et al., 2009; Cho et al., 2008; Zhang et al., 2014) found that awareness of compound structure was a strong predictor to indicate the development of an L2, English reading skills. Therefore, the Mandarin morphological awareness task focused on testing whether Mandarin derivational awareness interacts with English morphological awareness. The derivational morphology task was adopted from Zhang and Koda (2014) and revised according to the needs of this research.

This derivational morphology task was structured similar to the English written relatives task. One practice sentence and 15 test sentences were listed on one piece of A4 paper. The participants in the experimental and control group schools completed 15 sentences by filling in the blank with the correct derived forms according to the base word and sentence meaning. Before the test, students had time to read the example and test instructions. For example, the participants read '小明长大后，想成为_____（科学）。' (Xiaoming wants to be a _____ (science) when he grows up.) on the answer sheet, and they were expected to write the correct answer '科学家' (scientist) in the blank space. The participants could see the

correct answer at the end of the example sentence. Because the students seldom had tests to add affixes to the word root in Mandarin, the common affixes were provided to the participants as a reference. The affixes that were listed in the Mandarin morphological awareness test are shown in Table 3.4:

Table 3.4

The affixes in the Mandarin morphological awareness test

Affix	Pinyin	Meaning
者	zhě	(after a verb or adjective) one who (is)
感	gǎn	sense
员	yuán	member
民	mín	a person of a certain occupation
件	jiàn	document
手	shǒu	a person doing or good at a certain job
迷	mí	fan
家	jiā	'-ist'
坛	tán	circles
气	qì	gas
星	xīng	star
客	kè	customer, a person engaged in some particular pursuit
师	shī	a person skilled in a certain profession
户	hù	family
型	xíng	type
法	fǎ	law, method
学	xué	'-ology', '-istry'
化	huà	'-ise', '-ify'
界	jiè	scope, extent
版	bǎn	edition

Once the participants had understood the testing requirements fully, the test commenced. The students had 10 minutes to complete the task. If the participants completed the task in less than 10 minutes, it was recommended that they turn over the test paper on their desks and wait until the other students had completed the test. One correct answer obtained 1 point, with a maximum total of 15 points. Mandarin teachers from both participating schools were consulted about the test contents to control the orthographical variable.

3.11 Korean Tasks

3.11.1 The Initial and Final Phoneme Detection Task (Phonological Awareness)

The phoneme detection task, adapted from Wang et al. (2006) and Yeon et al. (2017), was used to measure Korean phonological awareness. It was revised to adjust the difficulty level. Wang et al. (2006) tested whether the bilinguals' cross-language phonological and orthographic skills interacted with English reading ability. The measurements contained a questionnaire, English tasks and Korean tasks. Onset–rime detection task was used as one of the Korean tasks. Cronbach's alpha internal consistency reliability was .78 for both onset detection and rime detection tasks. Yeon et al. (2017) enquired whether Korean phonological, orthographic and morphological awareness contributed to English spelling. They used the initial phoneme detection task and final phoneme detection task to test Korean phonological awareness. In their study, Cronbach's alpha reliability coefficient was .86 for the initial phoneme detection task and .70 for the final phoneme detection task.

Like the English phonological awareness task, there were two subtests in the Korean phonological awareness task. One subtest measured initial phoneme awareness, which contained 10 items, and the second subtest examined final phoneme awareness, which involved 20 items. Four practice items were used to familiarise participants with each subtest. The participants had sufficient time to read the instructions and examples and had opportunities to ask the tester for test instructions. Although Korean is the participants' native language, they seldom performed tests like the Korean phonological awareness task. Therefore, the test did not commence until participants understood the testing items. The initial phoneme detection subtest included 10 groups of words, including five CV words. An example was presented at the top line of the five items to indicate how to choose their answers. For example, students could see '1. 마 /ma/, 2. 대 /dae/, 3. 모 /mo/', and they needed to circle on '2. 대' to show the

correct answer because the consonant 'ㄷ' in '대' was different from the consonant 'ㅁ' in the other two words '마, 모'. The other five items in the initial phoneme detection subtest were 10 CVC words (e.g., for the item '1. 언, 2. 운, 3. 견', participants should select '3. 견' as the correct choice) to increase the difficulty level. This part also had an example to show the participants how to respond, and the correct answer was provided. Although the first 10 items were aimed at testing the participants' initial phoneme awareness, in the test design, the words 'seeking first consonant' instead of 'seeking the initial phoneme' were used to reduce the participants' confusion. For the same reason, in the final phoneme detection part, the researcher selected instruction words familiar to the participants.

The final phonemes are more complicated than the initial phonemes in Korean, so the final phoneme detection task comprised more items (20 test items). Questions 11–16 were CV words, and questions 17–30 were CVC words. Participants chose the correct answers following the examples. The test took about 10 minutes. If the participants completed the task in less than 10 minutes, they were advised to turn over the test paper on their desks and wait until the other students completed the test. One correct answer obtained 1 point, with a maximum total of 30 points. The researcher consulted test contents with the Korean teachers in the Mandarin–Korean trilingual school to control the orthographical variable. The questions are presented in Appendix G.

3.11.2 Derivational Morphology Task (Morphological Awareness)

A task was adopted from the studies of Wang, Ko and Choi (2009) and Yeon et al. (2017) to assess Korean morphological awareness in a similar way to the English morphological awareness test. Yeon et al. (2017) studied whether Korean phonological, orthographic and morphological awareness contributed to English spelling. They also examined whether metalinguistic awareness was connected to English spelling skills. One of

the measurements they used to test Korean morphological awareness was the morphological derivational and decomposition task (Korean morphological awareness form). Cronbach's alpha reliability coefficient was .76.

The participants were asked to complete a sentence using a clue word associated with the target word. The derived words used in the Korean tasks were commonly used words reviewed by the Korean language teachers and considered medium-level of difficulty for the participants. Participants generated a derived word based on the root word provided in the task. Like the Mandarin morphological task, the students were given Korean affixes for reference while filling in the blanks. One practice sentence was presented to the students, and at the end of the line, students could find the correct answer to help them understand how to complete the task.

Fifteen sentences were listed after the example. Participants needed to fill in the blanks with the given prompt words (derived words), and the sentence was similar to the English and Mandarin written relatives tasks. For example, the participants read '철호는 커서 _____ 가(이) 되려고 한다. (과학)' ('Chelho wants to be a _____ when he grows up. (science)') and were expected to write the correct answer '과학자 (scientist)' from the root word '과학 (science)'. Participants were expected to finish the task within 10 minutes. If they completed the task in less than 10 minutes, they were told to turn the test paper over on their desk and wait for the other students to complete the test. One correct answer obtained 1 point, with a maximum total of 15 points.

3.12 Language Proficiency Materials

The participants' school grades for language subjects and maths were collected from both participating schools (maths grades were used to indicate cognitive ability). Language subjects were used to estimate participants' language proficiency.

The two participating public junior high schools were directed by the same District Education Bureau that monitored educational quality, teaching schedules and assessments. The academic year began in September, and the year was divided into two semesters. Typically, students expect two monthly exams, one mid-term exam and one final exam each semester. The final exams usually occur at the end of each semester (one in January, another in July). The District Education Bureau issued and monitored the English and Mandarin final exams each semester. As the Mandarin monolingual and Korean–Mandarin bilingual schools belong to the same district, they had the same English and Mandarin final exams during the same exam period. The current research focused on English phonological awareness and morphological awareness; therefore, only English final exam content was listed to show which English skills were assessed in the exam. The detailed content can be found in Appendix J.

From the contents of the English exam, it can be identified that the reading comprehension part was 75% of the assessment, writing was 20%, and grammar was 5%. Therefore, it can be inferred that the focus of the English final exam is to assess English reading skills.

3.13 Analysis

The analysis was designed to test the hypotheses. As the research used a mixed method design, the analyses were quantitative and qualitative.

For the quantitative analysis, descriptive statistics presented the mean (*M*) and *SD* of participants' scores of the six measurements (phonological and morphological awareness for

Mandarin, Korean and English). A chi-square analysis was used to show the relationship between independent variables and participating groups. This examined whether the variables were statistically different between groups to affect the English phonological and morphological awareness comparison. Next, *t*-tests were used to compare maths performance, Mandarin performance, English performance and Mandarin phonological and morphological awareness between the two groups.

Analysis of covariance (ANCOVA), with the confounding covariate of maths, was used to determine whether participants in the Korean–Mandarin bilingual group would have higher scores in English phonological and morphological awareness after controlling for maths performance. Linear mixed models were used to analyse the English phonological and morphological awareness by class. The ANCOVA results were presented separately for phonology testing and morphology testing. *T*-test results for Mandarin phonological and morphological awareness were embedded in the analysis. Finally, multiple regression analysis was conducted because English phonological and morphological awareness interacted with the independent variables. Reliability analysis is the last part of the quantitative analysis. All the tests ran with a significance level of $\alpha = 0.05$.

The qualitative results from the questionnaires were analysed to examine participants' perceptions of the effects of their previous language. The questionnaire embeds some open-ended questions requiring the participants to express their ideas. Questionnaires for the Korean–Mandarin bilingual group consisted of six questions and the Mandarin monolingual group had four questions. The open-ended questions were designed to avoid random answers from the participants. For example, in the questionnaire for the Korean–Mandarin bilingual group, question 23 asked whether the participants would like to improve their English language skills. Participants chose 'yes' or 'no' and were asked to provide the reason for that selection.

Questionnaires for Korean-Mandarin bilingual group consisted of 6 questions, and Mandarin monolinguals had four questions (exclude Korean-related questions, questions 25 and 27). The method of surveys was used in analysing qualitative data. The expressive answers from the participants were entered into an Excel sheet, and the answers were categorised. Each question was analysed by the percentages of the participants' answers.

3.14 Data Coding

A total of 318 participants (164 in the Korean-Mandarin bilingual group and 154 in the Mandarin monolingual group) were recruited. After inputting the data, data from 307 participants (158 in the Korean–Mandarin bilingual group, 149 in the Mandarin monolingual group) were considered valid and ready for data analysis. Every participant had a unique ID number marked on the questionnaires and task materials, which facilitated tracing. In the Korean–Mandarin bilingual group, there were 158 pieces of valid data against ID numbers marked sequentially from 1,001 to 1,164 (six were excluded because of missing data). The names of participants from the bilingual school were arranged from Class 1 to Class 5, and the ID number followed the name list provided by the school.

In the Mandarin monolingual group, there were 149 pieces of valid data, assigned ID numbers from 2001 to 2154, with five excluded because of missing data. The participants' name lists were arranged from Class 1 to Class 4 and were ordered according to the name lists of the participating school. The testing materials could be identified with the participants' unique ID numbers, facilitating searching for the original documents. The researcher labelled digital data with the same ID numbers as the paper materials.

3.15 Missing Data and Confounders

Missing data is a common occurrence in experimental studies involving assessments (Masconi et al., 2015), longitudinal studies (Dinh & Yang, 2011), repeated measures

(Kalaycioglu et al., 2016) and predictive models (Masconi et al., 2015). Nevertheless, even with a large sample size, one should be cautious when excluding data to avoid biased estimates, statistical power loss and inaccurate analysis. Therefore, Steyerberg (2009, Chapter 2) suggests that the missing data must be described and explained during the data analysis and presented in the final report.

While collecting, assessing and inputting the data, 11 pieces of missing data were found. Four participants in the bilingual group and three in the monolingual group did not respond to the questionnaires. Participants' dates of birth were collected in the questionnaires to avoid redundancy. The date of birth was an essential element while recruiting the participants. Therefore, the participants who did not participate in the questionnaire were excluded from the dataset.

One participant in the bilingual group and two in the monolingual group did not attend the English phonological awareness task test and the English morphological task test. One participant in the bilingual group did not complete the Korean phonological awareness test and Korean morphological awareness test. In all, four participants failed to finish the language tasks. Participant data were retained in the dataset, with responses marked as missing when running the data analysis.

Details of missing data are shown in Appendix K. There was a small portion of missing data, such as gender, English morphological awareness task, Mandarin phonological awareness task and Mandarin morphological awareness task. Mandarin monolinguals completed tasks related to Mandarin and English, and Korean–Mandarin bilinguals completed Korean-related tasks in addition to the tasks completed by Mandarin monolinguals. Therefore, variables were missing in Mandarin monolinguals' Korean tasks and associated Korean questions in the questionnaires. Missing data related to the Korean phonological awareness task, Korean

morphological awareness task, Korean performance, Korean use frequency, Korean kindergarten, the importance of Korean and the Korean effect.

While assessing and sorting the language task results, it was found that the participants in Class 2 in the bilingual school obtained extraordinarily low scores in the English phonological awareness tasks and Mandarin phonological awareness tasks (see Table 3.5). The children scoring poorly in the English phonological awareness tasks (M = 9.5/30) might be reasonable because English was their L2. However, the participants in Class 2 also obtained low marks in their L1 Mandarin phonological awareness tasks (M = score 8.4/30), which was unusual.

The monolingual participating school teachers were contacted immediately with the explanation and summary (see Table 3.5) of the scores in each task to discuss potential reasons for the results. The English phonological awareness task and the Mandarin phonological awareness task involved listening to the audio materials. The teacher's feedback reflected that the students did the language tasks following the required steps, and audio materials played well while conducting both Mandarin and English tasks. The teacher was not surprised with the results and said the results were acceptable regarding the students' academic performance.

Another factor was considered: Mandarin and English academic results. When looking at Mandarin academic results for Class 2, the average score of Class 2 was 60.8, slightly lower than the total average (61.2) of the Mandarin monolingual school. The contents of the English final exam (details in Appendix J, Academic results) showed that the exam assessed grammar (10%), writing (20%) and reading (70%) abilities. Reading occupied a large proportion of the English final exam. Since morphological awareness was a strong predictor of vocabulary knowledge and reading abilities (Ku & Anderson, 2003; Ke & Xiao, 2015; Shen & Crosson,

2023), with higher scores in the English final exams, students tended to obtain similar results in the English morphological awareness tasks.

The participants in Class 2 performed exceptionally well in the English morphological awareness task, and the average score was higher than other classes in the Mandarin monolingual school. However, the mean class mark for the English phonological awareness tasks was lower—the lowest in the school. Phonological awareness in L1 has been proven to be a strong predictor of English reading competence (Blachman, 1984; Gottardo et al., 2001; Wang et al., 2006) across different language backgrounds. These results conflicted with the findings from the previous research. Therefore, to avoid biased results, the researcher decided to exclude the Class 2 results from the analysis, but a record of it was kept for reference.

Table 3.5

Partial academic scores and language task scores for the Mandarin monolingual school

Class no.	English phonological awareness	English morphological awareness	Mandarin phonological awareness	Mandarin morphological awareness	English performance	Mandarin performance
Class 1	21.6	10.1	25.1	13.1	48.3	61.5
Class 2	9.5	17.7	8.4	13.4	45.9	60.8
Class 3	21.8	9.9	26.0	14.4	45.4	60.7
Class 4	20.0	10.9	26.9	12.5	49.4	61.7
Average score	18.2	12.2	21.6	13.4	47.2	61.2
Full score	30	20	30	15	100	100

3.16 Independent Variables

The research aimed to test whether Korean–Mandarin bilinguals had advantages over Mandarin monolinguals in English phonological and morphological awareness. The descriptive statistics showed that the participants in the Korean–Mandarin bilingual group performed better than the Mandarin monolingual group in both tasks. However, some variables may affect the results. Independent variables for English phonological awareness and English

morphological awareness differed between groups according to language (see Tables 3.6 and 3.7).

Table 3.6

Independent variables for the Mandarin monolingual group

Variable	English phonological awareness	English morphological awareness
Covariate	Cognitive ability (maths)	Cognitive ability (maths)
Independent variables		Reading skills (English and Mandarin performance)
	Mother's education level	
	Mandarin phonological awareness	Mandarin morphological awareness
	Language use (Mandarin)	Language use (Mandarin)

Table 3.7

Independent variables for Korean–Mandarin bilingual group

Variable	English phonological awareness	English morphological awareness
Covariate	Cognitive ability (maths)	Cognitive ability (maths)
Independent variables		Reading skills (English, Mandarin and Korean performance)
	Mother's education level	
	Mandarin phonological awareness	Mandarin morphological awareness
	Korean phonological awareness	Korean morphological awareness
	Language use (Mandarin and Korean)	Language use (Mandarin and Korean)

Independent variables that may affect English phonological awareness for the Mandarin monolingual group were Maths performance, Mother's education level, Mandarin phonological awareness and Mandarin language use. The bilingual group contained independent variables in the monolingual group and added Korean phonological awareness and Korean language use from the angle of bilingual speakers' language background. Independent variables that may affect English morphological awareness for the monolingual group were Maths, Mandarin and English performance, Mandarin morphological awareness and Mandarin language use. The Korean-Mandarin bilingual group contained independent variables in the Mandarin monolingual group and added Korean performance, Korean morphological

awareness, and Korean language use from the aspect of bilingual speakers' language background.

3.16.1 Maths Performance

Maths performance was used as an indicator of participants' cognitive abilities that may influence English phonological and morphological awareness. The maths scores were collected from the participants' semester final exams. The two participating public junior high schools were directed by the same District Education Bureau that monitored educational quality, teaching schedules and assessments. The academic year began in September, and the year was divided into two semesters. Typically, students expect two monthly exams, one mid-term exam and one final exam each semester. The final exams usually occur at the end of each semester (one in January, another in July). The District Education Bureau issued and monitored the maths final exams each semester. The maths exam was conducted during the final exam period set by the District Education Bureau in the school calendar. As the Mandarin monolingual and Korean–Mandarin bilingual schools belong to the same district, they had the same English and Mandarin final exams during the same exam period. Maths scores were treated as a covariate when analysing the two groups' English phonological and morphological awareness.

3.16.2 Language Use

Language use refers to the processing of language and all social and interactive uses conferred by language (Bybee, 2001). Bybee noted that language use frequency would affect the phonological development of the target language. Bybee (2001) applied phonology to a usage-based model, which involved the following basic principles:

Experience affects representation……

Mental representations of linguistic objects have the same properties as mental representations of other objects……

Categorisation is based on identity or similarity……

Generalisations over forms are not separate from the stored representation of forms but emerge directly from them……

Lexical organisation provides generalisations and segmentation at various degrees of abstraction and generality……

Grammatical knowledge is procedural knowledge.

One of the principles of the usage-based model is that high-frequency words and phrases are easier to access and have stronger representations than low-frequency words (Bybee, 2001). Therefore, Mandarin monolinguals tend to use more words in the L1 , which is easy to access, than in the L2. However, the bilinguals, especially the simultaneous Korean–Mandarin bilinguals in this study, have two L1s to choose to express themselves. The most frequently used language (and within that, frequently used vocabulary) is easier to access, so this was an aspect to be explored when considering phonological awareness, because the 'phonological structure is affected by use in that articulatory accommodations occur as the result of real language use' (Bybee, 2001, p. 16).

The participants' language use in a social context was collected because L3 acquisition was firmly associated with the social context, which influences how the participants interpreted things, how they spoke and the contents of their speech (Sanz, 2000). As exposure to the languages could influence performance in completing morphological tasks (Vernice & Pagliarini, 2018), the participants' frequency of using the language was used as an independent variable in the English morphological awareness analysis.

English language use was not included in the ANCOVA because only a small number of the participants used English in daily communication. Language use data were collected through questionnaires from both groups. When the researcher analysed the language use data, it appeared that the participants seldom used English in their daily lives, which is reasonable. Using language in communication needs an audience. For example, when the participants are talking to someone who does not know English, it is impossible to use English for communication. It is common to choose a language that can fulfil the goal of communication. Therefore, when the participants met their grandparents, it was natural for Mandarin monolinguals to use Mandarin, while Korean–Mandarin bilinguals used Mandarin or Korean to communicate because most grandparents in China have not learned English.

3.16.3 Parents' Occupation

Parents' occupations were included to investigate the SES of the participants' families, which might affect their language use (Labelle, 2019; Madrazo & Bernardo, 2018). As discussed in the previous section, more frequent access to languages will influence the development of phonological awareness. Children from families with higher incomes may benefit from it in language acquisition (Ermisch & Francesconi, 2000; Schildberg-Hörisch, 2016) as they may have more opportunities to receive language coaching. Also, full-time parental employment may reduce the time parents have to spend with their children, so their educational attainment may be affected more by full-time maternal employment when children are at the age of 0-5 (Ermisch & Francesconi, 2000). The English coaching time was also collected in the questionnaires to evaluate whether SES interacted with participants' English phonological awareness. Mirta and Elena (2018) collected SES through questionnaires when measuring the relationship between morphological awareness and reading ability.

However, public schools in this study are zoned, and the students in the same school zone are assumed to be from families with a similar SES. Therefore, SES was not used as a covariate in the analysis. The data collected in the questionnaires about the SES was used to consider the participant's family financial status.

3.16.4 Independent Variables for Phonological Awareness

English phonological awareness was compared between the two groups. Based on the current literature, several independent variables may influence the language task results of English phonological awareness, and these variables were used to test the hypotheses.

3.16.4.1 Phonological Awareness of Language Background Knowledge

Korean–Mandarin bilinguals in this study had Mandarin and Korean phonological awareness, while Mandarin monolinguals only had Mandarin phonological awareness before they started to acquire English phonological awareness skills. The study's hypothesis is that the phonological awareness of the background language has a better effect on Korean–Mandarin bilinguals obtaining English phonological awareness than Mandarin monolinguals.

Previous research (Lin et al., 2010; Wang et al., 2005) has demonstrated the influence of phonological awareness in the background language on L2 or L3 phonological awareness. With vowels and consonants similar to the English phonetic system, Chinese Pinyin enabled positive phonological transfer from Chinese to English (Lin et al., 2010; Wang et al., 2005).

Wang et al. (2006) presented that better phonological skills in one language facilitates better phonological skills in another language because Korean and English, two alphabetic languages, have a high correlation in phonological skills. Korean onset detection, time detection and phoneme deletion are highly associated with English onset detection, time detection and phoneme deletion. For these reasons, the phonological awareness of the

background language was used as an independent variable when comparing English phonological awareness between the two groups.

3.16.4.2 Mother's Education Level

Parents' highest level of education is another factor influencing performance in English phonological awareness. Participants from families with higher education levels were more easily supported in language development, especially in kindergarten and primary education. Dixon et al. (2012) believed that a mother's education was related to English vocabulary acquisition, which predicted a bilingual's phonological awareness. Therefore, this study examined the interaction between mothers' education levels and participants' phonological awareness because participants were of different language backgrounds and age groups compared to the previous research; the results aligned with the existing research.

To summarise, the following independent variables were used to analyse English phonological awareness: maths performance, language use, phonological awareness of language background knowledge (Mandarin phonological awareness for Mandarin monolingual group; Mandarin and Korean phonological awareness for Korean–Mandarin bilingual group), parent's occupation (SES) and mother's education level.

3.16.5 Independent Variables for Morphological Awareness

In this study, English morphological awareness was compared between the Mandarin monolingual group and Korean–Mandarin bilingual group. Several independent variables may influence the language task results for English morphological awareness, and these variables were used to test the hypotheses.

3.16.5.1 Morphological Awareness of Language Background Knowledge

The study aimed to compare the English morphological awareness between Mandarin monolinguals and Korean–Mandarin bilinguals and determine whether participants'

background knowledge contributed to their results. Korean–Mandarin bilinguals in the current study had Mandarin morphological awareness and Korean morphological awareness, while Mandarin monolinguals only had Mandarin morphological awareness before they started to obtain English morphological awareness. The hypothesis is that the morphological awareness of the background language has a greater effect on bilinguals obtaining English morphological awareness than monolinguals. The previous research showed the positive influence of morphological awareness of the background language on L2 or L3 morphological awareness (Chen et al., 2009; Cho et al., 2008; Ku & Anderson, 2003; Zhang et al., 2014).

3.16.5.2 English Performance

In this study, the language academic results showed participants' background language proficiency, and 75% of the final English language exam contents tested English reading skills. Morphological awareness is an indicator of English reading comprehension and is strongly related to reading skills (Ku & Anderson, 2003; Labelle, 2019).

The following independent variables were used in analysing English morphological awareness: maths performance, language use, morphological awareness of language background knowledge (Mandarin morphological awareness for Mandarin monolingual group; Mandarin and Korean morphological awareness for Korean–Mandarin bilingual group), parent's occupation (SES), background language proficiency (Mandarin performance for Mandarin monolingual group; Mandarin and Korean performance for Korean–Mandarin bilingual group).

3.17 Summary

This chapter began by outlining the research hypotheses and describing the materials and procedures used in this study. Participants' demographic factors and linguistic factors

provided the basic characteristics of students, and the process of recruiting the participants was described.

The experiment included seven measurements. All participants answered the language background questionnaire. Participants in the Mandarin monolingual school completed four language tasks (two each for English and Mandarin), and those in the Korean–Mandarin bilingual school completed six language tasks (two each for English, Mandarin and Korean). The English tasks were the sound oddity task and the written relatives task. The Mandarin tasks were the onset–rime detection task and derivational morphology task. The Korean tasks were the initial and final phoneme detection task and the derivational morphology task.

Participants' junior high school grades for language subjects (Mandarin and English for the Mandarin monolingual group; Mandarin, Korean and English for Korean–Mandarin bilingual group) and maths performance were collected from both schools. Language subjects were used to estimate participants' language proficiency, and maths performance was used to reflect cognitive abilities.

Finally, the analysis plan indicated the quantitative and qualitative methods used. It detailed the statistical tests and coding procedures, and missing data and confounders were explained.

Chapter 4: Results

This chapter presents the study results to compare the English phonological and morphological awareness between Korean–Mandarin bilinguals and Mandarin monolinguals to investigate if bilinguals have advantages in English phonological and morphological awareness. The quantitative results include four parts: chi-square tests for independent variables, ANCOVA results for English phonological and morphological awareness, *t*-test results for Mandarin phonological and morphological awareness, and multiple regression analysis results.

4.1 Description of the Sample

There were 271 children in the sample, with fewer boys (45%, $n = 121$) than girls (55%, $n = 150$) (see Table 4.1). The gender of participants in the Mandarin monolingual group was more evenly distributed than in participants from the Korean–Mandarin bilingual school. Females ($n = 58$) comprised 52.3%, and males ($n = 53$) were 47.7% of the Mandarin monolingual group. Conversely, the Korean–Mandarin bilingual group had 57.5% females ($n = 92$) and 42.5% males ($n = 68$). Both the Mandarin monolingual group and the Korean–Mandarin bilingual group had more females than males. The mean age of the Mandarin monolingual group was 14.02, and the Korean–Mandarin bilinguals' average age was 13.87.

Table 4.1

Mean age and gender distribution

Group	Gender	*n*	*M*	*SD*	% of total *N*
Mandarin monolingual group	Female	58	13.99	.414	21.4%
	Male	53	14.05	.455	19.6%
	Total	111	14.02	.434	41.0%
Korean–Mandarin bilingual group	Female	92	13.89	.395	33.9%
	Male	68	13.84	.398	25.1%
	Total	160	13.87	.396	59.0%
Total	Female	150	13.93	.404	55.4%
	Male	121	13.94	.435	44.6%
	Total	271	13.93	.417	100.0%

4.2 Descriptive Statistics for Continuous Variables

Descriptive statistics were performed for the continuous variables to determine whether the measurements were normally distributed (see Table 4.2). The distribution of the continuous variables was approximately normal. There are 112 missing values for the Korean phonological awareness variable because participants in the Mandarin monolingual group did not complete the Korean language tasks. The mean English phonological awareness and morphological awareness scores for all were 77.7 and 66.0, respectively, while Mandarin phonological awareness and morphological awareness mean scores were 87.1 and 88.2, respectively.

Table 4.2

Descriptive statistics for continuous variables

Variable	*N*	*M*	Maximum	*SD*	Skewness		Kurtosis	
					Statistic	*SE*	Statistic	*SE*
English phonological awareness	270	77.72	100	16.853	−1.240	0.148	1.798	0.295
English morphological awareness	270	65.98	100	30.054	−.837	0.148	−.532	0.295
Mandarin phonological awareness	271	87.11	100	13.936	−1.721	0.148	3.383	0.295
Mandarin morphological awareness	271	88.19	100	17.184	−3.092	0.148	11.715	0.295
Korean phonological awareness	159	94.97	100	13.066	−3.775	0.192	15.165	0.383
Korean morphological awareness	159	63.19	100	25.873	−.943	0.192	.447	0.383

4.2.1 Descriptive Statistics

4.2.1.1 Korean–Mandarin Bilinguals

Table 4.3 shows descriptive statistics for bilingual learners ($n = 160$). Bilinguals performed better than Mandarin monolinguals in the English phonological awareness task ($M = 82.3$,

SD = 14.26), English morphological awareness task (*M* = 75.7, *SD* = 22.71) and Mandarin phonological awareness task (*M* = 87.7, *SD* = 11.95), but not in the Mandarin morphological awareness task (*M* = 86.8, *SD* = 18.38). Their mean score was 95 (*SD* = 13.07) for the Korean phonological awareness task and 63.2 (*SD* = 25.87) for the Korean morphological awareness task. The minimum score for the phonological awareness tasks in the three languages were 16.7 for English, 26.7 for Mandarin and 16.7 for Korean, respectively. In contrast, for morphological awareness, the minimum scores were zero for all languages. Three students obtained zero scores in English morphological awareness. They attempted to answer the questions but did not provide the correct forms of words. A similar finding was observed in the Mandarin and Korean morphological awareness tasks were in a similar situation to English morphological awareness tasks. Among the six tasks, the highest mean scores appeared in the Korean phonological awareness tasks, and the lowest mean score was in the Korean morphological awareness task. The highest scores in the phonological awareness tasks among the three languages fell on Korean, and the lowest was English. In contrast, participants achieved the most scores in the Mandarin language type in the morphological awareness tasks and the fewest scores in the Korean language.

Table 4.3

Descriptive statistics for the bilingual group

Variable	*M*	Minimum	Maximum	*SD*
English phonological awareness	82.3	16.7	100	14.26
English morphological awareness	75.7	0	100	22.71
Mandarin phonological awareness	87.7	26.7	100	11.95
Mandarin morphological awareness	86.8	0	100	18.38
Korean phonological awareness	95.0	16.7	100	13.07
Korean morphological awareness	63.2	0	100	25.87

4.2.1.2 Mandarin Monolinguals

Table 4.4 presents descriptive statistics for Mandarin monolingual learners (*n* = 111). Monolingual learners obtained higher scores in the Mandarin morphological awareness task (*M* = 90.3, *SD* = 15.14) compared to the bilinguals but lower scores in the English phonological

awareness task ($M = 71.1$, $SD = 18.09$), English morphological awareness task ($M = 52.1$, $SD = 33.75$) and Mandarin phonological awareness task ($M = 86.3$, $SD = 16.41$). The minimum score for the Mandarin phonological awareness task was 26.7, and for the Mandarin morphological awareness task was 6.7. For the English tasks, both minimum scores of phonological awareness and morphological awareness tasks were zero. When considering language, participants achieved higher scores in the Mandarin phonological and morphological awareness tasks than in the English language tasks.

Table 4.4

Descriptive statistics for the monolingual group

Variable	*M*	Minimum	Maximum	*SD*
English phonological awareness	71.1	0	100	18.09
English morphological awareness	52.1	0	100	33.75
Mandarin phonological awareness	86.3	26.7	100	16.41
Mandarin morphological awareness	90.3	6.7	100	15.14

4.3 Chi-square Test Results

The quantitative analysis started with chi-square tests because 'non-parametric tests are extremely useful in situations where severe violations of the normality assumption would make interpreting a parametric test problematic and in situations where you wish to analyse categorical or ranked data' (Allen & Bennett, 2012, p. 225). According to the non-parametric tests decision tree (Allen & Bennett, 2012, p. 225), the researcher measured the variables through the chi-square test of contingencies. The 30 independent variables from the Language Background Questionnaire are presented in Appendix C. The chi-square test examined the relationship of two categorical variables, the participating groups, with variables such as gender, maths performance, language use, parents' occupations, parents' educational level and language performance.

4.3.1.1 Gender

The participants' gender was not balanced in the two participating schools, especially in the bilingual group (see Table 4.5). Therefore, chi-square tests were conducted to determine whether the gender of the participating groups was significantly different and needed to be considered a confounding covariate.

Table 4.5

Gender chi-square with crosstabulations by participating groups

Gender	Participating groups						Total		
	Mandarin monolingual group			Korean–Mandarin bilingual group					
	Count	% within Participating groups	% within Gender	Count	% within Participating groups	% within Gender	Count	% within Participating groups	% within Gender
Female	58	52.3%	38.7%	92	57.5%	61.3%	150	55.4%	100.0%
Male	53	47.7%	43.8%	68	42.5%	56.2%	121	44.6%	100.0%
Total	111	100.0%	41.0%	160	100.0%	59.0%	271	100.0%	100.0%

Table 4.6 presents the interaction between variables, gender, Mandarin monolingual group and Korean–Mandarin bilingual group. It shows that 271 cases are included in the analyses. The value of chi-square is 0.730, the degrees of freedom (*df*) is 1, and the asymptotic significance, or *p* value, is .393. Since the *p* value is not significant at the .05 level, the two variables do not have a statistically significant relationship, χ^2 (1, N = 271) = 0.730, $p > .05$. The result means that gender is not significantly related to whether participants are from bilingual or monolingual groups.

Table 4.6

Gender chi-square statistics in crosstabulations

	Value	*df*	Asymptotic sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	.730[a]	1	.393		
Continuity correction[b]	.533	1	.465		
Likelihood ratio	.730	1	.393		
Fisher's exact test				.456	.233
Linear-by-linear association	.728	1	.394		
N of valid cases	271				

Note. sig. = significance. [a] 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 49.56. [b] Computed only for a 2 × 2 table.

4.3.1.2 Maths Performance

Table 4.7 presents the interaction between two variables: maths performance and participating groups. The chi-square value was 242.027, the degrees of freedom (*df*) was 130, and the *p* value was < .001. Since the *p* value was significant at the .05 level, the two variables had a statistically significant relationship, χ^2 (130, N = 270) = 242.027, p < .05. The result meant that the relationship between maths performance and the participating groups was significant, which indicated that maths performance was related to the monolingual, bilingual group.

Table 4.7

Maths performance chi-square statistics in crosstabulations

	Value	*df*	Asymptotic sig. (2-sided)
Pearson chi-square	242.027[a]	130	< .001
Likelihood ratio	325.585	130	< .001
Linear-by-linear association	11.001	1	< .001
N of valid cases	270		

Note. sig. = significance. [a] 261 cells (99.6%) have an expected count of less than 5. The minimum expected count is .41.

4.3.1.3 Language Use

4.3.1.3.1 English Language Use

Table 4.8 shows the interaction between two variables: English language use and participating groups. The chi-square value was 43.296, the degrees of freedom (*df*) was 16, and the *p* value was < .001. Since the *p* value was significant at the .05 level, the two variables had a statistically significant relationship, χ^2 (16, N = 271) = 43.296, p < .05. The result meant that the relationship between English language use and the participating groups was significant. The English use was different between the two participating groups. The bilingual group used English more than the monolingual group.

Table 4.8

English language use chi-square statistics in crosstabulations

	Value	*df*	Asymptotic sig. (2-sided)
Pearson chi-square	43.296[a]	16	< .001
Likelihood ratio	51.271	16	< .001
Linear-by-linear association	4.814	1	.028
N of valid cases	271		

Note. sig. = significance. [a] 21 cells (61.8%) have an expected count of less than 5. The minimum expected count is .41.

4.3.1.3.2 Mandarin Language Use

Table 4.9 presents the interaction between two variables: Mandarin language use and participating groups. The chi-square value was 192.801, the degrees of freedom (*df*) was 36, and the *p* value was < .001. Since the *p* value was significant at the .05 level, the two variables had a statistically significant relationship, χ^2 (36, N = 271) = 192.801, p < .05. The result meant that the relationship between Mandarin language use and the participating groups was significant. The Mandarin use was diverse between the two participating groups. The monolingual group used Mandarin more than the bilingual group.

Table 4.9

Mandarin language use chi-square statistics in crosstabulations

	Value	*df*	Asymptotic sig. (2-sided)
Pearson chi-square	192.801[a]	36	< .001
Likelihood ratio	251.361	36	< .001
Linear-by-linear association	131.132	1	< .001
N of valid cases	271		

Note. sig. = significance. [a] 57 cells (77.0%) have an expected count of less than 5. The minimum expected count is .41.

4.3.1.4 Parents' Occupations

The questionnaires collected parents' occupations to investigate the SES of participants' families, which may affect language use (Labelle, 2019; Madrazo & Bernardo,

2018). Whether parents had occupations was considered in the analysis. The detailed occupations were used to reference when the participants' languages stood out as an outlier. For example, one participant in the Korean–Mandarin bilingual group responded that from birth to the age of six, the participant heard English as one of the home languages, which occupied half of the participant's home language. With common sense and the current situation of the ethnic Korean–Chinese family, it was unlikely that English would be used as their daily communication language. In this case, the parents' occupations were considered. Both of the participant's parents were employed in white-collar work, making the participant's response reasonable.

4.3.1.4.1 Mother's Occupation

Table 4.10 presents the interaction between two variables: mother's occupation and participating groups. The chi-square value was 3.912, the degrees of freedom (*df*) was 1, and the *p* value was .048. Since the *p* value was significant at the .05 level, the two variables had a statistically significant relationship, χ^2 (1, N = 271) = 3.912, $p < .05$. The result meant that the relationship between mother's occupation and the participating groups was significant.

Table 4.10

Mother's occupation chi-square statistics in crosstabulations

	Value	*df*	Asymptotic sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	3.912[a]	1	.048		
Continuity correction[b]	3.428	1	.064		
Likelihood ratio	3.950	1	.047		
Fisher's exact test				.058	.032
Linear-by-linear association	3.897	1	.048		
N of valid cases	271				

Note. sig. = significance. [a] 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 43.83. [b] Computed only for a 2 × 2 table.

4.3.1.4.2 Father's Occupation

Table 4.11 presents the interaction between two variables: father's occupation and participating groups. The chi-square value was 3.912, the degrees of freedom (*df*) was 1, and the *p* value was .048. Since the *p* value was not significant at the .05 level, the two variables did not have a statistically significant relationship, χ^2 (1, N = 271) = 0.252, $p > .05$. The result meant that the relationship between the father's occupation and the participating groups was not significant. However, it shows low expected frequencies (and a 2 × 2 table), which means the assumption is violated; therefore, the Fisher's exact test was also conducted.

Table 4.11

Father's occupation chi-square statistics in crosstabulations

	Value	*df*	Asymptotic sig. (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	1.314[a]	1	.252		
Continuity correction[b]	1.012	1	.314		
Likelihood ratio	1.329	1	.249		
Fisher's exact test				.265	.157
Linear-by-linear association	1.310	1	.252		
N of valid cases	271				

Note. sig. = significance. [a] 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 29.08. [b] Computed only for a 2 × 2 table.

4.3.1.5 Parents' Education Level

4.3.1.5.1 Mother's Education Level

Table 4.12 presents the interaction between two variables: mother's education level and the participating groups. The chi-square value was 76.450, the degrees of freedom (*df*) was 3, and the *p* value was < .001. Since the *p* value was significant at the .05 level, the two variables had a statistically significant relationship, χ^2 (3, N = 271) = 76.450, $p < .05$. The result meant that the relationship between the mother's education level and the participating groups was

significant. The mother's education level in the Korean–Mandarin bilingual group was significantly higher than that of the monolingual group (see Figure 4.1).

Table 4.12

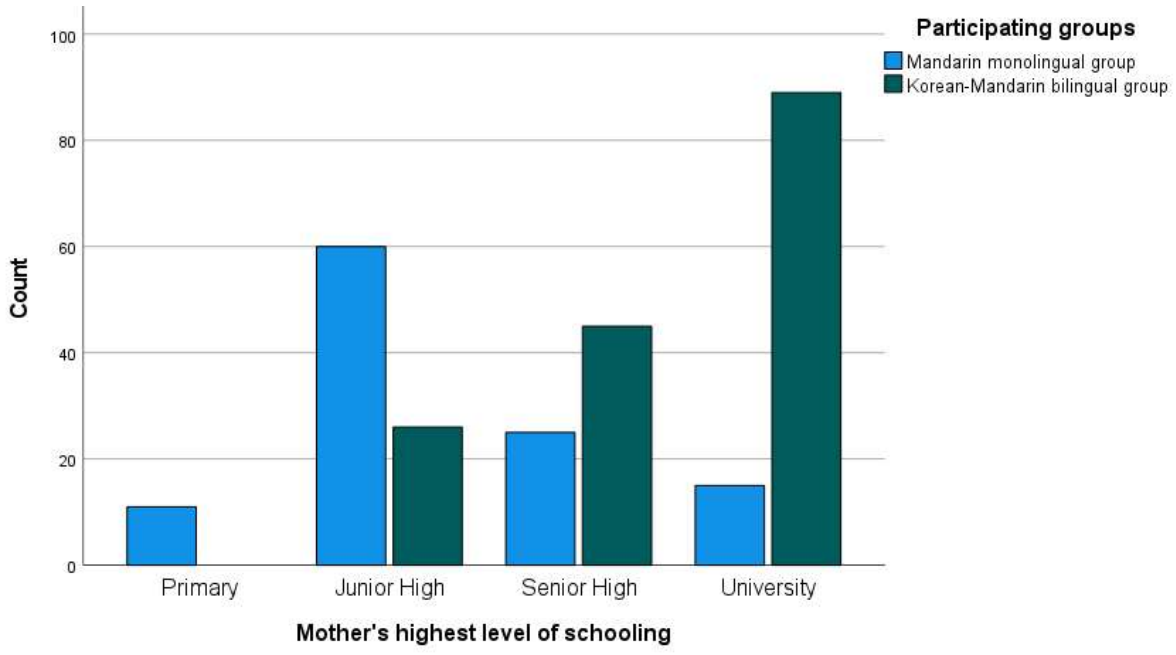
Mother's education level chi-square statistics in crosstabulations

	Value	*df*	Asymptotic sig. (2-sided)
Pearson chi-square	76.450[a]	3	< .001
Likelihood ratio	84.311	3	< .001
Linear-by-linear association	75.237	1	< .001
N of valid cases	271		

Note. sig. = significance. [a] 1 cell (12.5%) has an expected count of less than 5. The minimum expected count is 4.51.

Figure 4.1

Mother's education level among groups



4.3.1.5.2 Father's Education Level

Table 4.13 presents the interaction between two variables: father's education level and participating groups. The chi-square value was 66.015, the degrees of freedom (*df*) was 3, and the *p* value was < .001. Since the *p* value was significant at .05 level, the two variables had a statistically significant relationship, χ^2 (3, N = 271) = 66.015, p < .05. The result meant that the

relationship between the father's education level and the participating groups was significant. The father's education level of the bilingual group was significantly higher than that of the monolingual group.

Table 4.13

Father's education level chi-square statistics in crosstabulations

	Value	*df*	Asymptotic sig. (2-sided)
Pearson chi-square	66.015[a]	3	< .001
Likelihood ratio	69.483	3	< .001
Linear-by-linear association	58.334	1	< .001
N of valid cases	271		

Note. sig. = significance. [a] 1 cell (12.5%) has an expected count of less than 5. The minimum expected count is 4.10.

4.3.1.6 Language Performance

4.3.1.6.1 English Performance

Table 4.14 shows the interaction between two variables: English performance and participating groups. The chi-square value was 163.519, the degrees of freedom (*df*) was 108, and the *p* value was < .001. Since the *p* value was significant at the .05 level, the two variables had a statistically significant relationship, χ^2 (108, N = 271) = 163.519, $p < .05$. The result meant that the relationship between English and the participating groups was significant.

Table 4.14

English performance chi-square statistics in crosstabulations

	Value	*df*	Asymptotic sig. (2-sided)
Pearson chi-square	163.519[a]	108	< .001
Likelihood ratio	215.908	108	< .001
Linear-by-linear association	16.147	1	< .001
N of valid cases	271		

Note. sig. = significance. [a.] 218 cells (100%) have an expected count of less than 5. The minimum expected count is .41.

4.3.1.6.2 Mandarin Performance

Table 4.15 presents the interaction between two variables: Mandarin performance and participating groups. The chi-square value was 248.552, the degrees of freedom (*df*) was 105, and the *p* value was < .001. Since the *p* value was significant at the .05 level, the two variables had a statistically significant relationship, χ^2 (105, N = 271) = 248.552, p < .05. The result meant that the relationship between Mandarin and the participating groups was significant.

Table 4.15

Mandarin performance chi-square statistics in crosstabulations

	Value	*df*	Asymptotic sig. (2-sided)
Pearson chi-square	248.552[a]	105	< .001
Likelihood ratio	335.210	105	< .001
Linear-by-linear association	.971	1	.324
N of Valid Cases	271		

Note. sig. = significance. [a] 212 cells (100%) have an expected count of less than 5. The minimum expected count is .41.

4.3.1.7 Chi-square Test Results Summary

From the above series of chi-square test results, the following independent variables had statistical relationships with the participating groups: English language use, Mandarin language use, mother's occupation, mother's education level and father's educational level. The scores for maths performance, English performance and Mandarin performance had a statistical relationship with the participating groups. Therefore, these variables were considered in further statistical analysis.

The next section presents the quantitative analysis results of the research. The results of the *t*-tests, English phonological awareness task ANCOVAs, English morphological awareness task ANCOVAs, Mandarin phonological awareness task ANCOVAs and Mandarin morphological awareness task ANCOVAs are presented.

4.4 *T*-test Results for Maths, Mandarin and English Performance

The chi-square tests indicated that academic scores for maths, Mandarin and English differed statistically between the Mandarin monolingual group and Korean–Mandarin bilingual group. and the association between dependent and independent variables.

T-tests were conducted to investigate whether the academic scores of the Mandarin monolingual group and Korean–Mandarin bilingual group were statistically different. The following sections describe the *t*-test results for maths, Mandarin and English performance.

4.4.1 Maths Performance

There were 270 cases involved in the analysis, with one missing data in the bilingual group and no missing data in the monolingual group. An independent sample *t*-test was conducted to measure the differences in maths performance between the monolingual group ($n = 111$) and the bilingual group ($n = 159$). Table 4.17 shows that the monolingual group ($M = 65.50$, $SD = 23.60$) outperformed the bilingual group ($M = 55.64$, $SD = 23.57$) in maths scores. The standard deviations of the two groups were similar. Levene's test for equality of variances was not statistically significant ($F = 0.582$, $p > .05$); thus, equal variances could be assumed. The *t*-test was statistically significant, with the maths scores of the monolingual group 9.86 higher, 95% confidence interval (CI) [4.12, 15.60], than the bilingual group, $t(268) = 3.38$, $p < .001$, two-tailed, $d = 0.42$. The *t*-test results of maths performance show that the monolingual group performed statistically better than the bilingual group.

Table 4.16

Maths performance descriptive statistics by group

Group	*N*	*M*	*SD*	*SEM*
Mandarin monolingual group	111	65.50	23.604	2.240
Korean–Mandarin bilingual group	159	55.64	23.572	1.869

Table 4.17

Maths performance independent sample t-*test*

	t	*df*	*p* (2-tailed)	Mean difference	Std. error difference	95% CI of the difference	
						Lower	Upper
Maths performance	3.380	268	< .001	9.861	2.917	4.118	15.605

Note. CI = confidence interval; Std. = standard.

4.4.2 Mandarin Performance

There were 271 cases involved in the analysis, with no missing data in either group. An independent sample *t*-test was conducted to measure the differences in Mandarin performance between the monolingual group (n = 111) and the bilingual group (n = 160). Table 4.19 shows that the monolingual group (M = 61.47, SD = 14.55) outperformed the bilingual group (M = 59.51, SD = 17.16) in Mandarin performances, and there was more variance in the bilingual group's scores. Levene's test for equality of variances was significant (F = 4.411, p = .037); thus, equal variances could not be assumed. Therefore, Welch's *t*-test was used (Allen & Bennett, 2012) to compare the monolingual group's average Mandarin score to that of the bilingual group. The *t*-test was non-significant, t (258.32) = 1.02, p = .311, two-tailed, d = 0.12, 95% CI [−1.85, 5.78].

Table 4.18

Mandarin performance descriptive statistics by group

Group	*N*	*M*	*SD*	*SEM*
Mandarin monolingual group	111	61.47	14.552	1.381
Korean–Mandarin bilingual group	160	59.51	17.164	1.357

Table 4.19

Mandarin performance independent sample t-*test*

	t	*df*	*p* (2-tailed)	Mean difference	Std. error difference	95% CI of the difference	
						Lower	Upper
Mandarin performance	1.015	258.323	.311	1.965	1.936	−1.848	5.778

Note. CI = confidence interval; Std. = standard.

4.4.3 English Performance

There were 271 cases involved in the analysis, with no missing data in either group. An independent sample *t*-test was conducted to measure the differences in English performance between the monolingual group (n = 111) and the bilingual group (n = 160). Table 4.21 shows that the bilingual group (M = 59.48, SD = 21.54) outperformed the monolingual group (M = 47.98, SD = 23.81) in English academic scores, and there was more variance in the monolingual group's scores. Levene's test for equality of variances was significant (F = 3.946, p = .048); thus, equal variances could not be assumed. Therefore, Welch's *t*-test was used (Allen & Bennett, 2012) to compare the monolingual group's average English score to the bilingual group. The *t*-test was statistically significant, with the English scores of the bilingual group 11.5 higher, 95% CI [−17.07, −5.92], than the monolingual group, t (221.1) = −4.06, p < .001, two-tailed, d = −.51.

Table 4.20

English performance descriptive statistics by group

Group	*N*	*M*	*SD*	*SEM*
Mandarin monolingual group	111	47.98	23.807	2.260
Korean–Mandarin bilingual group	160	59.48	21.536	1.703

Table 4.21

English performance independent sample t-*test*

	t	*df*	*p* (2-tailed)	Mean difference	Std. error difference	95% CI of the difference	
						Lower	Upper
English performance	−4.06	221.1	< .001	−11.493	2.829	−17.069	−5.917

Note. CI = confidence interval; Std. = standard.

4.4.4 Mandarin Phonological Awareness

There were 271 cases involved in the analysis, with no missing data. An independent sample *t*-test was conducted to compare the Mandarin phonological awareness results of the monolingual group (n = 111) with the bilingual group (n = 160). Table 4.22 shows that the bilingual group (M = 87.67, SD = 11.95) obtained slightly higher scores than the monolingual group (M = 86.31, SD = 16.41), and there was more variance in the monolingual group's scores. Levene's test for equality of variances was significant (F = 9.874, p = .002); thus, equal variances could not be assumed. Therefore, Welch's *t*-test was used (Allen & Bennett, 2012) to compare the average Mandarin phonological awareness score of the monolingual group to that of the bilingual group. The *t*-test was non-significant, $t(188.2) = -.75$, p = .456, two-tailed, $d = -.10$, 95% CI [−4.95, 2.23].

Table 4.22

Mandarin phonological awareness descriptive statistics by group

Group	*N*	*M*	*SD*	*SEM*
Mandarin monolingual group	111	86.31	16.406	1.557
Korean–Mandarin bilingual group	160	87.67	11.950	.945

Table 4.23

Mandarin phonological awareness independent sample t-*test*

	t	*df*	*p* (2-tailed)	Mean difference	Std. error difference	95% CI of the difference

						95% CI of the difference	
						Lower	Upper
Mandarin phonological awareness	−.747	188.2	.456	−1.360	1.821	−4.953	2.233

Note. CI = confidence interval; Std. = standard.

4.4.5 Mandarin Morphological Awareness

There were 271 cases involved in the analysis, with no missing data. An independent sample *t*-test was conducted to compare the Mandarin morphological awareness results for the monolingual group (n = 111) with the bilingual group (n = 160). Table 4.24 shows that the monolingual group (M = 90.27, SD = 15.14) obtained higher scores in the Mandarin morphological awareness tasks than the bilingual group (M = 86.75, SD = 18.38), and there was more variance in the bilingual group's scores. Levene's test for equality of variances was not significant (F = 1.379, p > .05). The assumption of homogeneity of variance was not violated; thus, equal variances could be assumed. The *t*-test was not statistically significant, $t(269) = -1.66$, p = .097, two-tailed, d = .206, 95% CI [−.65, 7.69].

Table 4.24

Mandarin morphological awareness descriptive statistics by group

Groups	*N*	*M*	*SD*	*SEM*
Mandarin monolingual group	111	90.27	15.143	1.437
Korean–Mandarin bilingual group	160	86.75	18.375	1.453

Table 4.25

Mandarin morphological awareness independent sample t-*test*

	t	*df*	*p* (2-tailed)	Mean difference	Std. error difference	95% CI of the difference	
						Lower	Upper
Mandarin morphological awareness	1.664	269	.097	3.520	2.116	−.645	7.686

Note. CI = confidence interval; Std. = standard.

4.5 Phonology Testing

4.5.1 ANCOVA Results for English Phonological Awareness

As presented in the chi-square test and *t*-test result section, maths performance was unbalanced between the two participating groups, which showed that the Mandarin monolingual group performed better in maths than the Korean–Mandarin bilingual group. It indicated that monolinguals in the current study had better cognitive abilities than bilinguals. According to the literature, maths performance was regarded as a covariate when comparing English phonological awareness between monolingual and bilingual groups.

4.5.1.1 English Phonological Awareness

The English phonological awareness task results between the two groups were compared to investigate the hypothesis that bilinguals' English phonological awareness performance was better than monolinguals. The ANCOVA is used 'to test for a statistically significant difference between two or more independent samples (or levels of an independent variable) after statistically controlling for the effects of a 'third variable', referred to as a covariate' (Allen & Bennett, 2012, p. 127). Maths performance was treated as a covariate; therefore, the researcher chose ANCOVA to compare English phonological awareness between the two groups.

First, the assumption of normality was tested. Table 4.26 illustrates that z_s and z_k were within ± 1.96 for English phonological awareness for the monolingual group. In contrast, for the bilingual group, z_s was in the normal range, but z_k was not (3.406). The Shapiro–Wilk statistics were .935 for the Mandarin monolingual group and .865 for the bilingual group, both not statistically significant (see Table 4.27). Besides, the examination of histograms for each group indicated that the ANCOVA assumption of normality was supported.

Table 4.26

Descriptive normality test results for English phonological awareness by group

Group	Skewness	Kurtosis
Mandarin monolingual group	−.900	1.053
Korean–Mandarin bilingual group	−1.599	3.406

Table 4.27

Normality test results for English phonological awareness by group

Group	Kolmogorov–Smirnov[a]			Shapiro–Wilk		
	Statistic	*df*	*p*	Statistic	*df*	*p*
Mandarin monolingual group	.126	111	.000	.935	111	< .001
Korean–Mandarin bilingual group	.179	159	.000	.865	159	< .001

[a]. Lilliefors Significance Correction

The next step was to run the homogeneity of regression slopes for English phonological awareness for both groups. Table 4.28 indicates that the 'Group*Maths' interaction was not statistically significant, $F(1, 265) = 1.03$, $p = .311$; hence, the assumption of homogeneity of regression slopes had not been violated.

Table 4.28

Homogeneity of regression slopes for English phonological awareness by group

Source	Type III *SS*	*df*	*MS*	*F*	*p*
Corrected model	18442.177[a]	3	6147.392	28.180	< .001
Intercept	120700.569	1	120700.569	553.298	< .001
Group	2867.466	1	2867.466	13.145	< .001
Maths	10227.923	1	10227.923	46.885	< .001
Group*Maths	224.497	1	224.497	1.029	.311
Error	57809.041	265	218.147		
Total	1699044.444	269			
Corrected total	76251.219	268			

[a] $R^2 = .242$ (adjusted $R^2 = .233$).

The scatterplot ensures that there is a linear relationship between the covariate and the dependent variable (Allen & Bennett, 2012). In the scatterplot, there appeared to be a linear

relationship between the covariate (maths performance) and the dependent variable (English phonological awareness); therefore, the one-way ANCOVA was performed.

Table 4.29 shows that 269 cases were involved in the analysis, with two missing data in the bilingual group and no missing data in the Mandarin monolingual group. A one-way ANCOVA was conducted to measure the differences between the monolingual group (n = 111) and bilingual group (n = 158) on English phonological awareness. Participants in the monolingual group had a mean score of 71.08 for the English phonological awareness tasks, while students in the bilingual group had a mean score of 82.30. The *SD* in the Mandarin monolingual group was larger than that of the Korean–Mandarin bilingual group. There was a difference between the means of the monolingual and the bilingual group. Participants in the bilingual group achieved higher scores in the English phonological awareness tasks than their peers in the monolingual group. The results from the ANCOVA were later shown on whether the difference was statistically significant.

Table 4.29

Descriptive statistics for English phonological awareness by group

Group	*M*	*SD*	*N*
Mandarin monolingual group	71.08	18.086	111
Korean–Mandarin bilingual group	82.30	14.291	158
Total	77.67	16.868	269

As Levene's test was statistically significant $F(1, 267) = 7.96$, $p = .005$, the assumption of homogeneity of variance had been violated (see Table 4.30). In Table 4.31, the 'Maths' row suggests that the covariate (maths performance) is significantly related to the English phonological awareness score, $F(1, 266) = 45.89$, $p < .001$. The 'Group' row shows that, after controlling for maths performance, the English phonological awareness score was significantly related to the participating groups, $F(1, 266) = 54.28$, $p < .001$, partial $\eta^2 = .169$.

Table 4.30

Levene's test for English phonological awareness

F	*df*1	*df*2	*p*
7.956	1	267	.005

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups. [a] Design: Intercept + Maths + Group.

Table 4.31

One-way ANCOVA results for English phonological awareness task by group

Source	Type III *SS*	*df*	*MS*	*F*	*p*	Partial η^2	Noncent. parameter	Observed power[b]
Corrected model	18217.681[a]	2	9108.840	41.751	< .001	.239	83.502	1.000
Intercept	130505.225	1	130505.23	598.18	< .001	.692	598.178	1.000
Maths	10012.330	1	10012.330	45.892	< .001	.147	45.892	1.000
Group	11842.853	1	11842.853	54.282	< .001	.169	54.282	1.000
Error	58033.538	266	218.171					
Total	1699044.444	269						
Corrected total	76251.219	268						

Note. [a] R^2 = .239 (adjusted R^2 = .233). [b] Computed using alpha = .05.

4.5.1.1.1 Analysing English Phonological Awareness by Class

Participants in the current study were nested in the classes during school education. Therefore, there were nesting effects that needed to be considered.

As presented in Table 4.32, 269 cases were involved in the analysis. A one-way ANCOVA with a covariate (maths performance) was conducted to measure the differences in English phonological awareness among classes in both groups. The average score of the participating classes was 77.67. The highest score was in the bilingual group, bilingual Class 1, with a mean score of 87.17, exceeding the total mean score by 9.50. The lowest score was in monolingual Class 4, with a mean score of 67.67. The biggest *SD*, 20.02, was observed in bilingual Class 3. The results from the ANCOVA determined whether the difference was statistically significant.

Table 4.32

Descriptive statistics for English phonological awareness by class

Class	*M*	*SD*	*N*
Mandarin monolingual Class 1	71.08	19.347	40
Mandarin monolingual Class 3	72.76	15.508	41
Mandarin monolingual Class 4	67.67	19.713	30
Korean–Mandarin bilingual Class 1	87.17	11.670	33
Korean–Mandarin bilingual Class 2	82.84	10.829	34
Korean–Mandarin bilingual Class 3	76.44	20.018	29
Korean–Mandarin bilingual Class 4	82.22	13.403	33
Korean–Mandarin bilingual Class 5	82.07	13.464	29
Total	77.67	16.868	269

The reason for choosing one-way ANCOVA with a covariate (maths performance) by classes was that linear mixed models are an extension of simple linear models to allow both fixed and random effects (Allen & Bennett, 2012). Fixed and random effects are used when there is non-independence in the data, which may arise from a hierarchical structure (Allen & Bennett, 2012). For example, students may be sampled from classrooms or patients from doctors' surgeries.

As Levene's test was significant $F(7, 261) = 2.24$, $p = .032$, the assumption of homogeneity of variance had been violated (see Table 4.33). In Table 4.34, the 'Maths' row suggests that the covariate (maths performance) is significantly related to the English phonological awareness score, $F(1, 260) = 62.46$, $p < .001$. The 'Class' row shows that the English phonological awareness score is significantly related to the bilingual and monolingual groups after controlling for the maths performance, $F(7, 260) = 11.81$, $p < .001$, partial $\eta^2 = .241$.

Table 4.33

Levene's test for English phonological awareness by class

F	*df*1	*df*2	*p*
2.238	7	261	.032

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups. [a] Design: Intercept + Maths + Class.

Table 4.34

One-way ANCOVA results for English phonological awareness task by class

Source	Type III *SS*	*df*	*MS*	*F*	*p*	Partial η^2	Noncent. parameter	Observed power[b]
Corrected model	23228.775[a]	8	2903.597	14.238	< .001	.305	113.904	1.000
Intercept	117315.293	1	117315.293	575.265	< .001	.689	575.265	1.000
Maths	12737.668	1	12737.668	62.460	< .001	.194	62.460	1.000
Group	16853.948	7	2407.707	11.806	< .001	.241	82.645	1.000
Error	53022.444	260	203.932					
Total	1699044.444	269						
Corrected total	76251.219	268						

Note. [a] R^2 = .305 (adjusted R^2 = .233). [b] Computed using alpha = .05.

4.5.1.1.2 Error Analysis for English Phonological Awareness Task

The English phonological awareness task consisted of three subtests: first sound absence, middle sound absence and last sound absence. Table 4.35 compares the mean scores for each subtest of the English phonological awareness task between the monolingual and bilingual groups. The bilingual group performed better than the monolingual group in the total mean score of the English phonological awareness task. The bilingual group consistently achieved higher scores in each section of the task. The lowest scores both appeared in the 'middle sound absence' section for the monolingual and bilingual groups, which illustrated that middle sounds were hard to detect compared to first sound absence and last sound absence.

Table 4.35

Mean subtest scores for English phonological awareness

Group	First sound absence	Middle sound absence	Last sound absence	Total mean score
Mandarin monolingual group	25.16	20.29	25.59	71.04
Korean–Mandarin bilingual group	28.19	25.33	28.83	82.35
SD	3.03	5.04	3.24	11.31

4.6 Morphology Testing

4.6.1 ANCOVA Results for English Morphological Awareness

As presented in the Section 3.16 and chi-square test results, the maths performance was unbalanced between the two participating groups. According to the literature, maths performance was regarded as a covariate when comparing English morphological awareness between monolingual and bilingual groups.

4.6.1.1 English Morphological Awareness

The English morphological awareness task results between two groups of participants were compared to investigate the hypothesis that bilinguals' English morphological awareness performance was better than that of Mandarin monolinguals. ANCOVA was used to compare the English morphological awareness of the monolingual group with the bilingual group with maths performance as a covariate.

First, the assumption of normality was tested. Table 4.36 presents that both z_s and z_k were within ± 1.96 for English morphological awareness, indicating that normality can be assumed (see Table 4.36). The Shapiro–Wilk statistics were not statistically significant, with .909 for the Mandarin monolingual group and .855 for the bilingual group. Additionally, the examination of histograms for each group indicated that the ANCOVA assumption of normality was supported (see Table 4.37).

Table 4.36

Descriptive normality test results for English morphological awareness by group

Group	Skewness	Kurtosis
Mandarin monolingual group	−.124	−1.462
Korean–Mandarin bilingual group	−1.400	1.699

Table 4.37

Normality tests results for English morphological awareness by group

Group	Kolmogorov–Smirnov[a]			Shapiro–Wilk		
	Statistic	*df*	*p*	Statistic	*df*	*p*
Mandarin monolingual group	.147	111	< .001	.909	111	.000
Korean–Mandarin bilingual group	.192	159	< .001	.855	159	.000

The next step was to run the homogeneity of regression slopes for English morphological awareness for both groups. Table 4.38 indicates that the 'Group*Maths' interaction is significant, $F(1, 265) = 10.30$, $p = .001$; hence, the assumption of homogeneity of regression slopes had been violated.

Table 4.38

Homogeneity of regression slopes for English morphological awareness by group

Source	Type III *SS*	*df*	*MS*	*F*	*p*
Corrected model	105248.223[a]	3	35082.741	67.924	< .001
Intercept	14677.697	1	14677.697	28.418	< .001
Group	23664.190	1	23664.190	45.817	< .001
Maths	68762.166	1	68762.166	133.132	< .001
Group*Maths	5318.678	1	5318.678	10.298	.001
Error	136871.479	265	516.496		
Total	1409400.000	269			
Corrected total	242119.703	268			

[a] $R^2 = .435$ (adjusted $R^2 = .428$).

In the scatterplot, there appeared to be a linear relationship between the covariate (Maths performance) and the dependent variable (English morphological awareness); therefore, a one-way ANCOVA was performed on the data.

Descriptive statistics for English morphological awareness included 269 cases (see Table 4.39), with two missing data in the bilingual group and no missing data in the monolingual group. A one-way ANCOVA was conducted to measure the differences in English morphological awareness between the monolingual group ($n = 111$) and the bilingual group ($n = 158$). Participants in the monolingual group had a mean score of 52.12, while students in

the bilingual group had a mean score of 75.54. The *SD* in the Mandarin monolingual group was larger than that of the bilingual group. There was a difference in means between the monolingual and the bilingual groups. The participants in the bilingual group achieved higher scores in the English morphological awareness tasks than their peers in the Mandarin monolingual group.

Table 4.39

Descriptive statistics for English morphological awareness by group

Group	*M*	*SD*	*N*
Mandarin monolingual group	52.12	33.747	111
Korean–Mandarin bilingual group	75.54	22.725	158
Total	65.87	30.057	269

As Levene's test was significant at $F(1, 267) = 21.775$, $p < .001$, the assumption of homogeneity of variance had been violated. In Table 4.41, the 'Maths' row suggested that the covariate (maths performance) was significantly related to the English morphological awareness score, $F(1, 266) = 120.04$, $p < .001$. The 'Group' row showed that, after controlling for the maths performance, the English morphological awareness score was significantly related to the participating groups, $F(1, 266) = 104.29$, $p < .001$, partial $\eta^2 = .282$.

Table 4.40

Levene's test for English morphological awareness by group

F	*df*1	*df*2	*p*
21.775	1	267	< .001

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups. [a] Design: Intercept + Maths + Group.

Table 4.41

One-way ANCOVA results for English morphological awareness task results by group

Source	Type III *SS*	*df*	*MS*	*F*	*p*	Partial η^2	Noncent. parameter	Observed power[b]
Corrected model	99929.545[a]	2	49964.773	93.471	< .001	.413	186.942	1.000

Source	Type III *SS*	*df*	*MS*	*F*	*p*	Partial η^2	Noncent. parameter	Observed power[b]
Intercept	20302.491	1	20302.491	37.981	< .001	.125	37.981	1.000
Maths	64166.592	1	64166.592	120.039	< .001	.311	120.039	1.000
Group	55747.237	1	55747.237	104.288	< .001	.282	104.288	1.000
Error	142190.157	266	534.549					
Total	1409400.000	269						
Corrected total	242119.703	268						

Note. [a] R^2 = .413 (adjusted R^2 = .408). [b] Computed using alpha = .05.

4.6.1.1.1 Analysing English Morphological Awareness by Class

In the current study, the participants were nested in the classes during school education. Therefore, there were nesting effects that required attention. In Table 4.42, 269 cases were involved in the analysis. A one-way ANCOVA with a covariate (maths performance) was conducted to measure the differences in English morphological awareness among classes in both groups. The average score of the participating classes was 65.87. The highest score, 78.68, was found in bilingual Class 1. This exceeded the total mean score of 12.81. The lowest mean score, 49.27, appeared in bilingual Class 3. The greatest *SD* of 37.07 can be observed in monolingual Class 1.

Table 4.42

Descriptive statistics for English morphological awareness by class

Class	*M*	*SD*	*N*
Mandarin monolingual Class 1	50.25	37.071	40
Mandarin monolingual Class 3	49.27	32.143	41
Mandarin monolingual Class 4	58.50	31.435	30
Korean–Mandarin bilingual Class 1	78.18	19.717	33
Korean–Mandarin bilingual Class 2	78.68	18.599	34
Korean–Mandarin bilingual Class 3	69.48	29.073	29
Korean–Mandarin bilingual Class 4	77.58	19.570	33
Korean–Mandarin bilingual Class 5	72.59	26.241	29
Total	65.87	30.057	269

As Levene's test was significant $F(7, 261) = 5.29$, $p < .001$, the assumption of homogeneity of variance had been violated. In Table 4.44, the 'Maths' row suggested that the covariate (maths performance) was significantly related to the English phonological awareness

score, $F(1, 260) = 134.97$, $p < .001$. The 'Class' row showed that, after controlling for the maths performance, English phonological awareness score was significantly related to the participating groups, $F(7, 260) = 17.97$, $p < .001$, partial $\eta^2 = .326$.

Table 4.43

Levene's test for English morphological awareness by class

F	*df*1	*df*2	*p*
5.289	7	261	< .001

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups. [a]. Design: Intercept + Maths + Class.

Table 4.44

One-way ANCOVA results for English morphological awareness task by class

Source	Type III *SS*	*df*	*MS*	*F*	*p*	Partial η^2	Noncent. parameter	Observed power[b]
Corrected model	108723.961[a]	8	13590.495	26.489	< .001	.449	211.913	1.000
Intercept	19109.688	1	19109.688	37.246	< .001	.125	37.246	1.000
Maths	69247.994	1	69247.994	134.970	< .001	.342	134.970	1.000
Group	64541.653	7	9220.236	17.971	< .001	.326	125.797	1.000
Error	133395.741	260	513.061					
Total	1409400.000	269						
Corrected total	242119.703	268						

Note. [a] $R^2 = .449$ (adjusted $R^2 = .432$). [b] Computed using alpha = .05.

4.6.1.1.2 Error Analysis for English Morphological Awareness Task

Two subtests in the written relatives task measured participants' English morphological awareness: one was derivational morpheme detection, and the other was inflectional morpheme detection. Bilingual learners outperformed in both subtests. Bilinguals with previous Mandarin and Korean knowledge had a higher mean score for inflectional morpheme detection.

Table 4.45

Mean subtest scores for English morphological awareness

Group	Derivational morpheme detecting	Inflectional morpheme detecting	Total mean score
Mandarin monolingual group	26.15	26.60	52.75
Korean–Mandarin bilingual group	35.95	39.30	75.25
SD	9.80	12.70	22.50

4.7 Multiple Regression Analysis Results for Dependent and Independent Variables

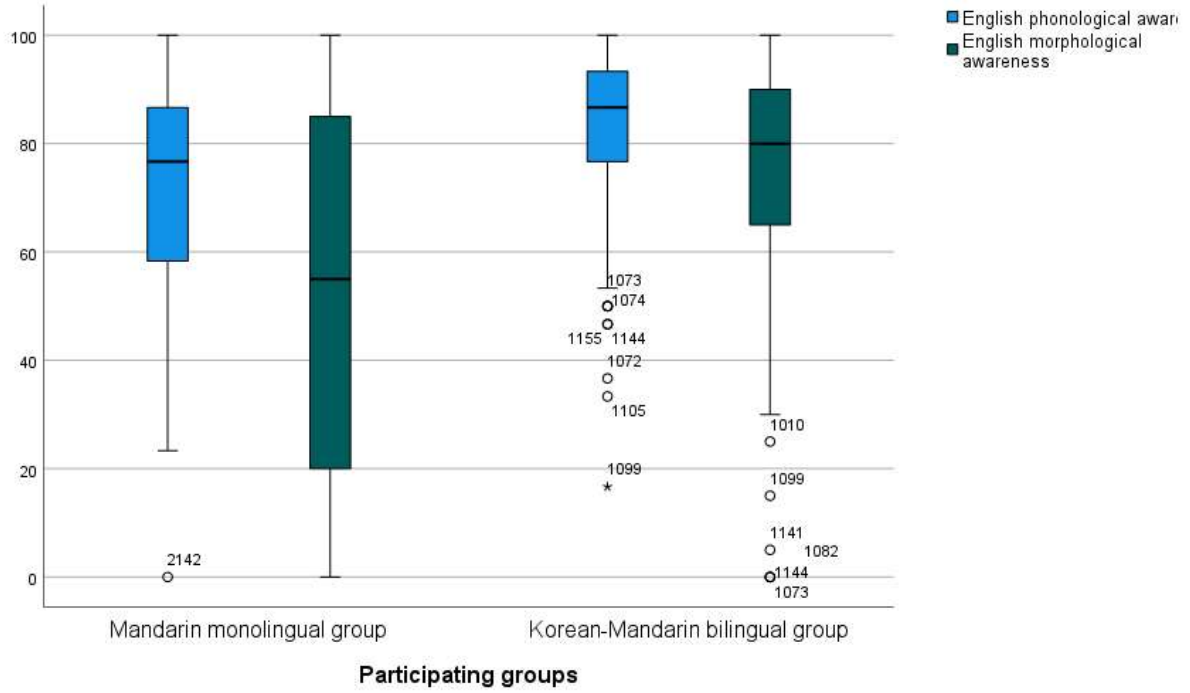
The supplemental multiple regression analysis was performed to provide evidence for the advantages of the bilingual group over the monolingual group in English phonological and morphological awareness. From the three main types of multiple regression analysis (Allen & Bennett, 2012), standard (or simultaneous) multiple regression was selected to investigate the relationship between English phonological awareness and the independent variables, such as mother's education level, Mandarin phonological awareness and Mandarin language use. Additionally, the relationship between English morphological awareness and independent variables, such as reading skills (English performance, Mandarin performance), Mandarin morphological awareness and Mandarin language use, were also explored.

Before performing the standard multiple regression analysis, the normality of each continuous variable was presented first through stem-and-leaf plots and boxplots to examine whether the data were normally distributed. Meanwhile, the existence of outliers was checked. Figure 4.2 shows 14 outliers in the English phonological awareness variable (one in the monolingual and 13 in the bilingual groups). Although 'multiple regression is sensitive to outliers' (Allen & Bennett, 2012, p. 182), the outliers were retained when running the follow-up multiple regression analysis in SPSS. This decision was justified because comparing English

phonological and morphological awareness scores with the participants' home language scores showed that outliers were in the reasonable range of scores.

Figure 4.2

Outliers in continuous variables multiple regression



An inspection of the normal probability plot of standardised residuals and the scatterplot of standardised residuals against standardised predicted values indicated that the assumptions of normality, linearity and homoscedasticity of residuals were met. Finally, Mahalanobis distance did not exceed the critical χ^2 for $df = 1$ (at alpha = .001) of 13.82 for any cases in the data file, indicating that multivariate outliers were not of concern.

Before interpreting the following results of the multiple regression analysis between dependent and independent variables, the assumptions were evaluated using the same procedure.

4.7.1.1 English Phonological Awareness and Mother's Education Level

A standard multiple regression analysis was performed to estimate the proportion of variance in English phonological awareness that can be accounted for by the mother's education level. Table 4.46 indicates that the mother's education level in the regression model explained a significant 5% of the variance in English phonological awareness, $R^2 = .05$, adjusted $R^2 = .044$, $F(1, 268) = 13.45$, $p < .001$. The unstandardised (B) and standardised (β) regression coefficients and squared semi-partial (or 'part' correlations [sr^2]) for the predictor in the regression model are reported in Table 4.46.

Table 4.46

Regression with mother's education level as a predictor of English phonological awareness

Variable	B [95% CI]	β	sr^2	*t*	*p*
Mother's education level	3.951 [1.830, 6.071]	.219	.048	3.667	< .001

Note. $N = 270$. Model statistics: $F = 13.45$, $R = .219$, $R^2 = .048$, $p < .001$.

4.7.1.2 English Phonological Awareness and Mandarin Phonological Awareness

A standard multiple regression analysis was performed to estimate the proportion of variance in English phonological awareness that can be accounted for by Mandarin phonological awareness. Table 4.47 indicates that Mandarin phonological awareness explained a significant 24% of the variance in English phonological awareness in the regression model, $R^2 = .235$, adjusted $R^2 = .232$, $F(1, 268) = 82.47$, $p < .001$. The unstandardised (B) and standardised (β) regression coefficients and squared semi-partial (or sr^2) for the predictor in the regression model are reported in Table 4.47.

Table 4.47

Regression with Mandarin phonological awareness as a predictor of English phonological awareness

Variable	*B* [95% CI]	β	sr^2	*t*	*p*
Mandarin phonological awareness	.586 [.459, .713]	.485	.235	9.081	< .001

Note. $N = 270$. Model statistics: $F = 82.473$, $R = .485$, $R^2 = .235$, $p < .001$.

4.7.1.3 English Phonological Awareness and Mandarin Language Use

A standard multiple regression analysis was performed to estimate the proportion of variance in English phonological awareness that can be accounted for by Mandarin language use. Table 4.48 indicates that Mandarin language use explained a significant 9% of the variance in English phonological awareness in the regression model, $R^2 = .09$, adjusted $R^2 = .086$, $F(1, 268) = 26.37$, $p < .001$. The unstandardised (B) and standardised (β) regression coefficients and squared semi-partial (or sr^2) for the predictor in the regression model are reported in Table 4.48.

Table 4.48

Regression with Mandarin language use as a predictor of English phonological awareness

Variable	B [95% CI]	β	sr^2	t	p
Mandarin language use	−.557 [−.770, −.343]	−.299	−.089	−5.135	< .001

Note. $N = 270$. Model statistics: $F = 26.373$, $R = .299$, $R^2 = .090$, $p < .001$.

4.7.1.4 English Morphological Awareness and English Performance

A standard multiple regression analysis was performed to estimate the proportion of variance in English morphological awareness that can be accounted for by English performance. Table 4.49 indicates that Mandarin phonological awareness explained a significant 72% of the variance in English morphological awareness in the regression model, $R^2 = .72$, adjusted $R^2 = .715$, $F(1, 268) = 676.98$, $p < .001$. The unstandardised (B) and standardised (β) regression coefficients and squared semi-partial (or sr^2) for the predictor in the regression model are reported in Table 4.49.

Table 4.49

Regression with English performance as a predictor of English morphological awareness

Variable	B [95% CI]	β	sr^2	*t*	*p*
English performance	1.099 [1.016, 1.183]	.846	.716	26.019	< .001

Note. $N = 270$. Model statistics: $F = 676.975$, $R = .219$, $R^2 = .716$, $p < .001$.

4.7.1.5 English Morphological Awareness and Mandarin Performance

A standard multiple regression analysis was performed to estimate the proportion of variance in English morphological awareness that can be accounted for by Mandarin performance. Table 4.50 indicates that Mandarin performance explained a non-significant 4% of the variance in English morphological awareness in the regression model, $R^2 = .33$, adjusted $R^2 = .328$, $F(1, 268) = 132.016$, $p < .001$. The unstandardised (B) and standardised (β) regression coefficients and squared semi-partial (or sr^2) for the predictor in the regression model are reported in Table 4.50.

Table 4.50

Regression with Mandarin performance as a predictor of English morphological awareness

Variable	B [95% CI]	β	sr^2	*t*	*p*
Mandarin performance	1.070 [.887, 1.254]	.574	.329	11.490	< .001

Note. $N = 270$. Model Statistics: $F = 132.016$, $R = .574$, $R^2 = .330$, $p < .001$.

4.7.1.6 English Morphological Awareness and Mandarin Morphological Awareness

A standard multiple regression analysis was performed to estimate the proportion of variance in English morphological awareness that can be accounted for by Mandarin morphological awareness. Table 4.51 indicates that Mandarin morphological awareness explained a significant 5% of the variance in English morphological awareness in the regression model, $R^2 = .05$, adjusted $R^2 = .047$, $F(1, 268) = 14.24$, $p < .001$. The unstandardised (B) and standardised (β) regression coefficients and squared semi-partial (or sr^2) for the predictor in the regression model are reported in Table 4.51.

Table 4.51

Regression with Mandarin morphological awareness as a predictor of English morphological awareness

Variable	B [95% CI]	β	sr^2	*t*	*p*
Mandarin morphological awareness	.392 [.188, .597]	.225	.050	3.774	< .001

Note. $N = 270$. Model statistics: $F = 14.240$, $R = .225$, $R^2 = .050$, $p < .001$.

4.7.1.7 English Morphological Awareness and Mandarin Language Use

A standard multiple regression analysis was performed to estimate the proportion of variance in English morphological awareness that can be accounted for by Mandarin language use. Table 4.52 indicates that Mandarin language use explained a significant 5% of the variance in English morphological awareness in the regression model, $R^2 = .14$, adjusted $R^2 = .134$, $F(1, 268) = 42.65$, $p < .001$. The unstandardised (B) and standardised (β) regression coefficients and squared semi-partial (or sr^2) for the predictor in the regression model are reported in Table 4.52.

Table 4.52

Regression with Mandarin language use as a predictor of English morphological awareness

Variable	B [95% CI]	β	sr^2	*t*	*p*
Mandarin language use	−1.229 [1.830, 6.071]	−.371	−.138	−6.530	< .001

Note. $N = 270$. Model statistics: $F = 42.645$, $R = .371$, $R^{2\,=}$ .137, $p < .001$.

4.7.2 Reliability Analysis

Reliability presents the consistency or dependability of a measure over time, over questionnaire items or among observers or raters (Allen & Bennett, 2012). Commonly used measurements to show reliability are Cronbach's alpha and Cohen's kappa. Bravo and Potvin (1991) said that when estimating coefficient alpha, Cronbach's alpha with the intraclass coefficient two-way mixed is precisely the same as coefficient alpha. SPSS does this as the confidence limits for intraclass reliability coefficients (Baumgartner & Chung, 2001). The

study needed to test through the coefficient alpha; therefore, it chose Cronbach's alpha to test the reliability of the main study measurements.

Cronbach's alpha is an indicator of consistency, an estimate of reliability, and it reveals internal consistency reliability. A result of .00 means no consistency in measurement, and 1.0 means perfect consistency in measurement. More realistically, .70 means that 70% of the variance in the scores is reliable variance. Cronbach's alpha for the four measurements in the current study was .71, which is adequate for the research purposes of the study. From Table 4.54, it could be observed that deleting the Mandarin morphological awareness item would increase reliability to .73. However, the Mandarin morphological awareness task results were one of the key results of the study, so they were retained in the analysis.

Table 4.53

Reliability statistics

Cronbach's alpha	Cronbach's alpha based on standardised items	*N* of items
.712	.752	4

Table 4.54

Item total reliability statistics

	Scale *M* if item deleted	Scale variance if item deleted	Corrected item total correlation	Squared multiple correlation	Cronbach's alpha if item deleted
English phonological awareness	241.315	2211.038	.697	.498	.554
English morphological awareness	253.049	1394.673	.580	.470	.666
Mandarin phonological awareness	231.895	2592.358	.572	.330	.642
Mandarin morphological awareness	230.833	2679.404	.350	.190	.726

4.8 Qualitative Analysis

This part will present the qualitative results of the study. The questionnaire included some open-ended questions requiring the participants to express their ideas about learning English and the effects of a previously acquired language on English learning. This part explored whether the students' English learning attitudes affect English phonological and morphological awareness. Questionnaires for the Korean-Mandarin bilingual group consist of six questions, and those for the Mandarin monolingual group excluded two Korean-related questions and kept four questions. The specific questions can be found in Appendix C. Six themes were developed from participants' responses to the questions.

4.8.1 Willingness to Improve English Skills

For the question 'would you like to improve your English language skills?', seven bilinguals (4%) did not want to improve their English language skills, while the number among monolinguals was 19 (17%). When expressing their reasons for willingness to improve their English skills, bilinguals supplied various answers that could be divided into 13 categories (see Table 4.55). 'Academic result' was the most common reason, reported by 21.3% of bilingual participants, for their willingness to improve their English skills. 'Communicating with foreigners' and 'English is a global language' were each reported by 15% of participants as motivators to improve their English skills. Other reasons included 'learning an additional language is useful' (7.5%), 'going abroad to study' (6.9%), 'future development, future job' (4.3%), 'helpful in the future' (3.8%), 'travelling' (1.9%), 'improving English proficiency' (1.9%), 'hobby' (0.6%) and 'like foreign literature, love reading original copies' (0.6%). Two bilingual participants provided negative answers, which said they did not want to improve their English language skills because they 'love China' (0.6%) and thought English was 'useless' (0.6%). Thirty-two participants (20% of the participants) did not provide answers.

Table 4.55

Reasons provided by Korean–Mandarin bilinguals for improving their English language skills

Item	Reason	Number	Percentage
1	Academic result	34	21.3%
2	Communication	24	15.0%
3	English is a global language, important	24	15.0%
4	Learning an additional language is useful	12	7.5%
5	Going abroad to study	11	6.9%
6	Future development, future job	7	4.3%
7	Helpful in the future	6	3.8%
8	Travelling	3	1.9%
9	Improving English proficiency	3	1.9%
10	Hobby	1	0.6%
11	Like foreign literature, love reading original copies	1	0.6%
12	Love China	1	0.6%
13	Useless	1	0.6%
14	No response	32	20.0%

By contrast, in answer to the question, 'would you like to improve your English language skills?' Mandarin monolinguals gave 12 different answers, as shown in Table 4.56. Thirty-one participants (27.9%) put 'academic result' as the reason for improving their skills. Twelve monolinguals (10.8%) chose 'communication' as their reason, while 8.1% chose 'go abroad to study' as their reason. 'English is a global language, important' was another reason cited by 5.5% of monolinguals for their willingness to develop English. Along with the three main reasons, monolinguals responded that their willingness to improve English language skills was also affected by other sentiments such as 'Learning an additional language is useful' (1.8%), 'Hobby' (1.8%), 'Future development, future job' (0.9%), 'Promoting education and cultural development' (0.9%) and 'Reading original English books' (0.9%). Nine (8.1%) monolingual participants answered negatively and provided the following observations: 'cannot understand, hard to learn' (6.3%) and 'useless' (1.8%). Thirty-two (28.8%) participants did not provide answers.

Table 4.56

Reasons provided by Mandarin monolinguals for improving their English language skills

Item	Reason	Number	Percentage
1	Academic result	31	27.9%
2	Communication	12	10.8%
3	Go abroad to study	9	8.1%
4	English is a global language, important	6	5.5%
5	Improving English proficiency	5	4.5%
6	Learning an additional language useful	2	1.8%
7	Hobby	2	1.8%
8	Future development, future job	1	0.9%
9	Promoting education and cultural development	1	0.9%
10	Reading original English books	1	0.9%
11	Cannot understand, hard to learn	7	6.3%
12	Useless	2	1.8%
13	No response	32	28.8%

4.8.1.1 Commonalities and Differences Between Two Groups

From the data in Tables 4.55 and 4.56, both bilinguals and monolinguals considered 'academic result' and 'communication' as important reasons for improving their English skills. 'English is a global language which is an important language' was the third most frequent reason for improving English skills among bilinguals and was fourth among monolinguals. Bilinguals and monolinguals regarded 'going abroad to study' as another reason to improve their English language skills. Bilinguals chose 'Learning an additional language is useful' was the fourth most frequent reason among bilinguals and the sixth among monolinguals (only 1.8%). 'Improving English proficiency' was the fifth most frequent reason for monolinguals but was less important for bilinguals (ranked ninth, 1.9%).

4.8.2 Which English Skills to Improve

Participants were asked, 'what English language ability would you like to improve? (listening, speaking, reading, writing)'. the participants needed to answer what English language ability they would like to improve. The options of 'listening, speaking, reading, writing' were suggested as cues for the response. Participants provided various answers; for

example, some students nominated one of the four skills provided, while others stated they would like to improve more than two skills (see Table 4.57).

4.8.2.1 Comparison Between Groups

More than half of the participants' answers centred on the following options (see Table 4.57). Fifty bilinguals chose 'speaking' (31.3%), 41 chose 'writing' (25.6%), and 9.4% chose 'reading' as the English skill they wanted to improve. In the monolingual group, 19 participants (17.2%) chose 'reading' as the aspect they wished to improve, while 'writing'(13.5%) and speaking '10.8%) were less-frequent responses. Eighteen bilinguals (11.3%) said listening needed to be improved, and eight monolinguals (7.2%) thought the same. In total, 124 (78%) bilinguals selected one among four skills (listening, speaking, reading, writing), and 54 (49%) monolinguals selected one of the four skills. Four bilinguals and nine monolinguals did not provide answers.

None of the bilinguals left a negative answer of 'no', but eight monolinguals responded 'no' in the questionnaires, meaning they considered it unnecessary to improve their English skills. Except for these 'no' or negative responses, other participants were supplied with various combinations of language skills ready for them to choose or answer with their consideration. Some bilinguals provided extraordinary responses: one bilingual said 'grammar' was a skill that should be developed, and another thought 'sense of language' was an essential skill in English learning. Responses for bilinguals and monolinguals are listed in Table 4.57.

Table 4.57

English skills to improve

Item	Korean–Mandarin bilingual group	Percentage	Mandarin monolingual group	Percentage
Speaking	50	31.3%	12	10.8%
Writing	41	25.6%	15	13.5%
Listening	18	11.3%	8	7.2%
Reading	15	9.4%	19	17.2%

Item	Korean–Mandarin bilingual group	Percentage	Mandarin monolingual group	Percentage
All four skills	9	5.6%	15	13.5%
Two or three skills	20	12.5%	25	22.5%
Grammar	1	0.6%	0	0
Sense of language	1	0.6%	0	0
Not willing to improve any English skills	1	0.6%	8	7.2%
No response	4	2.5%	9	8.1%

4.8.3 Importance of Mandarin

Participants were asked 'is Mandarin important to you?'. Responses for why they considered Mandarin important or unimportant are presented in Table 4.58, and were ordered according to the frequency of the bilinguals' selection. The ranking order was similar among bilinguals and monolinguals. Responses from the monolingual and bilingual groups were concentrated in four categories: 'everyday language, communication', 'mother tongue', 'being a Chinese [person]' and 'exam'. Bilinguals' answers were more centred, which showed that Mandarin was important for them because it was used as an everyday language that was essential for communication. The proportion of bilinguals who nominated 'everyday language, communication' as the reason for Mandarin's importance was 48.1%, while 36.1% of monolinguals also nominated this reason. Participants regarded 'mother tongue' as another reason that showed the importance of Mandarin (20% of bilinguals and 24.3% of monolinguals).

Nineteen bilinguals (11.9%) considered Mandarin vital for 'being a Chinese [person]' was why they thought Mandarin was vital, but only six monolinguals (5.4%) shared this perspective. Four bilinguals (2.5%) and three monolinguals (2.7%) said Mandarin was important because it was associated with the 'exam'. Besides these reasons, bilinguals responded that Mandarin was related to their 'future development', which was 'useful', so it is

essential to learn. Monolinguals provided additional reasons that showed the importance of Mandarin, such as it is the 'official language' (6.3%) and for 'education level' (0.9%). Twenty-four bilinguals and 27 bilinguals did not respond to the question (15% and 24.3%, respectively).

Table 4.58

Importance of Mandarin

Item	Korean–Mandarin bilingual group	Percentage	Mandarin monolingual group	Percentage
Everyday language, communication	77	48.1%	40	36.1%
Mother tongue	32	20%	27	24.3%
As a Chinese [person]	19	11.9%	6	5.4%
Exam	4	2.5%	3	2.7%
Future development, useful	4	2.5%	0	0
Official language	0	0	7	6.3%
Education level	0	0	1	0.9%
No response	24	15%	27	24.3%

4.8.4 Influence of Mandarin on English Learning

Only two participants—one in the bilingual group and the other in the monolingual group—did not answer the question 'do you think Mandarin is helpful when you learn English?'. Twenty-eight bilinguals and 25 monolinguals answered 'no'. Participants from the bilingual group cited 'too many differences between Mandarin and English', 'no connections between languages' and 'no similarities' as reasons why Mandarin was not helpful during English learning. Among 25 monolinguals who regarded Mandarin as not helpful, six monolinguals considered that 'Mandarin and English are different languages, therefore not helpful'.

One hundred thirty-one of the 160 bilinguals (81.9%) and 85 of the 111 monolinguals (76.6%) regarded Mandarin as helpful when learning English. Forty-nine bilinguals (30.6%) demonstrated that Mandarin was 'helpful in understanding' when learning English. Twenty-

six bilinguals (16.3%) considered Mandarin helpful in understanding English through translation. Other reasons included Mandarin being helpful for English 'pronunciation' (2.5%), 'the teaching language is Mandarin' (1.9%), Mandarin was 'helpful in reciting' (1.9%) and 'helpful in understanding words' (1.3%), and 'English learning material is in Mandarin' (1.3%). Other reasons can be found in Table 4.59. Thirty-three bilinguals (20.6%) did not respond with specific reasons why they believed Mandarin was helpful.

Table 4.59

Bilinguals' responses on the influence of Mandarin on learning English

Item	Reason	Number	Percentage
1	Helpful in understanding	49	30.6%
2	Understanding through translation	26	16.3%
3	Pronunciation	4	2.5%
4	The teaching language is Mandarin	3	1.9%
5	Helpful in reciting	3	1.9%
6	Helpful in understanding words	2	1.3%
7	English learning material is in Mandarin	2	1.3%
8	Used to Mandarin	1	0.6%
9	Improve comprehensive learning skills	1	0.6%
10	Helpful in understanding grammar	1	0.6%
11	Grammar similarity	1	0.6%
12	Easy to understand words and grammar	1	0.6%
13	Mandarin makes it easier to learn English	1	0.6%
14	Communication	1	0.6%
15	Both are languages	1	0.6%
16	Apply Mandarin to English	1	0.6%
17	Answering questions	1	0.6%
18	No response	33	20.6%
19	Not helpful	28	17.6%

Fifty-five Mandarin monolinguals provided reasons for why they considered Mandarin helpful when learning English. Twenty-two monolinguals (18.8%) showed that Mandarin was used to understand English when translating English into Mandarin. The second most frequent reason was that nine monolinguals (8.1%) considered Mandarin a 'communication' tool when learning English. Seven monolinguals (6.3%) said that Mandarin was 'helpful in

understanding' English. The following reasons presented similar percentages: 'languages are connected' (2.7%), 'pronunciation' (1.8%), 'Pinyin' (1.8%) and 'the basis of English is Mandarin' (1.8%). The other eight monolinguals provided various reasons (see Table 4.60). Thirty-one monolinguals (27.9%) left blanks for why they thought Mandarin was helpful.

Table 4.60

Mandarin monolinguals' responses on the influence of Mandarin on learning English

Item	Reason	Number	Percentage
1	Understanding through translation	22	19.8%
2	Communication	9	8.1%
3	Helpful in understanding	7	6.3%
4	Languages are connected	3	2.7%
5	Pronunciation	2	1.8%
6	Pinyin	2	1.8%
7	The basis of English is Mandarin	2	1.8%
8	While practising oral English	1	0.9%
9	While reading text	1	0.9%
10	Teaching language	1	0.9%
11	Similar grammar	1	0.9%
12	Reciting through translation	1	0.9%
13	Promotes English communication	1	0.9%
14	Language fluency	1	0.9%
15	Language ability	1	0.9%
16	No response	31	27.9%
17	Not helpful	25	22.5%

The subsequent two sections describe bilinguals' attitudes toward Korean when learning English. Bilinguals' language backgrounds were Mandarin and Korean; therefore, whether the bilinguals used Korean as a tool when learning English was also discussed.

4.8.5 Importance of Korean

Participants were asked, 'is Korean important to you?'. Table 4.61 shows that 146 bilinguals (91.3%) agreed that Korean was an essential language to learn, for four main reasons. The top reason, stated by 55 bilinguals (34.3%), was that Korean is an 'ethnic language' that was important to learn. The next most common reason was that Korean was used in the 'family communication' situation, which was the 'everyday language' (28 bilinguals, 17.5%). Twenty-

one bilinguals (13.1%) said Korean was important because it was their 'mother tongue', and 12 bilinguals (7.5%) considered that Korean was associated with their 'academic result'. Other less-frequently stated reasons were that Korean helped to 'improve language skills' and was 'helpful'. Two bilinguals treated learning Korean as a 'hobby' and Korean as 'interesting', and two learnt Korean for 'going abroad' or 'travelling'. Korean made one bilingual a 'multilanguage user'. One bilingual said learning Korean can help them 'know an additional language', and another bilingual responded that it was 'knowledgeable' to learn Korean. Twenty bilinguals (12.5%) did not respond to this question.

Table 4.61

Korean–Mandarin bilinguals' responses to the importance of Korean

Item	Reason	Number	Percentage
1	Ethnic language	55	34.3%
2	Family communication, everyday language	28	17.5%
3	Mother tongue	21	13.1%
4	Academic result	12	7.5%
5	Improve language skills	2	1.3%
6	Helpful	2	1.3%
7	Hobby, interesting	2	1.3%
8	Go abroad	2	1.3%
9	Multilanguage user	1	0.6%
10	Know an additional language	1	0.6%
11	Knowledgeable, travelling	1	0.6%
12	Left blank	20	12.5%
13	Not important	13	8.1%

4.8.6 Influence of Korean on English Learning

Participants were asked the following question: 'Do you think Korean is helpful when you learn English?'. Eighty-seven bilinguals (54.4%) out of 160 considered Korean helpful when learning English (see Table 4.62). Twenty-one bilinguals (13.1%) considered Korean helpful because there were many English 'loan words' in Korean. Twenty bilinguals (12.5%) described the similarities between languages when considering 'pronunciation', and seven

thought Korean was ‘helpful in understanding’ (4.4%) English. Other less-frequently stated reasons were ‘helpful in reciting’ (1.9%), ‘understanding through translation’ (1.9%), ‘similar’ (1.9%) and ‘easy to understand’ (1.3%). Among those who thought Korean was helpful, 21 bilinguals (13.1%) did not provide specific reasons for their choices.

Table 4.62

Korean–Mandarin bilinguals’ responses on the influence of Korean on learning English

Item	Reason	Number	Percentage
1	Loan words	21	13.1%
2	Pronunciation	20	12.5%
3	Helpful in understanding	7	4.4%
4	Helpful in reciting	3	1.9%
5	Understanding through translation	3	1.9%
6	Similar	3	1.9%
7	Easy to understand	2	1.3%
8	Useful in practising language logic	1	0.6%
9	Helpful in reading comprehension	1	0.6%
10	Sense of language	1	0.6%
11	Reciting words	1	0.6%
12	Communication	1	0.6%
13	Both are languages	1	0.6%
14	Answering questions	1	0.6%
15	No response	21	13.1%
16	Not helpful	73	45.6%

Nearly half of the bilinguals (45.6%) viewed Korean as not helpful during English learning for the following reasons: ‘cannot apply Korean rules to English’, ‘no connections between languages’, ‘study materials are in Mandarin’, ‘learning Korean is time-consuming’, ‘poor performance in Korean subject lowered the ranking in the class’ and ‘English teaching language is Mandarin’.

These qualitative results demonstrate similarities and differences between the two participating groups. The data from qualitative results will be discussed in the next chapter.

4.9 Summary

This chapter presented both quantitative and qualitative results. The first part of this chapter presented the quantitative results that compared monolinguals' and bilinguals' results for English phonological and morphological awareness. Descriptive statistics were provided to show the basic characteristics of the participants and continuous variables. Two hundred and seventy-one students participated in the experiment; the number of females was slightly greater than the number of males in the total sample and in both groups. The gender SD was larger in the bilingual group than in the monolingual group. The mean score, minimum score, maximum score, and standard deviations of participants were calculated for the four tasks completed by the monolingual group and the six tasks completed by the bilingual group. The bilingual group achieved higher scores than the monolingual group for the English phonological and morphological awareness tasks. The monolingual group achieved higher scores than the bilingual group for the Mandarin morphological awareness task but lower scores for the Mandarin phonological awareness task.

Independent variables that may affect English phonological and morphological awareness were presented. Independent variables that may affect English phonological awareness for the Mandarin monolingual group were maths performance, mother's education level, Mandarin phonological awareness and Mandarin language use. The same independent variables were identified for the bilingual group with the addition of Korean phonological awareness and Korean language use, which reflected the bilingual learners' language background. Independent variables that may affect English morphological awareness for the monolingual group were maths performance, Mandarin and English performance, Mandarin morphological awareness and Mandarin language use. The same independent variables were

identified in the bilingual group, with the addition of Korean performance, Korean morphological awareness and Korean language use.

Chi-square test results were presented to test the relationship between independent variables and participating groups. Independent variables were gender, maths performance, language use, parents' occupations, parents' education level and language performance. The chi-square test results showed that English language use, Mandarin language use, mother's occupation, mother's education level and father's educational level had statistical relationships with the participating groups. The maths, English and Mandarin scores had a statistical relationship with the participating groups.

Next, ANCOVAs were used to test the hypotheses that Korean–Mandarin bilinguals' English phonological and morphological awareness were better than Mandarin monolinguals'. Each group's results for the English phonological and morphological awareness tasks with the covariate of maths performance were compared. ANCOVA results showed that the bilingual group performed statistically better on the English phonological and morphological awareness tasks than the monolingual group.

T-tests were used to compare the groups' results for maths, Mandarin and English performance and Mandarin phonological and morphological awareness. Maths performance *t*-test results exhibited that the monolingual group had statistically higher scores than the bilingual group. The *t*-tests for Mandarin performance and Mandarin phonological and morphological awareness tasks were not statistically significant. However, English performance *t*-test results showed a statistically significant difference between groups, with bilingual learners achieving statistically higher scores in English performance than monolingual learners.

Multiple regression analysis was used to test whether English phonological awareness would interact with the independent variables, such as the mother's education level, Mandarin phonological awareness and Mandarin language use. Multiple regression analysis was also used to test whether English morphological awareness would interact with the independent variables, such as English performance, Mandarin performance, Mandarin morphological awareness and Mandarin language use.

Reliability was tested by calculating Cronbach's alpha coefficient for four measurements: English phonological awareness, English morphological awareness, Mandarin phonological awareness and Mandarin morphological awareness. Cronbach's alpha was .71, which was considered adequate.

The qualitative results from the questionnaires were also presented and interpreted. In the Mandarin monolinguals' questionnaires, four questions involved qualitative data and six questions for the bilinguals. Qualitative results were presented according to the question themes, such as improving English skills, the importance of Mandarin, the influence of Mandarin on learning English, the importance of Korean and the influence of Korean on learning English.

'Academic result' was the most frequent reason for bilinguals (21.3%) and monolinguals (27.9%) wanting to improve their English skills. Differences were noted between groups in which English language ability they would like to improve. 'Speaking' was the most frequent response among bilinguals (31.3%), followed by 'writing' (25.6%). 'Reading' was the most frequent response from 17.2% of monolinguals; however, only 9.4% of bilinguals nominated 'reading'. Improving 'listening' skills was desired by 11.3% of bilinguals and 7.2% of monolinguals.

Participants' responses to the question 'is Mandarin important to you?' were grouped into four categories: 'everyday language, communication', 'mother tongue', 'being a Chinese [person]' and 'exam'. Bilinguals' answers were more centred, which showed that Mandarin was important for them because it was used as an everyday language, essential for communication. The proportion of bilinguals who considered Mandarin an 'everyday language, communication' was 48.1%, and 36.1% of monolinguals also nominated this reason. Finally, 81.9% of the bilinguals and 76.6% of the monolinguals regarded Mandarin as helpful when learning English.

Chapter 5: Discussion

This study investigated whether Korean–Mandarin bilingual learners performed better than and had an advantage over Mandarin monolingual learners in English phonological and morphological awareness. The study also explored the possible reasons for the advantages of Korean–Mandarin bilingual learners. In this chapter, the aims and rationale of the research will be revisited. The major findings will be presented according to the research questions and linked to the literature. The qualitative results will be discussed as to how they are related to the participants' English phonological and morphological awareness. The implications for future English language teaching and teachers' training in ethnic Korean schools will be discussed, as will the limitations of this study.

5.1 Aims and Rationale of the Present Study

This study adds new information to the L3 acquisition area by exploring whether bilinguals had advantages in English phonological and morphological awareness. This was achieved by comparing the English phonological awareness and morphological awareness test results of bilingual and monolingual participants. The research also explored the reasons for bilingual advantages.

Few published studies have focused on L3 learners, especially simultaneous bilinguals and those with Mandarin and Korean as their L1s. Moreover, teachers have not focused on the facilitative effects of their students' language background during instruction, which may be due to the lack of trilingual English teachers (Pedersen, 2016). The current study broadens the L3 research area by including participants whose L1s are Mandarin and Korean and who are learning English as the L3. Existing phonological and morphological awareness literature focuses on the Indo–European family languages, where there may be typological differences

(e.g., Greek and Norwegian) or where languages come from the same typological family (e.g., Spanish and Italian). Mandarin and Korean are typologically different languages. The extent to which phonological and morphological awareness of these two L1s influence learning English, a third typologically different language, is still unknown. There is also limited literature on the study of teenagers' phonological and morphological awareness in L3 acquisition. The information in the current study can inform policymakers and teachers about the trilingual learners' background language knowledge and stimulate teachers to adjust their daily instructional practice.

5.2 Major Findings

5.2.1 Research Question 1: English Phonological Awareness Comparison

The first research question asked whether Korean–Mandarin bilingual learners had advantages in English phonological awareness over Mandarin monolingual learners. The hypothesis was that Korean–Mandarin bilingual learners would perform better in English phonological awareness tasks than Mandarin monolingual learners.

The ANCOVA results demonstrated that bilingual learners had significantly better English phonological awareness than monolingual learners. The findings that bilinguals had advantages in English phonological awareness over bilinguals were consistent with the previous research of Andreou (2007), Kang (2012) and Wang, Yang and Cheng (2009). The null hypothesis—that bilingual learners' performance in English phonological awareness tasks was the same as monolingual learners—was rejected. The alternative hypothesis—that bilingual learners' performance in English phonological awareness tasks was worse than monolingual learners—was also rejected.

The mean score for the English phonological awareness task was higher in the Korean–Mandarin bilingual group than in the Mandarin monolingual group. The bilingual group

consistently achieved higher scores in each section of the task. The lowest scores appeared in the middle sound–absence section for both groups, which illustrated that middle sounds were harder to detect than first sounds and last sounds. The differences between groups in the average scores were larger in the middle sound absence part of the test. During the 'middle sound absence' test, the participants detected ten pairs of sounds; eight out of ten were vowel detection. A possible explanation for this result is that bilinguals are more sensitive to phonological units than monolinguals (Andreou, 2007). In this study, bilinguals with Korean and Mandarin acquisition experience were more sensitive to phonological units than monolinguals with only Mandarin acquisition experience.

This finding is in line with Andreou (2007), who proved those trilinguals performed better than bilinguals in both the same–different matching and the riming tests, which means that trilinguals' phonological awareness is better than that of the bilinguals. Andreou (2007) identified that the trilinguals' advantage in English phonological awareness was their ability to distinguish three languages and concentrate on language form when making language choices. The process of making language choices enhanced trilinguals' sensitivity to the phonological units of words because they must pay attention to the speech stream to distinguish the three languages and arrange lexical development. In this study, Korean–Mandarin bilinguals' advantages in English phonological awareness may be a benefit of their previous Korean and Mandarin language experience. They were more sensitive in detecting phonological units when learning English than monolinguals, evident in their higher scores in the English phonological task. In Andreou's study, the participants' mean age was nine years and nine months, and their language background was Albanian as the L1, Greek as the L2 and English as the L3 (all belonging to the Indo–European language family). The trilinguals had learned English for approximately three months.

In comparison to Andreou's research, the participants in the bilingual group of this study were about 14 years old and acquired two L1s simultaneously when they were young. The three languages (Korean belonging to the Altaic language family, Mandarin being a Sino-Tibetan language, and English belonging to the Indo–European language group) that the bilinguals were learning were typologically different. Bilinguals' home languages were Korean and Mandarin, while monolinguals spoke Mandarin at home. Bilinguals had additional Korean knowledge compared to monolinguals and showed more advantages in English phonological awareness than monolinguals when learning English.

This study's findings supported those of Kang (2012). Kang found that Korean–English bilingual children aged 5–6 years had an advantage over Korean monolingual children in Korean and English phonological awareness tasks. The study measurements were phoneme awareness tasks (rime awareness tasks) in both English and Korean; syllable and body awareness in Korean; vocabulary, letter identification, word reading and pseudoword reading. The results indicated that with previous linguistic knowledge, bilingual children had advantages over monolingual children in English and Korean phonological awareness. Identical results have been found in this study: bilinguals achieved higher scores in English phonological awareness and performed better in Mandarin phonological awareness than monolinguals. The findings align with previous research that found better phonological awareness in one language facilitates better phonological awareness in another language because Korean and English, two alphabetic languages, have a high correlation in phonological awareness (Wang et al., 2006).

The participants in the Wang, Yang and Cheng (2009) study showed cross-language phonological transfer from Chinese to English but not in reverse. The authors measured the participants' phonological, orthographic and morphological awareness and English and

Chinese word-reading skills. They found that character reading and Chinese onset awareness were highly associated, and character reading and the compound structure task had a strong correlation. The results showed that Chinese onset awareness contributed to English real-word and pseudoword reading. The fact that onset is a shared phonological unit between Chinese and English may have contributed to this conclusion. Despite onset being regarded as a relatively simple phoneme to perceive and control in Chinese and English, it is evident that onset awareness in Chinese improved children's (in the current study) reading ability in English.

L2 learners will be affected by their L1 phonological structures through speech contrasts; thus, phonological transfer from L1 plays an important part in L2 phonology (Lin et al., 2014). The same results have been found in this study that bilinguals perform better in their other language (Mandarin phonological awareness) has a positive effect on their English phonological awareness (Flynn et al., 2004; Jessner, 1999). Jessner (1999) noted that language development in two or more languages might promote higher metalinguistic awareness levels. Participants in this study's bilingual group showed higher Mandarin phonological awareness than their peers in the monolingual group. The finding that bilinguals could perform better in L3 phonological awareness with more-developed phonological awareness in the previous language confirms the CEM developed by Flynn et al. (2004). Flynn et al. demonstrated that L3 transfer could be from any language system already possessed by learners, and prior language knowledge will influence new language acquisition, which shows that language learning is cumulative.

Not all the researchers found cross-linguistic transfer from Chinese to English. Li et al. (2012) presented evidence of cross-linguistic transfer in Chinese–English immersion students. The research involved 159 students from grade 2 and grade 4 who were randomly selected

from three schools in China (96 from English immersion programs and the remainder from non-immersion programs). English measurements included the Cambridge Young Learners English test for reading and writing, English sound detection and rapid automatised naming. In comparison, Chinese measurements included mathematics achievement in Chinese, Chinese sound detection, Chinese tone detection and rapid automatised naming. The results showed that English phonological awareness was a significant predictor of participants' English reading achievement, and the effect increased in grade 4 participants. This result may be due to the grade 4 students learning spelling and phonology, which enabled them to pay more attention to sounds and letters, which are strongly related to English phonological awareness. The naming speed and mathematic results showed that students from both grades in English immersion and non-immersion programs performed equally. The study presented no clear evidence for cross-linguistic transfer resulting from the observation that there were 'great differences between Chinese and English' (Li et al., 2012, p. 443).

Interestingly, the Korean–Mandarin bilingual participants in this study had better Mandarin phonological awareness than the Mandarin monolinguals. Although the bilinguals used the same community language (Mandarin) as the monolinguals, the bilinguals learned three languages at school while their monolingual counterparts were learning two languages, which meant bilinguals were spending extra time learning Korean. Nevertheless, the bilinguals still performed better in Mandarin phonological awareness, which confirmed that acquiring one more language than monolinguals helped the learner be more sensitive to the phonological units (Andreou, 2007) of their L1 and enabled them to perform better in it.

Several factors affected the finding that bilinguals had significantly higher scores in English phonological awareness tasks than the monolingual group. One factor was the mother's education level. The mean score of the mother's education level in the bilingual group was

higher than in the monolingual group, which means the bilingual learners were more likely to receive assistance than their peers (Dixon et al., 2012). Highly educated mothers tend to demonstrate the correct use of language and assist with children's academic difficulties (Hoff & Tian, 2005). Previous studies (Dixon et al., 2012; Hoff & Tian, 2005) have also found that a mother's education was related to a child's English vocabulary acquisition, which suggests that highly educated mothers used more vocabulary and different varieties of language expressions.

Hoff and Tian (2005) proved that a mother's education had a statistically significant positive influence on their children's language development (e.g., larger vocabulary size). Mieszkowska et al. (2017) compared the vocabulary size of trilinguals, bilinguals and monolinguals. The results indicated that parents' support was essential for migrant children to maintain language(s) other than the community language. Trilinguals and bilinguals received less language input than monolinguals because the total language input is allocated to two or three languages for bilinguals and trilinguals (Mieszkowska et al., 2017). Therefore, the authors concluded that migrant toddlers' community language might take care of itself, meaning it can be acquired naturally; the same was not so for the home language(s).

Another factor affecting English phonological awareness is the L1 or L1s. The *t*-test results showed that the bilingual group performed slightly better than the monolingual group in the Mandarin phonological awareness task. Bilinguals and monolinguals both had Mandarin phonological awareness before obtaining English phonological awareness. However, bilinguals had additional Korean phonological awareness compared to monolinguals, which may help bilinguals learn English phonology. Bilinguals' Korean phonological awareness may facilitate an advantage for English phonological awareness. As discussed in Chapter 2, Korean has a more complicated vowel system than English and Mandarin. Long vowels (such as [i:])

are absent in Mandarin and Korean. However, learners with previous Mandarin and Korean vowel experience can use existing short vowels in their previous language to learn the English vowels. Three diphthongs ([ɔɪ], [eə] and [ɪə]) do not exist in Mandarin but can be transformed from Korean syllable clusters to English phonemes. The results of this study showed that the phonological awareness of the background languages had a positive effect on bilinguals obtaining English phonological awareness compared to the monolinguals. This supports the theory proposed by Andreou (2007).

As mentioned, the bilingual group performed significantly better in both English and Mandarin phonological awareness. Multiple regression analysis results showed that the influence of Mandarin on learners' English phonological awareness was significant. The Mandarin monolingual group had significantly more exposure to Mandarin than the bilingual group, inferring that monolingual learners used more Mandarin than bilingual learners (Mandarin was used at school and home). However, bilinguals performed better in the Mandarin phonological awareness tasks than monolinguals. Although monolinguals use Mandarin more frequently than bilinguals, monolinguals still performed worse in Mandarin and English phonological awareness tasks.

Maths performance was unbalanced between the two participating groups. The Mandarin monolingual group performed better in maths than the Korean–Mandarin bilingual group. Kliziene et al. (2022) have shown that monolinguals with better maths performance may have better cognitive abilities than bilinguals in this study. The ANCOVA results indicated that maths performance was statistically related to English phonological awareness. *T*-test results showed that monolingual learners performed significantly better than bilingual learners in maths performance, implying that monolingual learners may have higher cognitive abilities than bilingual learners (Kliziene et al., 2022). The ANCOVA analysis of English phonological

awareness controlled for maths scores because significant differences were observed between the two groups. Although bilingual learners received lower scores in maths, they achieved comparatively higher scores in English phonological awareness tasks.

The final factor that may affect learners' English phonological awareness is the frequency of language use with others, such as family members. In the Mandarin monolingual group, 44% of participants had a sibling or siblings, 15% had older siblings, 27% had younger siblings, and 2% had two siblings, respectively, one younger and one older. Meanwhile, 42% of bilinguals had a sibling or siblings, including 19% with older siblings, 22% with younger siblings, and only 1% with both younger and older siblings. Participants in both groups had a similar number of siblings. However, the bilinguals had more older siblings than monolinguals, which may influence the participants' language use frequency and development. The study's findings are in line with the research of Kwon and Martínez-Álvarez (2022), who suggested that a trilingual child with an older sibling would benefit from the meaning-maintaining processes in multilingual interactions.

More bilinguals (50, 31%) lived with grandparents than monolinguals (24, 22%). In the city of the participating schools, grandparents of the Korean–Mandarin bilinguals speak more fluently in Korean than Mandarin, which may positively affect the bilinguals' Korean phonology. Language use positively affects trilingual language development (Quay, 2012). Quay explored the language use of two trilingual mothers with their trilingual toddlers. They concluded that even a small amount of mixed L2 utterances might provide additional input for the trilingual toddler and encourage active trilingual development. In this study, the bilinguals had more siblings than monolinguals, and more bilinguals lived with their grandparents. These factors facilitated language development and language use in Korean, which supports the findings of Quay (2012).

5.2.2 Research Question 2: English Morphological Awareness Comparison

The second research question asked whether Korean–Mandarin bilingual learners had advantages in English morphological awareness compared to Mandarin monolingual learners. The hypothesis was that the Korean–Mandarin bilingual learners would perform better in the English morphological awareness tasks than the Mandarin monolingual learners.

The results showed that bilingual learners had better English morphological awareness than monolingual learners. The findings aligned with Pilar and Errasti's (2003) proposal that trilinguals had more benefits than bilinguals in learning an L3. Their results showed that students with high proficiency levels in their L1 and L2 would benefit most from their bilingualism. The instruction language was Basque, which was the minority language. The adolescents used Spanish as their majority language and English as a foreign language. The results indicated that most participants who used Basque achieved higher scores in the L3 of English. In this study, the participants in the bilingual school also used a minority language, Korean, as their instruction language, which may promote their learning of English. Several other factors affected the results that showed the bilingual group had significantly higher scores in English morphological awareness tasks than the monolingual group.

The study also explored whether the participants' morphological awareness of their background language influences English morphological awareness. Although bilinguals performed better in English morphological awareness than monolinguals, bilinguals achieved lower scores in the Mandarin morphological awareness task. The *t*-test results showed that the monolingual learners had higher scores in the Mandarin morphological awareness tasks than the bilingual learners. Chinese has a relatively opaque sound–symbol correspondence compared to other languages, therefore, Mandarin morphology is complicated and challenging to learn (Ku & Anderson, 2003). The inflectional and derivational affixes are productive in

Mandarin, although the number of inflectional morphemes is limited compared to the number of derivational morphemes. A language does not contain enough words and morphemes to represent all the objects, events, or ideas; therefore, some words represent more than one meaning (Taylor & Taylor, 2014). In Chinese, homonyms have multiple meanings. With the knowledge of Mandarin morphology, Mandarin monolinguals performed significantly better in Mandarin morphological awareness than Korean–Mandarin bilinguals.

However, in the ANCOVA analysis, where intervening variables were controlled, the bilingual learners only performed significantly better than monolingual learners in English morphology. The bilinguals in this study had extra Korean morphological awareness compared to the monolingual participants. The results indicated that morphological awareness of the background language has a better effect on bilingual learners obtaining English morphological awareness than monolingual learners.

The following factors may affect the bilinguals' advantages in English morphological awareness: English academic performance, language use frequency and previous language experience. The multiple regression analysis results showed that the English morphological awareness was influenced significantly by learners' English academic performance (i.e., the English final exam) and indicated that English morphological awareness was a good predictor of English reading skills. These findings align with previous studies (Ku & Anderson, 2003; Labelle, 2019). For example, Ku and Anderson (2003) investigated Chinese and English morphological awareness and found that morphological awareness is strongly related to reading ability.

Participants' language use in a social context was collected because L3 acquisition is associated with the social context, which influences how people interpret things, how they speak and the contents of their speech (Sanz, 2000). Exposure to languages could influence

performance in performing morphological tasks (Vernice & Pagliarini, 2018); therefore, the participants' frequency of using the language was considered an independent variable in the English morphological awareness analysis. The information collected in the questionnaire indicated that bilinguals used languages (both Korean and Mandarin) more frequently than monolinguals, not only the previous languages but also the additional language, English. The frequent use of languages facilitated bilinguals' language development. This finding was reflected in their superior English morphological awareness compared to monolinguals.

This finding aligns with those of Gómez (2009), who explained that the extent of exposure to English was important in the performance of derivational awareness for Chinese-speaking English language learners in Canada. Chinese children have few opportunities to become familiar with derivational morphology—inflectional and derivational morphemes are rare in Chinese—before learning English; they develop this skill through English exposure (Ku & Anderson, 2003). The study results indicated that the participants' L1 characteristics influence English language learners' morphological awareness.

The comparison of the Mandarin, Korean and English morphological systems in Chapter 2 indicated that Korean morphology is more complicated than Mandarin morphology. Bilingual learners likely benefited from the complexity of Korean morphology and developed Korean morphological awareness, which influenced their English morphological awareness. In Korean, (받침 /batchim/, a consonant or consonant cluster that appears in the final position, such as the consonant ㄷ in 받) increased the bilingual learners' anticipation of the details provided after each base form of a word, cueing them to look for such suffix information. Korean morphology has a more-complex system of inflectional suffixes attached to various stem types than English. As stated by Cho (2020), 'Korean is well known as an agglutinative language, with a complex system of inflectional suffixes attached to various stem types'

(p. 115). A verb can be derived from a noun, a verb or an adjective, and an inflectional morpheme is used to create a variant form of a word to signal grammatical information. Several inflectional morphemes exist in Korean, for example, 하다 /hada/, which shows a verb in the present tense, and 을거다, /-eul geoda/, which shows a verb in the future tense.

5.3 Demographic Characteristics

The questionnaire included some open-ended questions requiring the participants to express their ideas about learning English and the effects of previously acquired language on English learning. Participants' answers varied. For example, in answering the question, 'What English language ability would you like to improve? (listening, speaking, reading, writing)', some students replied with one of the four skills, while others stated they would like to improve more than two skills. The participants' responses were categorised into groups to investigate and discuss their demographic characteristics. The results reveal how the qualitative results are associated with the participants' English phonological and morphological awareness.

'Academic result' was the top reason for monolingual participants wanting to improve their English skills, while for 'communication' and to 'go abroad to study' were less-frequently reported. 'Reading' was the ability most monolinguals wanted to improve, followed by 'writing' and 'all four skills (listening, speaking, reading, writing)'. 'Academic result' was also the top reason for bilinguals wanting to improve their English skills. 'Communicating with foreigners' and 'English is a global language' were the second and third most frequently reported reasons. When bilinguals were asked which English skills they wanted to improve, 'speaking' and 'writing' were their priorities: more than half of the bilinguals chose 'speaking' and 'writing' as a skill that needed improving in English.

The next section demonstrated the participants' ideas about the importance of previously learned languages. Bilinguals learned Korean and Mandarin before English. Nearly

half of the bilinguals believed that Mandarin was important, and 91.3% agreed that Korean was an essential language to learn. When considering the importance of Mandarin, the percentage of bilinguals who selected the 'everyday language, communication' item was 48.1%, and this was also the most common for monolinguals. Eighty-five monolinguals (76.6%) believed that Mandarin was helpful for English learning. 'Understanding through translation' summarised their thoughts on the usefulness of Mandarin.

One hundred and thirty-one of 160 bilinguals (81.9%) regarded Mandarin as applicable when learning English. 'Helpful in understanding' and 'understanding through translation' were the two main reasons why bilinguals considered Mandarin useful.

5.3.1 Commonalities

There were some commonalities between groups in participant responses. When comparing the reasons provided by bilinguals and monolinguals for improving English language skills, it was quickly identified that they put 'academic result', 'communication' and 'going abroad to study' as their primary reasons.

Both bilinguals and monolinguals thought they should improve their English writing. Fifty bilinguals (31.3%) chose 'speaking', and 41 (25.6%) chose 'writing' as their English skills that needed improving. Nineteen (17.2%) participants in the monolingual group chose 'reading', while 9.4% of participants in the bilingual group chose 'reading'. 'Writing' was the second option for the monolinguals, nominated by 13.5%. Cenoz and Valencia (1994) showed that intelligence, motivation, age and exposure were good predictors of English achievement. Bilinguals' motivation to develop their speaking meant that they were more likely to improve their phonological awareness than monolinguals.

A large proportion of the participants regarded Mandarin as helpful for English learning. One hundred thirty-one (81.9%) of 160 bilinguals and 85 (76.6%) of 111

monolinguals regarded Mandarin as useful when learning English. Rothman et al. (2019) stated that if the L1 or L2 can match the target language, either L1, L2 or both will promote L3 learning, which appears to have facilitative effects. The participants found Mandarin helpful, which meant they realised the similarities between the two languages and promoted their English learning. Finally, both bilingual and monolingual group responses to the importance of Mandarin were concentrated into four categories: 'everyday language, communication', 'mother tongue', 'being Chinese' and 'exam'.

5.4 Theoretical Considerations

As mentioned in Chapter 2, there are four trending models in L3 acquisition. The models explore how L1s and L2s interact with L3 while learning a new language and whether the previous languages would affect L3 acquisition. Some linguists (Bardel & Falk, 2007; Flynn et al., 2004; Rothman, 2010a; Rothman et al., 2013) have discussed whether the knowledge of the previously acquired language would interact with L3 development and change a learner's understanding of languages during the process of acquiring the L3. The evidence in the literature affirmed that previous language experiences could influence an L3. Thus, the issue was how previous knowledge influenced the learner's L3 acquisition and whether the transfer was from the L1, L2 or both (Rothman et al., 2013). The following section will discuss whether this study confirms the four models.

5.4.1 CEM

The CEM asks whether only L1 plays a role in developing the L3 or L1 and L2 both affect L3 acquisition (Flynn et al., 2004). Flynn et al. (2004) emphasised that a facilitative effect can come from any previously acquired or learned languages, and multilingual transfer could only be facilitative. Thus, language learning is a cumulative process, and the previously

acquired languages can either positively affect the acquisition of the new languages or remain neutral for transfer if non-facilitative.

This study confirms the CEM because bilinguals' previous language experience played a facilitative role in achieving higher scores than monolinguals in the English phonological and morphological awareness tasks. Korean, Mandarin and English, a different language combination compared to the combination studied in Flynn et al. (2004), obtained identical results to the CEM. Bilinguals performed better in their other language (Mandarin and Korean phonological awareness), which influenced their English phonological awareness (Flynn et al., 2004; Jessner, 1999).

When comparing two groups of participants, bilinguals performed better in Mandarin phonological awareness than monolinguals. Bilinguals in this study had additional Korean phonological awareness compared to monolinguals, which may have helped bilinguals learn English phonology and show greater English phonological awareness. The bilinguals' Korean phonological awareness may play a facilitative effect for them to be more advantageous in English phonological awareness, and it shows a cumulative effect. Therefore, it is not surprising to find bilinguals' advantages in English phonological awareness. The results of this study showed that the phonological awareness of the background languages has a positive effect on bilinguals obtaining English phonological awareness compared to the monolinguals, as proposed by Andreou (2007). Jessner (1999) noted that language development in two or more languages could promote higher metalinguistic awareness, facilitating language acquisition by developing cognitive mechanisms to transfer previous language knowledge to the target language and enhancing multilinguals' metalinguistic awareness. Flynn et al. (2004) demonstrated that L3 transfer could be from any language system learners already possess.

Prior language knowledge will influence new language acquisition, which shows that language learning is cumulative.

5.4.2 L2SFM

The L2SFM posits that L2 is more likely than L1 to be transferred in the initial stage of L3 acquisition (Bardel & Falk, 2007). The L2SFM is more focused on the sequential language learner. In other cases of language learning, for example, when the learner has acquired two L1s at an early age (like simultaneous language learners in this study), it is complex to determine which language is the L1 and which is the L2. These learners have two language systems before learning their L3. Therefore, the L2SFM was not applicable to this study.

5.4.3 TPM

The TPM indicates that L3 transfer is affected by the typological proximity of the target L3 compared to the other previously acquired linguistic systems (Rothman, 2010a). The transfer will happen unconsciously from the prior language that is similar to the L3, and that language will be the source of transfer for an L3. According to the TPM, the transfer can be facilitative or non-facilitative. Cenoz and Hoffmann (2003) ascribe transfer to typology, saying that transfer is related to whether the form is typologically universal. Speakers tend to borrow more terms from the language that is closer in type to the target language (Cenoz et al., 2001a). Therefore, the speakers' linguistic knowledge is influential in the amount of language transfer.

In this study, Korean–Mandarin bilingual learners acquired two languages and then learned English as an L3. Although Korean, Mandarin and English are typologically different languages, there are similarities between the three languages (see Section 2.6.3). The similarities between the languages enable language transfer possibilities. This study partly confirms the TPM, although this model needs testing in further research.

5.4.4 LPM

The LPM was developed based on the CEM and the TPM. The LPM considers that the similarities between languages will be the major factor in transfer, not the sequence of the language acquired (Westergaard et al., 2017). The LPM revealed that bilinguals would benefit from prior language knowledge when learning an L3, regardless of whether they had two L1s or an L1 plus an L2. According to the LPM, all prior languages are active during L3 learning, and cross-linguistic influence depends on the similarity of each linguistic property and the properties of L3. Westergaard et al. (2017) said cross-linguistic influence can be facilitative or non-facilitative.

From this review of the models, it can be deduced that in the initial stage of L3 learning, an L1 is not necessarily the default source of the transfer. The CEM advocates that linguistic acquisition is cumulative. The previously acquired languages will have a facilitative effect on the learners' additional language learning. The TPM is a modified version of the CEM, which discusses the source of the transfer. An L3 will take advantage of the similarities with prior language knowledge, either L1 or L2, and choose the one most beneficial to L3 learning.

5.5 Implications for Future English Language Teaching

English teachers working in bilingual schools can use this study's findings to improve their understanding of bilingual learners' language experience and deliver more effective English teaching. Jessner (1999) said that prior language knowledge should be reactivated in the classroom, not ignored, and learning an additional language based on a language system that already existed seemed to be facilitative. Therefore, English teachers and policymakers should investigate the students' prior language experience; focus on the similarities between Mandarin, Korean and English; and adjust their pedagogic approach to English teaching.

5.5.1 Understanding the Background Language

Understanding differences between prior language knowledge and newly adopted language will be beneficial, and a positive transfer is more likely to occur (Flynn et al., 2004). In the bilingual learners' questionnaire responses, 81.9% of bilinguals and 76.6% of monolinguals replied that Mandarin was applicable when learning English. Further, 30.6% considered Mandarin 'helpful in understanding English', but only 4.4% of the bilingual participants thought Korean was 'helpful in understanding English'.

5.6 English Teacher Training

As mentioned in Section 2.7, English teachers' multilingual competence is beneficial to teachers and learners in multilingual classrooms. Iamroz (2018) highlighted that teachers' attitudes towards multilingual education indicated how linguistic diversity influences teaching practice in the English-as-a-foreign-language classroom. Iamroz presented how English language teachers use various teaching methods to meet learners' needs with multilingual backgrounds. In Iamroz's study, the multilinguals' L2 was Norwegian, and L3 was English. Some of the participants had more than one L1. However, teachers only considered the students' L2, Norwegian, when teaching English. This was caused by the English educators' insufficient multilingual knowledge, which affected their teaching strategies and lack of multilingual pedagogy training. Pedersen (2016) also drew attention to the English teachers' multilingual competence in teaching multilingual children in Norwegian schools. The research results showed that English teachers do not fully understand multilingualism's complexity during L3 teaching. The English teachers lacked sufficient multilingual abilities to teach L3 English to the multilingual students.

Teacher training that focuses on students' background language knowledge will benefit English teachers, especially when dealing with students from multilingual backgrounds.

English teachers in bilingual schools have little prior knowledge of Mandarin and Korean, which requires attention. In the bilingual participating school, the Mandarin–Korean English teachers comprised 23% of all English teachers. Therefore, the English teachers' L3 acquisition knowledge is necessary for effective English instruction.

This study identified the similarities and differences between Mandarin, Korean and English while comparing bilingual and monolingual learners. This information can be used as a reference for English teachers in their future training, especially for teachers who do not have the experience of knowing two languages and learning a third.

The educator needs to prepare the contents of the training well, considering previous language influences. English teachers must improve their linguistic knowledge, such as English phonological and morphological awareness. English teachers in ethnic Korean schools must consider the positive transfer of Mandarin and Korean. When Korean helps learners remember English words because of similarities in pronunciation or loan words, teachers may call attention to the method of reciting words.

Mandarin and English have similar word order in sentences; this knowledge can be used to explain the grammar rules to assist the students in understanding English grammar. In Mandarin phonetic transcription, Chinese Pinyin contains /f/, one of the labiodental sounds in English. This provided alternative assistance for ethnic Korean–Chinese learners to realise the sound of /f/ and /v/ and to pronounce the sound more precisely than native-Korean speakers. For the English /s/, /z/ and /ʃ/ consonants, only the sound similar to /s/ can be found in Korean. However, in Chinese Pinyin, there are /s/, /sh/, /z/ and /zh/ different consonants that can help ethnic Korean–Chinese learners learn English pronunciation more easily. English teachers can use the similarities between the three languages to facilitate students' English learning.

Teachers should be aware of trilinguals who have previous language(s) through training. With the sense of a trilingual, teachers will understand the prior language knowledge of bilingual learners and the differences between bilingual and monolingual learners who are learning English. English teachers in ethnic Korean schools or those who are teaching students with Mandarin and Korean as previous languages can use the materials in Section 2.6.3 and the appendices, especially the sections that contrast Mandarin, Korean and English, as a reference to learn about the similarities and differences between the three languages. For example, Mandarin, Korean and English include similar phonemes (see Tables 2.5 and 2.6 in Chapter 2). In the initial stage of English learning, learners may realise the similarities between prior language knowledge and English and use them to support their development of English phonological awareness. Teachers can use these tables as a reference to encourage the students to use their background knowledge as a tool to learn L3 English.

Teachers may remind the students about the differences between languages when teaching English. For instance, in English, there are long vowels and short vowels. By contrast, there are no long vowels in Korean or Mandarin. From the morphology perspective, Korean and Mandarin do not use inflectional morphemes to present grammatical features (tense, plurality) like English. As Jessner (1999) said:

> In third language learning, especially in the case of learning a third typologically related language, a student's prior experience with other languages (and also with language learning) would suggest a focus on the commonalities in the pedagogic approach. The learning process of a third language sets itself apart from learning a second language as the student can reflect consciously on the strategies used in SLA and apply them to TLA (pp. 206–207)

By understanding the similarities and differences between the three languages, teachers will be reminded of the advantages and disadvantages of bilinguals who have developed two native languages and are learning an L3. By adjusting their teaching strategies, teachers may enhance the transfer from bilinguals' background languages and avoid negative transfer. Tailored teaching methods will effectively influence bilingual learners to learn English and improve the teaching quality in ethnic Korean schools.

Policymakers and principals in ethnic Korean schools in China should encourage teachers to conduct further research on Mandarin–Korean–English learners. English teachers in ethnic Korean schools can use this study as a starting point for further research. L3 learning is still developing. Its application in teaching will also facilitate the development of L3 research. This study only compared the advantages of Mandarin–Korean–English learners over Mandarin–English learners from the aspects of English phonological and morphological awareness. As the study showed a facilitating effect of the previously acquired language(s) on L3 learning, English teachers may conduct further research on the advantages of learners who have two or more previous languages, adjust their teaching strategies and improve the effectiveness of L3 teaching.

Translanguaging pedagogies promote English morphological awareness. Leonet et al. (2020) analysed the development of English morphological awareness by fluent bilingual students, whose mean age was 10.67 years, in Basque Country. The results showed that the experimental group, who were taught with translanguaging pedagogies, used their multilingual resources to acquire higher morphological awareness scores than the control group, who were taught in their regular program. In the current study, participants indicated whether they considered Mandarin helpful for their English learning. Mandarin was used a tool of understanding or 'understanding through translation' by 46.9% of bilinguals and 26.1% of

monolinguals. More bilinguals took advantage of their previous languages, which facilitated their performance in English morphological awareness.

Finally, English teachers in China need to motivate students to learn English. Two participants in the bilingual group responded that they would like to improve their English language skills because 'English is a communication tool' and they 'like foreign literature and love reading original copies' and 'love watching American films'. As students realise the importance of improving their English language skills, English teachers can use this as a key to developing their interest in learning English, especially increasing their spoken English.

5.7 Limitations

There were several limitations in this study. The study used convenience sampling, but only schools willing to participate and could conduct the research were chosen. However, in the city where the experiment was conducted, other potential participants in other schools met the requirements of the current study. Therefore, future researchers with adequate funding should use a random sampling method or enlarge the participants' group.

A nesting effect may exist in the current study. In the city of the two participating schools, the students learned in fixed classrooms, with different subject teachers coming into the classrooms to deliver lessons. Thus, the learning environment and teachers' teaching strategies may affect the students in one class.

The measurements in the English phonological and morphological awareness tasks were limited in variety. Several tasks can be used to measure English phonological and morphological awareness. By negotiating with the participating schools, the researcher decided to use the current tasks to measure the participants' phonological and morphological awareness because they are faster to complete and more practical for testing.

The mother's education level between the two participating groups was not balanced, which might be a confounder in the study. The mean score of the mother's education level in the bilingual group was higher than in the monolingual group, which means the bilingual learners might have been more likely to receive maternal assistance than their peers.

The time participants spent using their different languages was collected in the questionnaires, which may have been affected by their understanding of measuring their language use. Determining language usage time in a typical day is complex, particularly for a person who speaks many languages. This study collected language use as a percentage of total time. Participants chose from five options—< 25%, 25%, 50%, 75% and 100%—and were given the following instructions: 'when you choose the percentage of each language, the total ratio of three languages cannot exceed 100%.' However, the calculation method is complicated for participants to estimate the time spent using each language in a typical day, especially for bilingual learners with three language options. The participants' language use in social contexts influences how they interpret things, how they speak and the contents of their speech (Sanz, 2000). Language use will differ according to social contexts. For example, bilingual learners may use English to communicate with their friends and Korean in conversations with older family members. In addition, estimating '< 25%' is also an issue. If one speaks only one sentence in English in a day, it cannot be categorised as '25%'; it will appear in the '< 25' category. Therefore, estimating the participants' language use may differ from their actual language use in daily life.

5.8 Suggestions for Future Research

Future researchers should consider the following points when conducting studies on English phonological and morphological awareness. Future researchers may use other tests to measure English phonological awareness. Various tasks can measure English phonological

awareness skills: sound blending, phoneme deletion, onset and rime detection, and sound oddity. The current study used the sound oddity task to measure English phonological awareness. Using other tasks that measure English phonological awareness would support the results. Further, English vocabulary testing can be used as a supplementary task in future studies.

Subject to funding, future researchers should use standard language proficiency assessment tests to estimate participants' Mandarin, Korean and English language skills. The English language tests can also include reading tests, which may be used in the English morphological awareness measurement.

Future research can examine the influence of English teachers by adding questionnaires or interviews with teachers. This would allow the teacher's teaching strategies and time to be included in the analysis of participants' English phonological and morphological awareness. Teachers' knowledge of English phonological and morphological awareness will influence students' English learning, especially English phonology.

5.9 Summary

This chapter discussed the themes of the major findings for each research question, and the findings were linked to the related literature and theoretical frameworks. Finally, the implications for future English language teaching in ethnic Korean schools and wider contexts were discussed, as were the limitations of this study and suggestions for future research.

Chapter 6: Conclusion

This study aimed to investigate the advantages in English phonological and morphological awareness held by Korean–Mandarin bilingual learners compared to Mandarin monolingual learners. The study found that having mastery of two typologically different language systems allowed bilingual learners of English to perform better than monolingual learners. The results demonstrated that the bilinguals' Korean/Mandarin language background did not hinder their English language development, and instead helped them. Korean–Mandarin bilinguals' English phonological awareness was statistically better than that of Mandarin monolinguals. When comparing English phonological awareness task results, the bilinguals achieved higher scores than the monolinguals. English phonological awareness ANCOVA results showed that the bilingual group performed statistically better than the monolingual group. The finding that bilinguals had advantages in English phonological awareness over monolinguals was consistent with the previous research of Andreou (2007), Kang (2012) and Wang, Yang and Cheng (2009).

The bilingual group also performed better in the Mandarin phonological awareness tasks. When comparing Mandarin phonological awareness between the monolingual group and the bilingual group, the *t*-test results showed that the bilingual group was slightly better than the monolingual group. Bilingual learners had phonological awareness in Mandarin and Korean before obtaining English phonological awareness skills, while monolingual learners only had phonological awareness in Mandarin. The results indicated that the phonological awareness of the background language has a better effect on bilinguals while obtaining English phonological awareness than monolinguals.

The study results showed that several factors affect English phonological awareness, one of which is the mother's education level. The mean score of the mother's education level in the bilingual group was higher than the monolingual group, possibly because bilingual learners were more likely to receive assistance from mothers academically than monolingual learners. More-educated mothers are likely to guide the correct use of language and assist with children's academic difficulties than less-educated mothers. This finding aligns with previous findings (Dixon et al., 2012; Hoff & Tian, 2005) that a mother's education was related to English vocabulary acquisition, which meant that more-educated mothers used more vocabulary and different varieties of language expressions than less-educated mothers. Hoff and Tian (2005) proved that a mother's education had a statistically significant influence on children's language development (e.g., phonological awareness); this finding predicted bilinguals' phonological awareness in the current study.

The results of multiple regression analysis demonstrated that using Mandarin significantly influenced English phonological awareness and explained 9% of the variance. Monolingual learners used more Mandarin than bilingual learners. Despite this, bilinguals performed better in the Mandarin phonological awareness tasks than monolinguals. Therefore, it can be deduced that although monolinguals use more Mandarin than bilinguals, monolinguals still perform worse in both Mandarin and English phonological awareness tasks.

Maths performance was used as a proxy for cognitive ability. *T*-test results showed that monolingual learners performed significantly better than bilingual learners in maths, indicating that the monolingual learners in this study had higher cognitive abilities than the bilingual learners. As there were significant differences between the two participating groups, maths scores were controlled for in ANCOVA of the English phonological awareness. Although

bilingual learners received lower scores in maths, they achieved higher scores in English phonological awareness tasks.

The results from English morphological awareness comparisons found that bilingual learners also had advantages over monolinguals. Bilingual English learners achieved statistically higher scores in English morphological awareness tasks than monolingual English learners. English morphological awareness ANCOVA results showed that the bilingual group also performed statistically better than the monolingual group.

The multiple regression analysis results reflected that English performance (English final exam) predicted English morphological awareness. Bilingual learners had higher scores in English performance than monolingual learners. Therefore, English morphological awareness was a good predictor of English reading skills. This finding was identical to the work of other researchers (Ku & Anderson, 2003; Labelle, 2019).

Four compelling models were discussed in this study: CEM, L2SFM, TPM and LPM. These four models were discussed in relation to the study's findings. It could be deduced that in the initial stage of L3 learning, an L1 was not necessarily the default source of the transfer. The CEM advocates that linguistic acquisition is cumulative, where the previously acquired languages would facilitate the learners' additional language learning. The TPM is a modified version of the CEM that discusses the source of the transfer. An L3 would take advantage of the similarities with the prior language knowledge—either L1, L2 or both—and choose the one beneficial to L3 learning. This study confirms the CEM: bilinguals' previous language experience played a facilitative role in achieving higher scores in both English phonological and morphological awareness tasks.

In this study, Korean–Mandarin bilingual learners acquired two languages and then learned English as an L3. Although Korean, Mandarin and English are typologically different

languages, there are similarities between the three (see Section 2.6.3 in Chapter 2). The similarities among the languages enable language transfer possibilities. This study partly confirms the TPM, and further research is needed to test the TPM fully.

The current research showed the effect of prior language knowledge on English phonological and morphological awareness, which needs the educators' attention. English teachers in bilingual schools in China should be encouraged to use the current study as the foundation for further research, especially focusing on how to facilitate English phonological awareness based on students' previous language experience. With further study in English phonological and morphological awareness, English teachers may assist learners in benefiting from their background languages during the process of L3 learning.

Leaders and policymakers in ethnic Korean schools in China should encourage teachers to conduct further research on bilingual learners. English teachers in ethnic Korean schools can expand on the findings from this study by focusing on English phonological awareness. This study only compared the advantages of Korean–Mandarin–English learners over Mandarin–English learners from the aspects of English phonological awareness and morphological awareness. As the study results showed the facilitating effect of previous language experience, those privileges can be deeply researched using various measurement tasks and scales to provide more evidence to encourage L3 learning and teaching.

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Appendices

Appendix A: China's Minorities: The Population and the Main Territories (based on the Sixth National Census of China, 2010)

X	Minority group English term (*Chinese term*)	Population	Territories
1	Mongols (*Meng Gu Zu*) *	5,981,840	Nei Menggu, Liaoning, Jilin, Hebei, Heilongjiang, Xinjiang
2	Hui (*Hui Zu*)	10,586,087	Ningxia, Gansu, Henan, Xinjiang, Qinghai, Yunnan, Hebei, Shandong, Anhui, Liaoning, Beijing, Nei Menggu, Tianjin, Heilongjiang, Shanxi, Guizhou, Jilin, Jiangsu, Sichuan
3	Tibetan (*Zang Zu*) *	6,282,187	Xizang, Sichuan, Qinghai, Gansu, Yunnan
4	Uyghurs (*Wei Wu Er Zu*) *	10,069,346	Xinjiang
5	Miao (*Miao Zu*) **	9,426,007	Guizhou, Hunan, Yunnan, Guangxi, Chongqing, Hubei, Sichuan
6	Yi (*Yi Zu*) **	8,714,393	Yunnan, Sichuan, Guizhou
7	Zhuang (*Zhuang Zu*)	16,926,381	Guangxi, Yunnan, Guangdong
8	Buyei (*Bu Yi Zu*)	2,870,034	Guizhou
9	**Koreans (*Chao Xian Zu*) ***	**1,830,929**	**Jilin, Heilongjiang, Liaoning**
10	Manchu (*Man Zu*)	10,387,958	Liaoning, Hebei, Heilongjiang, Jilin, Nei Menggu, Beijing
11	Dong (*Dong Zu*)	2,879,974	Guizhou, Hunan, Guangxi
12	Yao (*Yao Zu*)	2,796,003	Guangxi, Hunan, Yunnan, Guangdong
13	Bai (*Bai Zu*)	1,933,510	Yunnan, Guizhou
14	Tu Jia (*Tu Jia Zu*)	8,353,912	Hunan, Hubei, Sichuan
15	Ha Ni (*Ha Ni Zu*)	1,660,932	Yunnan
16	Kazakh (*Ha Sa Ke Zu*) *	1,462,588	Xinjiang, Gansu
17	Dai (*Dai Zu*) **	1,261,311	Yunnan
18	Li (*Li Zu*)	1,463,064	Hainan
19	Su (*Su Zu*) **	702,839	Yunnan, Sichuan
20	Va (*Wa Zu*) **	429,709	Yunnan
21	She (*She Zu*)	708,651	Fujian, Zhejiang, Jiangxi, Guangdong
22	Gaoshan (*Gao Shan Zu*)	4,009	Taiwan, Fujian
23	Lahu (*La Hu Zu*) **	485,966	Yunnan
24	Sui (*Sui Zu*)	411,847	Guizhou, Guangxi
25	Dongxiang (*Dong Xiang Zu*)	621,500	Gansu, Xinjiang
26	Nakhi (*Na Si Zu*) **	326,295	Yunnan
27	Jingpo (*Jing Po Zu*) **	147,828	Yunnan
28	Kyrgyz (*Ke Er Ke Zi Zu*)	186,708	Xinjiang
29	Tu (*Tu Zu*)	289,565	Qinghai, Gansu
30	Daur (*Da Wo Er Zu*)	131,992	Nei Menggu, Henilongjiang, Xinjiang
31	Mulao (*Mu Lao Zu*)	216,257	Guang Xi
32	Qiang (*Qiang Zu*)	309,576	Sichuan
33	Blang (*Bu Lang Zu*)	119,639	Yunnan
34	Salar (*Sa La Zu*)	130,607	Qinghai, Gansu
35	Maonan (*Mao Nan Zu*)	101,192	Guangxi
36	Yilao (*Yi Lao Zu*)	550,746	Guizhou, Guangxi, Yunnan
37	Xibo (*Xi Bo Zu*)	190,481	Liaoning, Xinjiang, Jilin
38	Achang (*A Chang Zu*)	39,555	Yunnan

X	Minority group English term (*Chinese term*)	Population	Territories
39	Pumi (*Pu Mi Zu*)	42,861	Yunnan
40	Tajik (*Ta Ji Ke Zu*)	51,069	Xinjiang
41	Nu (*Nu Zu*)	37,523	Yunnan
42	Uzbeks (*Wu Zi Bie Ke Zu*)	10,569	Xinjiang
43	Russian (*E Luo Si Zu*)	15,393	Xinjiang, Heilongjiang
44	Ewenki (*E Wen Ke Zu*)	30,875	Nei Menggu
45	De'ang (*De Ang Zu*)	20,556	Yunnan
46	Bonan (*Bao An Zu*)	20,074	Gansu
47	Yugur (*Yu Gu Zu*)	14,378	Gansu
48	Jing (*Jing Zu*)	28,199	Guangxi
49	Tatars (*Ta Ta Er Zu*)	3,556	Xinjiang
50	Derung (*Du Long Zu*)	6,930	Yunnan
51	Oroqen (*E Lun Chun Zu*)	8,659	Heilongjiang, Nei Menggu
52	Hezhen (*He Zhe Zu*)	5,354	Heilongjiang
53	Monba (*Men Ba Zu*)	10,561	Xizang
54	Lhoba (*Luo Ba Zu*)	3,682	Xizang
55	Jino (*Ji Luo Zu*)	23,143	Yunnan

Appendix B: Romanisation Systems for Korean, Based on United Nations Group of Experts on Geographical Names Working Group on Romanization (2013)

Hangul	ISO TR 11941	DPRK 1992	ROK 2000	McCune–Reischauer	Yale
ㄱ	k/g	k	g, k	k/g	k
ㅋ	kh/k	kh	k	k'/k	kh
ㄲ	kk/gg	kk	kk	kk	kk
ㄷ	t/d	t	d, t	t/d	t
ㅌ	th/t	th	t	t'/t	th
ㄸ	tt/dd	tt	tt	tt	tt
ㅂ	p/b	p	b, p	p/b	p
ㅍ	ph/p	ph	p	p'/p	ph
ㅃ	pp/bb	pp	pp	pp	pp
ㅈ	c/j	j	j	ch/j	c
ㅊ	ch/c	ch	ch	ch'/ch	ch
ㅉ	cc/jj	jj	jj	tch	cc
ㅅ	s	s	s	s	s
ㅆ	ss	ss	ss	ss	ss
ㅎ	h	h	h	h	h
ㅇ	-, ng	-, ng	-, ng	-, ng	-, ng
ㄴ	n	n	n	n	n
ㄹ	l, r	r	r, l	r, n, l	l
ㅁ	m	m	m	m	m
ㅏ	a	a	a	a	a
ㅓ	eo	ŏ	eo	ŏ	e
ㅗ	o	o	o	o	o
ㅜ	u	u	u	u	wu
ㅡ	eu	ŭ	eu	ŭ	u
ㅣ	i	i	i	i	i
ㅐ	ae	ae	ae	ae	ay
ㅔ	e	e	e	e	ey
ㅚ	oe	oe	oe	oe	oy
ㅑ	ya	ya	ya	ya	ya
ㅕ	yeo	yŏ	yeo	yeo	ye
ㅛ	yo	yo	yo	yo	yo
ㅠ	yu	yu	yu	yu	yu
ㅒ	yae	yae	yae	yae	yay
ㅖ	ye	ye	ye	ye	yey
ㅘ	wa	wa	wa	wa	wa
ㅝ	weo	wŏ	wo	wŏ	we
ㅟ	wi	wi	wi	wi	wuy

Note. DPRK = X; ISO TR = X; ROK = X.

Appendix C: Independent Variables

X	Label	Description
1	DOB	Date of birth
2	Gender	Participant gender
3	Parents'/caregiver's language	Mother's main language; Father's main language
4	Parents' occupation	Mother's occupation; Father's occupation
5	Parents' education	Mother's education; Father's education
6	English learning began	When they began learning English
7	Korean kindergarten	If the trilingual participant had Korean kindergarten care
8	Early home language	What language did the participant hear from age 0 to 6
9	Parents'/caregivers' language	Parents'/caregivers' language when speaking with the participant
10	The participant's language to parents/caregivers	The participant's language when speaking with parents/caregivers
11	Sibling	Number of siblings, older or younger
12	The participant's language to siblings	The participant's language when speaking with siblings
13	Siblings' language	Siblings' language when speaking with the participant
14	Grandparents	If the participant lives with the grandparents
15	Grandparents' language	Grandparents' language when speaking with the participant
16	The participant's language to grandparents	The participant's language when speaking with grandparents
17	Leisure time language	The participant's language use in their leisure time
18	Overall language use	The participant's language use on a typical day
19	Primary school language	The participant's language in primary school
20	The participant's language to teachers	The participant's language when speaking with teachers
21	The participant's language to friends	The participant's language when speaking with classmates or friends
22	Out-of-school English tutoring	The participant's English tutoring outside of school in the primary education
23	Self-rating language proficiency	Self-rating of the participant's Korean, Mandarin and English language abilities
24	Language preference	The participant's language preference
25	Willing to learn English	If the participant wants to improve their English language skills
26	Improve English language ability	Which English language ability would the participant like to improve
27	Importance of Korean	If Korean is important to the participant
28	Importance of Mandarin	If Mandarin is important to the participant
29	Korean effect	If Korean was helpful when the participant was learning English
30	Mandarin effect	If Mandarin was helpful when the participant was learning English

Appendix D: Language Background Questionnaire

(For Mandarin Monolingual Group)

Name: _____ Date of birth: _____ Gender: _____

……..

I. Family History

1. What languages do your parents/caregivers speak?

Mother: _____ Father: _____

2. What do your parents do for a living? (Occupation, Unemployed)

Mother: _____ Father: _____

3. What is your parents' highest level of schooling? (circle one for each)

Mother:	Primary school	Father:	Primary school
	Junior high school		Junior high school
	Senior high school		Senior high school
	University		University

……..

II. Your Linguistic History

4. At what age did you first begin to learn English? (circle one)

a. Before 6 b. 6 c. 7 d. 8

When you choose the percentage of each language, the total ratio of 2 languages cannot exceed 100%.

5. What languages did you hear in your home between the ages of 0-6 years?

(circle to the choice which applies to you)

Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

6. What languages did your parents/caregivers use most when speaking to you?

Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

7. What languages did you use most when speaking to your parents/caregivers?

Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

8. Do you have siblings?

Yes No how many? Are they older or younger?

If "No", jump to question 11.

9. What language/s did you use when speaking with your siblings?

Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

10. What language/s did your siblings use when speaking with you?

Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

11. Did grandparents live at home?

Yes No

12. What language/s did your grandparents use when speaking to you?

Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

13. What language/s did you use when speaking with your grandparents?

Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

14. What language do you use in your leisure time, for example, watching TV or movies, interacting with friends, etc.?

Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

15. On a typical day, which languages do you use at what percentage?

Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

……..

III. Elementary School

16. What language did you use most in primary school? (circle one)

Mandarin English

17. What language did you use when you speak to teachers? (circle one)

Mandarin English both

18. What language did you use when you speak to classmates or friends? (circle one)

Mandarin English both

19. How many hours a week of English did you have out of school when you were in primary education?

1.5 hours 2 hours 3 hours more than 3 hours

……..

IV. Your linguistic proficiency now

20. On a scale from 1 to 5, rate your abilities in Mandarin and English

(1 =poor; 2= needs work; 3=good; 4= very good; 5= native speaker command)

Mandarin Reading= Speaking= Listening= Writing=

English Reading= Speaking= Listening= Writing=

21. In general, which language do you prefer to use? (circle one)

Mandarin English It depends on whom I talk to

22. Would you like to improve your English language skills?

Yes No Why?_____

23. What English language ability would you like to improve? (listening, speaking, reading, writing)

_____

_____

24. Is Mandarin important to you?

Yes No Why?_____

25. Do you think Mandarin is helpful when you learn English?

Yes No Why?_____

……..

End of the questionnaire. Thank you very much.

Language Background Questionnaire

(For Korean-Mandarin Bilingual Group)

Name: _____ Date of birth: _____ Gender: _____

……..

I. Family History

1. What languages do your parents/caregivers speak?

Mother: _____ Father: _____

2. What do your parents do for a living? (Occupation, Unemployed)

Mother: _____ Father: _____

3. What is your parents' highest level of schooling? (circle one for each)

Mother: Primary school Father: Primary school

Junior high school Junior high school

Senior high school Senior high school

University University

……..

II. Your Linguistic History

4. At what age did you first begin to learn English? (circle one)

a. Before 6 b. 6 c. 7 d. 8

5. Did you go to Korean kindergarten? (circle one)

Yes No

When you choose the percentage of each language, the total ratio of 3 languages cannot exceed 100%.

6. What languages did you hear in your home between the ages of 0-6 years?

(circle to the choice which applies to you)

Korean	<25%	25%	50%	75%	100%
Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

7. What languages did your parents/caregivers use most when speaking to you?

Korean	<25%	25%	50%	75%	100%
Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

8. What languages did you use most when speaking to your parents/caregivers?

Korean	<25%	25%	50%	75%	100%
Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

9. Do you have siblings?

Yes No how many? Are they older or younger?

If "No", jump to question 12.

10. What language/s did you use when speaking with your siblings?

Korean	<25%	25%	50%	75%	100%
Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

11. What language/s did your siblings use when speaking with you?

Korean	<25%	25%	50%	75%	100%
Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

12. Did grandparents live at home?

Yes No

13. What language/s did your grandparents use when speaking to you?

Korean	<25%	25%	50%	75%	100%
Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

14. What language/s did you use when speaking with your grandparents?

Korean	<25%	25%	50%	75%	100%
Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

15. What language do you use in your leisure time, for example, watching TV or movies, interacting with friends, etc.?

Korean	<25%	25%	50%	75%	100%
Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

16. On a typical day, which languages do you use at what percentage?

Korean	<25%	25%	50%	75%	100%
Mandarin	<25%	25%	50%	75%	100%
English	<25%	25%	50%	75%	100%

……..

III. Elementary School

17. What language did you use most in primary school? (circle one)

Korean Mandarin English

18. What language did you use when you speak to teachers? (circle one)

Korean Mandarin English

19. What language did you use when you speak to classmates or friends? (circle one)

Korean Mandarin English

20. How many hours a week of English did you have out of school when you were in primary education?

1.5 hours 2 hours 3 hours more than 3 hours

……..

IV. Your linguistic proficiency now

21. On a scale from 1 to 5, rate your abilities in Korean, Mandarin, and English

(1 =poor; 2= needs work; 3=good; 4= very good; 5= native speaker command)

Korean Reading = Speaking= Listening= Writing=

Mandarin Reading = Speaking= Listening= Writing=
English Reading = Speaking= Listening= Writing=

22. In general, which language do you prefer to use? (circle one)
Korean Mandarin English It depends on whom I talk to

23. Would you like to improve your English language skills?
Yes No Why?_____

24. What English language ability would you like to improve? (listening, speaking, reading, writing)
_____
_____

25. Is Korean important to you?
Yes No Why?_____

26. Is Mandarin important to you?
Yes No Why?_____

27. Do you think Korean is helpful when you learn English?
Yes No Why?_____

28. Do you think Mandarin is helpful when you learn English?
Yes No Why?_____

……..
End of the questionnaire. Thank you very much.

Appendix E: English Tasks

Name: Class:

Sound Oddity Task (phonological awareness)

Listen to the audio, find the absent sound which is different from the other two as examples, and then circle the answer.

Initial sound absence

Example: 1. __ag 2. __oss 3. __ear

Correct answer: (3)

In the recording, you will hear:

bag, boss, pear

(1) 1. __en 2. __ost 3. __ook
(2) 1. __oot 2. __erb 3. __ish
(3) 1. __oo 2. __ofa 3. __alad
(4) 1. __ed 2. __amb 3. __ion
(5) 1. __et 2. __ery 3. __arm
(6) 1. __at 2. __ake 3. __oat
(7) 1. __awn 2. __ow 3. __at
(8) 1. __ose 2. __oon 3. __ame
(9) 1. __gain 2. __ften 3. __go
(10) 1. __ank 2. __ere 3. __ink

Middle sound absence

Example: 1. l__g 2. r__g 3. d__g

Correct answer: (2)

In the recording, you will hear: log, rag, dog

(11) 1. p__t 2. b__t 3. c__t
(12) 1. l__g 2. b__d 3. n__d
(13) 1. m__t 2. p__ty 3. t__m
(14) 1. r__m 2. d__ty 3. m__sic
(15) 1. c__ffee 2. s__rry 3. c__rry
(16) 1. g__l 2.fr__it 3.h__t
(17) 1. televi__ion 2.fa__ion 3. deci__ion
(18) 1. thir__een 2.wa__er 3.ha__y
(19) 1. del__cious 2.fav__rite 3. an__mal
(20) 1. Amer__ca 2. inform__tion 3. s__tting

Final sound absence

Example: 1. cit__ 2. part__ 3. Ann__

Correct answer: (3)

In the recording, you will hear:

city, party, Anna

(21) 1. d__ 2. b__ 3.t__
(22) 1. h__ 2.n__ 3.p__
(23) 1. b__ 2. s__ 3.b__
(24) 1. h__ 2.n__ 3.s__
(25) 1. so__ 2. mada__ 3. exa__
(26) 1. wi__ 2. mou__ 3. nor__
(27) 1. wat__ 2. rea__ 3. fri__
(28) 1.happine__ 2. busine__ 3. orange__
(29) 1. noo__ 2. si__ 3.ca__
(30) 1. Engli__ 2. qui__ 3. Spani__

English tasks—

The written relatives task (morphological awareness)

Name: Class:

Examples:

(1) How fast can he _____ (runner)? Correct answer: run

(2) The nurse talked to the girl gently and _____ (kind). Correct answer: kindly

(3) He _____ (run) fast. Correct answer: runs

(4) John is _____ (tall) than Mike. Correct answer: taller

Questions:

Please write down the correct form of the given words in the blanks.

(1) Be _____ (care) with the glasses.

(2) Dogs are very _____ (friend) to People.

(3) My father is a good _____ (farm).

(4) It was _____ (possible) to sleep because of the noise.

(5) I _____ (like) walking and I hate camping.

(6) “Where are we going?” he asked _____ (polite).

(7) She is such a pleasant, _____ (help) child.

(8) We are reading a _____ (differ) book this week.

(9) Tom is a good boy. He listens to his teacher _____ (careful).

(10) Some animals are in great _____ (dangerous).

(11) Bruce often _____ (help) his parents do the farm work.

(12) You must practice _____ (speak) English every day.

(13) Jane is _____ (run) with her mother in the park.

(14) May I ask some _____ (question)?

(15) Today is _____ (hot) than yesterday.

(16) Jim has _____ (be) in Dalian for three days.

(17) It’s June 1st, it’s _____ (children) Day.

(18) Nancy _____ (pick) up strawberries on the farm last week.

(19) Lily and Lucy are my _____ (classmate).

(20) January is the _____ (cold) month in the year in Shenyang.

Appendix F: Chinese Tasks

Onset/ rime detection task (phonological awareness)

Name: Class:

声母测试： 请听录音，选出与其它两个字的声母不同的字。

例：1. __ǎn 2. __ào 3. __ēn 正确答案是:(3)

录音里播放的内容是：板 bǎn，抱 bào，喷 pēn

(1) 1. __én 2. __ǎo 3. __āo
(2) 1. __ēng 2. __ū 3. __āng
(3) 1. __ǎ 2. __ǔ 3. __ān
(4) 1. __én 2. __ǎo 3. __iáo
(5) 1. __āo 2. __āi 3. __ěi
(6) 1. __ǒu 2. __ùe 3. __ái
(7) 1. __án 2. __āo 3. __iú
(8) 1. __iān 2. __áo 3. __ì
(9) 1. __ǎo 2. __òng 3. __òu
(10) 1. __ì 2. __iǎo 3. __ī
(11) 1. __uāng 2. __àng 3. __āng
(12) 1. __ì 2. __àn 3. __èn
(13) 1. __èn 2. __án 3. __ù
(14) 1. __èng 2. __áo 3. __àng
(15) 1. __ī 2. __ǒu 3. __ào

韵母测试： 请听录音，选出与其它两个字的韵母不同的字。

例：1. t__ 2. m__ 3. r__ 正确答案是:(2)

录音里播放的内容是：谈 tán 猫 māo 然 rán

(16) 1. k__ 2. m__ 3. f__
(17) 1. k__ 2. t__ 3. d__
(18) 1. ch__ 2. m__ 3. ch__
(19) 1. k__ 2. h__ 3. b__
(20) 1. k__ 2. k__ 3. t__
(21) 1. n__ 2. n__ 3. n__
(22) 1. l__ 2. t__ 3. sh__
(23) 1. z__ 2. j__ 3. x__
(24) 1. l__ 2. t__ 3. d__

(25) 1. d__ 2. q__ 3. ch__
(26) 1. n__ 2. y__ 3. t__
(27) 1. ch__ 2. ch__ 3. zh__
(28) 1. n__ 2. l__ 3. m__
(29) 1. ch__ 2. zh__ 3. ch__
(30) 1. h__ 2. f__ 3. r__

Chinese tasks

Derivational morphology task (morphological awareness)

Name: Class:

请根据句子内容，给括号内的字或词添加词缀后，将正确的词填入句子。
（常用词缀有：者，化，型，感，界，法，员，版，学，民，家，客，件，坛，师，手，气，户，迷，星等）

例：小明长大后，想成为_____（科学）。[答案：科学家]

1 产品物美价廉,才能打动_____（消费）的心。
2 这种血压器的_____（用）简单,一般人就能自行操作。
3 截至 2020 年 6 月，我国_____（网）规模 9.40 亿。
4 于浴室内燃点此香氛油，散发花果_____（香）。
5 大楼_____（住）必须特别留意,当有人按门铃时,一定要确认他的身份才可开门,以免引狼入室。
6 这个_____（歌）最新的唱片使她荣升到了排行榜的顶部。
7 一个偶然的机会,他结识了这位体育_____（明）。
8 她断言他的这一_____（说）是谎言。
9 如果电子_____（邮）的标题有问题或者匪夷所思，就不要打开附件。
10 他就是这栋新购物中心的_____（设计）。
11 球赛虽已结束，但_____（球）们仍意犹未尽，兴高采烈地谈论着刚才比赛的情况。
12 这位_____（画）出类拔萃，画的人物都栩栩如生。
13 深入了解_____（黑）技术，作到知彼知己，化害为利，对于保证和促进网络安全是十分有益的。
14 东方神秘而璨烂的文明令西方_____（艺术）叹为观止。
15 通知上,学校的美术特长班正在招收新_____（学）。

Appendix G: Korean Tasks

The phoneme detection task (phonological awareness)

Name: Class:

례를 따라 요구에 맞게 정답을 찾은후 정답에 대응하는 수자에 동그라미를 치세요.

자음 찾기

례: 1. 마 2. 대 3. 모 정답: (2)

(1) 1. 그 2. 느 3. 기

(2) 1. 뿌 2. 뽀 3. 써

(3) 1. 되 2. 래 3. 례

(4) 1. 먀 2. 므 3. 쇼

(5) 1. 저 2. 파 3. 펴

례: 1. 먼 2. 문 3. 견 정답: (3)

(6) 1. 맛 2. 빗 3. 멋

(7) 1. 칼 2. 콜 3. 툴

(8) 1. 껑 2. 땅 3. 꿍

(9) 1. 찬 2. 돈 3. 천

(10) 1. 강 2. 성 3. 송

모음 찾기

례: 1. 불 2. 볼 3. 물 정답: (2)

(11) 1. 나 2. 거 3. 더

(12) 1. 랴 2. 며 3. 벼

(13) 1. 소 2. 조 3. 교

(14) 1. 추 2. 류 3. 수

(15) 1. 패 2. 채 3. 데

(16) 1. 외　　2. 쥐　　3. 뵈

(17) 1. 강　　2. 송　　3. 농

(18) 1. 얼　　2. 를　　3. 설

(19) 1. 월　　2.왕　　3. 완

(20) 1. 둡　　2. 든　　3. 둥

받침 찾기

례: 1. 군 2. 전 3. 숨 정답:③

(21) 1. 판　　2. 찬　　3. 감

(22) 1. 겁　　2. 섬　　3. 덥

(23) 1. 몰　　2. 롯　　3. 솟

(24) 1. 식　　2.석　　3. 상

(25) 1. 존　　2. 줄　　3. 전

(26) 1.창　　2. 총　　3. 첫

(27) 1. 닭　　2. 삶　　3. 흙

(28) 1. 퀑　　2. 좔　　3. 팽

(29) 1. 넣　　2. 좋　　3. 팍

(30) 1. 촬　　2. 훨　　3. 웬

Derivational morphology task (morphological awareness)

Name:　　Class:

례: 철호는 커서 _____ 가(이) 되려고 한다. (과학)　정답:과학자

아래 주어진 단어와 접사들로 새 단어를 만든후 구절내용에 맞는 단어를 빈칸에 써넣으세요.

(헛-, 햇-, 날-, 풋-, -개, -하다, -관, -실, -사 , -자, -꾼)

1 새로 나온 이 상품은 _____ 돋친듯이 잘 팔려나갔다. (날다)

2 그의 생활은 생각보다 _____ (행복).

3 환자를 살리려던 의사들의 노력은 _____로 끝났다. (수고)

4 _____은 관람자들로 꽉 찼다. (영화)

5 복도 맨 끝에 _____이 있다. (화장)

6 _____는 온도계로 체온을 측정하였다. (간호)

7 _____ 시험에서 100 점을 받았다. (수)

8 광고는 _____의 구미를 돋운다. (소비)

9 _____들의 포장된 말에 넘어가지 않았다. (장사)

10 아버지는 _____으로는 밥을 짓고 구곡으로는 떡을 하셨다. (곡식)

11 이 _____에는 많은 도서가 소장되여 있다. (도서)

12 처음에는 익지도 않은 _____를 어떻게 먹느냐고 하던 언니가 정작 육회를 제일 많이 먹었다. (고기)

13 _____는 솜씨를 십분 발휘하여 진수성찬을 만들었다. (료리)

14 최근에 떠돌던 끔찍한 이야기들은 모두 _____으로 밝혀졌다. (소문)

15 나뭇가지에 앉아있던 까치가 퍼드덕 날자 작은 _____ 하나가 떨어졌다. (사과)

Appendix H: Information Sheets

INFORMATION SHEET

(for the parents/guardians of *Mandarin monolingual group*)

Title: Is English Language Learning Easier for Mandarin or Mandarin/Korean Speakers?

Description of the study

This study is called "Is English Language Learning Easier for Mandarin or Mandarin/Korean Speakers?", and will investigate language awareness in Korean, Mandarin, and English. This project is supported by Flinders University's College of Nursing and Health Sciences.

Purpose of the study

This study aims to find out whether being monolingual or bilingual will help with learning English.

What will I be asked to do?

Your child is invited to participate in studying the influence of your first language, Mandarin, on English learning. If so, your child will answer a questionnaire and complete four tasks in Mandarin and English. The questionnaire will take about 30 minutes and the four tasks will take 30 minutes, a total of 60 minutes.

What benefit will I gain from being involved in this study?

The educators and policymakers will understand how English learning is affected by knowing one or two other languages.

Will I be identifiable by being involved in this study?

We do not need your child's name and the tests will be anonymous. Your child's data will be anonymised. The educators will not know the individual results, because the data will be processed in Australia, and the comments will not be linked directly to your child. All information and results obtained in this study will be stored in a secure way, with access restricted to relevant researchers.

Are there any risks or discomforts if I am involved?

The researcher anticipates few risks from your child's involvement in this study; however, since the students will be required to do the tasks in different languages and have to switch languages in a short

time. This might cause some students to feel discomfort because they need to use specific language, which may be not their preferred language. If any emotional discomfort is experienced, please go to the office of the school psychologist for the support that will be provided free of charge. If you have any concerns regarding anticipated or actual risks or discomforts, please raise them with the researcher.

How do I agree to participate?

Participation is voluntary. Your child may answer 'no comment' or refuse to answer any questions, and your child is free to withdraw from answering the questionnaire or doing tasks at any time without consequences. A consent form accompanies this information sheet. If you agree to let your child participate, please read, and sign the form and give the form to your child.

How will I receive feedback?

On project completion, the outcomes of the project will be given to all participants via email.

Thank you for taking the time to read this information sheet, and we hope that you will accept our invitation to be involved.

INFORMATION SHEET

(for the parents/guardians of the *Korean-Mandarin bilingual group*)

Title: Is English Language Learning Easier for Mandarin or Mandarin/Korean Speakers?

Description of the study

This study is called "Is English Language Learning Easier for Mandarin or Mandarin/Korean Speakers?", and will investigate language awareness in Korean, Mandarin, and English. This project is supported by Flinders University's College of Nursing and Health Sciences.

Purpose of the study

This study aims to find out whether being monolingual or bilingual will help with learning English.

What will I be asked to do?

Your child is invited to participate in studying the influence of your first languages (Mandarin, Korean) on English learning. If so, your child will answer a questionnaire and complete six tasks in Korean,

Mandarin, and English. The questionnaire will take about 30 minutes, and the six tasks will take 50 minutes, a total of 80 minutes.

What benefit will I gain from being involved in this study?

The educators and policymakers will understand how English learning is affected by knowing one or two other languages.

Will I be identifiable by being involved in this study?

We do not need your child's name, and the tests will be anonymous. Your child's data will be anonymised, and the educators will not know the individual results because the data will be processed in Australia, and the comments will not be linked directly to your child. All information and results obtained in this study will be stored in a secure way, with access restricted to relevant researchers.

Are there any risks or discomforts if I am involved?

The researcher anticipates few risks from your child's involvement in this study; however, since the students will be required to do the tasks in different languages and have to switch languages in a short time. This might cause some students to feel discomfort because they need to use a specific language that may not be their preferred language. If any emotional discomfort is experienced, please go to the office of the school psychologist for the support that will be provided free of charge. If you have any concerns regarding anticipated or actual risks or discomforts, please raise them with the researcher.

How do I agree to participate?

Participation is voluntary. Your child may answer 'no comment' or refuse to answer any questions, and your child is free to withdraw from answering the questionnaire or doing tasks at any time without consequences. A consent form accompanies this information sheet. If you agree to let your child participate, please read, and sign the form and give the form to your child.

How will I receive feedback?

On project completion, the outcomes of the project will be given to all participants via email.

Thank you for taking the time to read this information sheet, and we hope that you will accept our invitation to be involved.

Appendix J: English Final Exam Content

(Test duration: 100 minutes. Total score: 100 points.)

Part I Multiple choice (38 points)

1. Fill in the blanks, single choice. (10 × 0.5, 5 points)
2. Fill in the blanks according to the passage's content, single choice. (15 × 1, 15 points)
3. Read the three comprehension reading articles, single choice. (12 × 1.5, 18 points)

Part II Non-multiple choice (62 points)

4. Answer the questions. (5 × 2, 10 points)
5. Read the passage, then fill in the blanks. (7 × 1, 7 points)
6. Read the two comprehensive reading articles. (10 × 2, 20 points)
7. Complete the two reading and expression sections. (25 points)
    a. Section A: Read the passage and choose the suitable words or phrases to fill in the blanks. (5 points)
    b. Section B: For the topic 'My favourite hobby is _____', write a presentation that describes the things you like to do. (80–100 words) (20 points)

The steps and key points are as follows:

1. Choose a topic and explain the reasons for the choice of the topic.
2. Narrate the topic.
3. Express a story or an experience related to the topic.

Requirements:

1. You should complete the title (reference words are playing sports, listening to music, reading, drawing, studying English, etc.)
2. You should use clear handwriting, cover all the key points with a logical flow and use correct and standard language.
3. You are encouraged to express your true feelings but focus on the topic.
4. You can write your own experience, a story that is not real, or refer to the contents of the reading material, but you should not use the original sentences in the articles.
5. You should not use school and students' names in the composition.

Appendix K: Missing Value Analysis

Univariate statistics	*N*	*M*	*SD*	Missing		No. of extremes	
				Count	%	Low	High
Age	271	13.932	.41733	0	0	0	2
Gender	271	1.45	.498	0	0	0	0
English phonological awareness	270	77.716	16.8530	1	.4	9	0
English morphological awareness	271	69.424	64.1259	0	0	0	1
Mandarin phonological awareness	271	87.109	13.9358	0	0	14	0
Mandarin morphological awareness	271	88.192	17.1837	0	0	24	0
English academic score	271	54.768	23.1538	0	0	0	0
Mandarin performance	271	60.311	16.1463	0	0	0	0
Maths performance	270	59.696	24.0381	1	.4	0	0
Mother's language	271	1.30	.718	0	0	—	—
Father's language	271	1.32	.732	0	0	—	—
Mother's occupation	271	.61	.490	0	0	0	0
Father's occupation	271	.74	.441	0	0	0	0
English use frequency	271	2.51	3.431	0	0	0	14
Mandarin use frequency	271	30.55	9.061	0	0	2	0
Mother's highest level of schooling	271	2.99	.931	0	0	0	0
Father's highest level of schooling	271	2.94	.890	0	0	0	0
English learning began	271	2.38	1.072	0	0	0	0
Have siblings or not	264	.44	.497	7	2.6	0	0
Number of siblings	264	.46	.543	7	2.6	0	0
Live with the grandparents or not	264	.28	.450	7	2.6	0	0
Overall language use_Mandarin	264	4.02	.898	7	2.6	1	0
Overall language use_English	264	.72	.887	7	2.6	0	0
Primary school language	264	1.13	.481	7	2.6	—	—
Out-of-school English tutoring	270	2.18	1.159	1	.4	0	0
Willing to learn English	270	.90	.296	1	.4	—	—
Importance of Mandarin	270	.99	.086	1	.4	—	—
Mandarin effect	269	.80	.398	2	.7	—	—
Korean phonological awareness	159	94.969	13.0662	112	41.3	21	0
Korean morphological awareness	159	63.187	25.8725	112	41.3	15	0
Korean performance	160	61.813	16.0626	111	41.0	3	0
Korean use frequency	160	16.49	7.618	111	41.0	0	1
Korean kindergarten	160	.81	.392	111	41.0	—	—
Importance of Korean	159	.92	.275	112	41.3	—	—
Korean effect	159	.54	.500	112	41.3	0	0

Note. Number of cases outside the range (quartile 1 − 1.5*interquartile range, quartile 3 + 1.5*interquartile range).