HERITAGE AND L2 LEARNERS' ACQUISITION OF KOREAN IN TERMS OF IMPLICIT AND EXPLICIT KNOWLEDGE

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ABSTRACT

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Recent research has demonstrated that L2 learners and heritage speakers might have two different profiles in terms of their syntactic, morpho-syntactic, and lexical-semantic knowledge of a target language (Montrul, 2004, 2006, 2010; Montrul, Foote, & Perpinan, 2008). However, the most influential of the major studies have been limited to Spanish. To expand our understandings of the incompleteness of heritage and L2 language learning from implicit and explicit knowledge perspectives (Bowles, 2011), this study investigated the differences and/or similarities between two learner groups of Korean in their knowledge of 17 target structures. One hundred fourteen learners were recruited in three groups: 65 L2 learners, 38 heritage language (HL) learners, and 11 native speakers of Korean. This research utilized an elicited imitation test (EIT), a narrative test, and an untimed aural Grammaticality Judgment Test (GJT) to measure implicit knowledge, and a metalinguistic knowledge test, a written untimed GJT, and a C-test to gauge explicit knowledge of the 17 Korean target structures.

The results of a Confirmatory Factor Analysis (CFA) demonstrated that the EIT and the aural GJT significantly explained the participants' implicit knowledge of the target structures, whereas the written GJT, metalinguistic test, and C-test accounted for their explicit knowledge of the grammar topics. Further analyses showed that HL learners outperformed L2 learners when the scores of the EIT and aural GJT were combined,

highlighting HL learners' superior implicit knowledge of the target structures. Regarding explicit knowledge of the target structures, L2 learners showed significantly better performances in the combined scores of the written GJT, metalinguistic knowledge test, and C-test. However, the L2 and HL groups did not demonstrate significant differences for the aural and written GJTs. Overall, the results of this study showed that 1) the HL and L2 learners' linguistic knowledge of Korean have significantly different knowledge profiles in terms of the implicit-explicit dichotomy of knowledge, and 2) in addition to a time constraint and grammaticality, manipulating testing mode—aural or written—could be another valid factor to measure implicit and explicit knowledge relatively separately.

Keywords: implicit knowledge, explicit knowledge, heritage language learners, Korean, aural GJT

To HIM

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CHAPTER 1. LITERATURE REVIEW

1.1. Introduction

The topics of implict and explicit knowledge have received attention from researchers in Second Language Acquisition (SLA) in various areas. How to measure them has been an important topic, and how the two types of knowledge representations have been varied according to learner groups—i.e., HL learners and L2 learners—has been another important topic. In addition, for understanding the construct of L2 learners' linguistic knowledge, a two-factor model for implicit and explicit knowledge, and a one-factor model for automatized explicit knowledge have been studied by researchers. However, the jury is still out there concerning which model is more accurate. For the first issue of various measures, this study will discuss one additional element—modality—as another potential criteria, and one additional test, C-test, as a potential measure of explicit knowledge. For the second topic of varied learner groups and implicit and explicit knowledge, this study covers a HL learner group of Korean to present a comprehensive picture about implicit and explicit learning and knowledge of various learners. Based on the data set of the current study, a two-factor model seems to obtain supports than a one-factor model concerning the issue of the valid model of L2 learners' knowledge. For pedagogical implications, this study will direct attention to similarities and differences between HL and L2 learner groups.

1.2. Implicit and explicit learning and knowledge

Implicit and explicit learning and knowledge have been investigated in many studies (DeKeyser, 2003; DÖ rnyei, 2009; N. Ellis, 1994; R. Ellis, 2004, 2005; R. Ellis, Loewen, Elder, Erlam, Philp, & Reinders, 2009; Hulstijn, 2005; Godfroid, Loewen, Jung, Park, & Gass, 2015; Reber, 1993; Rebuschat & Williams, 2009) to investigate the nature and processing of language learning, the relationship between implicit/explicit distinction, and valid measures of implicit and explicit knowledge. Reber defined implicit learning as "the acquisition of knowledge that takes place largely independently of conscious attempts to learn and largely in the absence of explicit knowledge about what was acquired" (Reber, 1993, p. 5). N. Ellis also emphasized that implicit learning involves unconsciousness as "acquisition of knowledge about the underlying structure of a complex stimulus environment by a process which takes place naturally, simply and without conscious operations" (N. Ellis, 1994, p. 1). He also suggested that implicit knowledge "attainment can thus take place implicitly (a nonconscious and automatic abstraction of the structural nature of the material arrived at from experience of instances)" (N. Ellis, 1994, p. 1). Dörnyei (2009) and R. Ellis (2009) have also supported this idea.

In comparison, explicit learning is defined as "a more conscious operation where the individual makes and tests hypotheses in a search for structure" (N. Ellis, 1994, p.1), and explicit knowledge is attained "explicitly through selective learning (the

learner searching for information and testing hypotheses), or because we can communicate using language, explicitly via given rules (assimilation of a rule following explicit instruction)" (N. Ellis, 1994, pp. 1-2). R. Ellis (2004) also suggested a working definition of explicit knowledge as "The conscious awareness of what a language or language in general consists of and/or of the roles that it plays in human life" (p. 229). In the two definitions, it is commonly suggested that explicit learning involves consciousness and awareness. N. Ellis (1994), Dorynei (2009), and R. Ellis (2009) agreed that explicit knowledge is obtained from explicit learning.

In terms of implicit and explicit *learning and knowledge*, several characteristics have been investigated in previous studies. In terms of primacy and a default mechanism, implicit knowledge appears first and explicit knowledge later. Initially, L1 speakers acquire their language intuitively and utilize implicit knowledge to tell what is possible and impossible linguistically. At the age of around five, they are able to analyze L1 and develop explicit knowledge, especially metalinguistic knowledge, using conscious awareness about grammaticality of language structures "through making everything clearly and explicitly" (Karmiloff-Smith, 1979, p. 115). However, L1 speakers' implicit knowledge from implicit learning is primary and the default system (Reber, 1993) and L1 speakers tap into implicit knowledge for spontaneous production (R. Ellis, 2009). Like L1 speakers, L2 learners' default L2 production depends on implicit knowledge, but difficulty in performing an on-line task may cause them to

utilize explicit knowledge when they lack enough implicit knowledge (R. Ellis, Loewen et al., 2009).

Concerning awareness, implicit learning entails acquisition that occurs at an unconscious, lack-of-awareness level (Reber, 1993) and in unintentional and meaning-focused conditions (Rebuschat & Williams, 2009). Explicit learning, on the other hand, involves conscious awareness with an intention to find regularities and memorization (Hulstijn, 2005). Verbalizability—i.e.—self-reporting, is another criterion. Implicit knowledge, which learners acquire without awareness, is used without being known, therefore, it cannot be verbalized. In comparison, explicit knowledge, which results from a conscious and analyzing process, can consciously be applied and verbalized entailing at least some degree of metalinguistic knowledge. Therfore, it is suggested that learners are able to verbalize a subset of their explicit knowledge, even if they are not likely to verbalize the entire contents of it with proper metalanguage (R. Ellis, 2009).

In terms of processing and accessibility, explicit learning requires effort and strategic expertise, while implicit learning is an automatic process (Dorynei, 2009; R. Ellis et al., 2009). In other words, explicit knowledge is accessible through controlled processing, whereas implicit knowledge is accessible through procedural processing (Dörnyei, 2009). Therefore, implicit knowledge is available for fluent, spontaneous use of language, whereas explicit knowledge is accessible through monitored control in planned usages of language. However, the controlled vs. automatic types of processing

and the accessibilites of the two types of knowledge can be measured from their speeds. The boundaries of implicit knowledge, automatized explicit knowledge, and explicit knowledge have been blurry, due to: 1) proficient L2 learners' practice and speeded-up processing of information, and 2) lack of proper measures for the implicit and explicit knowledge. For example, DeKeyser (2003) has suggested that explicit knowledge can be fully automatized and functionally equivalent to implicit knowledge. This raises an important question of how to differentiate automatized explicit knowledge from implicit knowledge in terms of accessibility, processing, and even learning. This question makes researchers keep speculating on theories of interface between the two types of knowledge (DeKeyser, 2003; Hulstijn, 2002; N. Ellis, 2005).

The implicit learning mechanism is also different from the explicit learning mechanism in terms of variability, consistency, and certainty (R. Ellis, 2005, 2009). As previously suggested, the implicit learning system is primary and default; the majority of L1 competence depends on implicit learning and implicit knowledge. In addition to this, when the remarkable similarities of L1 speakers in their end-state of L1 acqusition are considered, it is reasonable to suggest that their implicit knowledge plays an important role in L1 speakers' homogeneity in L1. In fact, implicit learning is less subject to learner-to-learner variation or to period-to-period variation across a life span of learners than explicit learning. Therefore, individual differences such as IQ and aptitude do not influence the implicit learning system of learners as well as they affect

the explicit learning system (Dörnyei, 2009; Robinson, 2005). This is based on the postulation that explicit learning involves standard "smartness" because it requires elaboration and deep processing of the task (Dörnyei, 2009; N. Ellis, 2005; Robinson, 2005). Thus, explicit learning ability might be correlated with learners' general cognitive capacity, resulting in much variability between individuals. However, for less proficient L2 learners in instructional contexts, their implicit knowledge should be limited compared to their explicit knowledge. In this case, less variability in implicit knowledge between learners and more certainty in implicit knowledge might not be relevant. Instead, their explicit knowledge that depends on their invididual differences (IDs) counts in instructional settings.

Researchers in SLA have been interested in how both types of representations of knowledge are processed, interacted, and related to pedagogical implications. It has been suggested that even though learners cannot use implicit and explicit knowledge concurrently due to their distinctive natures, these two types of knowledge and cognitive processing may interact in a reasonable degree at the level of performance (Dörnyei, 2009; R. Ellis, 2004; Ellis et al., 2009). In addition to their interaction at the level of language use, researchers in SLA and neurocognition are especially interested in the possibility of conversions from one type of knowledge into the other—i.e.—interface between the two types of knowledge (DeKeyser, 2003; N. Ellis, 2005; R. Ellis, 2005, 2009; Krashen, 1981; Paradis, 2009; Ullman, 2001, 2004).

There are three major views about the interface of two types of knowledge and their views entail different pedagogical implications. The noninterface position assumes an absolute distinction between implicit and explicit knowledge (Hulstijn, 2005; Krashen, 1981; Paradis, 2009). There is no converting explicit knowledge directly into implicit knowledge, and vice versa; the two types of knowledge are not influenced by each other. According to this position, the implicit learning situation should be encouraged for the attainment of more implicit knowledge. The reason is that implicit knowledge is a primary factor in explaining language competence and implicit knowledge is obtained from implicit learning. In this perspective, communicative tasks should be encouraged for automatic and spontaneous learning, whereas tasks to enhance metalinguistic knowledge in teacher-centered learning should be discouraged (Krashen, 1981).

The strong interface position claims that even though implicit knowledge and explicit knowledge are two distinct systems, learned explicit knowledge, such as grammatical regularities, can be converted to implicit representation. This transformation is possible through communicative practice and use (DeKeyser, 1998). Likewise, conversion of implicit knowledge to explicit knowledge is possible through the process of conscious reflection and analysis. At the neural level, this conversion was explained using strengthening and weakening of declarative memory (DM) and procedural memory (PM) networks. Crowell (2004) suggested (as cited in Ellis, 2009, p.

22) that the conversion of explicit knowledge to implicit knowledge in the strong-interface position might be a strengthening of connections in the procedural network. This occurs with a weakening of connections in the declarative network, which leads to the proceduralization of declarative knowledge. However, it is not clear what conversion of two separate knowledge systems exactly means (Dörnyei, 2009). Pedagogically, in this position, instruction receives a strong support, and form-focused instruction as well as meaning-focused activities finds essential roles in SLA.

Last, the weak interface position puts restrictions on improving learners' implicit knowledge through explicit learning. For the transformation, learners should be ready developmentally and psychologically. Moreover, explicit learning only facilitates implicit learning by promoting controlled practice, but does not change the natural learning sequence of implicit learning processes, nor does it lead to implicit knowledge (Ellis, 2009). This suggests that explicit knowledge contributes indirectly to implicit knowledge by promoting certain processes where implicit learning can occur (Dörnyei, 2009). This guarantees that implicit and explicit learning processes work in concert. Pedagogically, the magnitude of restrictions and degrees of indirect contributions should be investigated to assess the exact role of instruction in enhancing implicit knowledge.

The issue of interface requires a great deal of further research at the levels of psychology, neurocognition, and behavioral studies. In psychology and neurocognition, there is another strong and related distinction between declarative memory (DM) and

procedural memory (PM) (Anderson, 1983; Paradis, 2009; Ullman, 2001). In nature, DM is factual and PM is rule-based. Concerning their access and processing, DM is accessed slowly, whereas PM is highly automated, and therefore, quickly accessed. The DM and PM networks should be regarded as dissociated, but functionally cooperative. Regarding the relationship of DM and PM with implicit and explicit knowledge, as it manifests in the intertwined relationships between SLA, cognitive psychology, and neuroscience, DM and explicit knowledge have been viewed as parallel, as have PM and implicit knowledge (DeKeyser, 1997; Dörnyei, 2009; R. Ellis, 2005; Hulstijn, 2002; Paradis, 2004, 2009; Ullman, 2001, 2004, 2005). Erçetin and Alptekin (2013) also suggested that declarative/procedural (DP) memories have a complementary relationship with the implicit and explicit knowledge systems that are embedded in DM and PM systems. Therefore, in the language learning of late L2 learners, it is natural for conscious awareness and controlled processing to govern the ways in which explicit learning and DM processing take place.

Ullman (2001) presented the declarative/procedural (DP) model and suggested that the interface between the two systems might be impossible due to a disparity between memory systems and types of processing for adult L2 learners. L1 speakers' learning procedure activates both declarative and procedural components of the memory system. However, late L2 learners, whose age of onset (AoO) is after puberty, experience a continuing weakness of PM and a strengthening of DM (Ullman, 2001).

This change differentiates late L2 learners' processing mechanisms from L1 acquisition. In other words, L1 speakers process morphosyntactic and phonological information of L1 implicitly through the procedural system, whereas lexical and semantic information through the declarative system. However, L2 learners' strengthened declarative system and weakened procedural system seem to find a different optimum processing mode from that of L1 speakers. Since the declarative mechanism is associated with conscious awareness and controlled processing in an instructional setting, adult L2 learners seem to process all L2 linguistic information—such as morphosyntactic, phonological, lexical, and semantic information—explicitly. Therefore, it is more plausible that the learning of adult L2 learners results in more declarative and explicit knowledge due to their highly controlled, conscious, and monitored learning context in a grammar-oriented class.

However, Ullman (2001, 2004, 2005) also suggests that due to L2 learners' practice and use in an L2, the DM-based processing of explicit knowledge is expected to be gradually replaced by the PM-based, automatic use of implicit knowledge. In other words, from extensive use, L2 learners' mismatched, but strengthened DM for morphosyntactic and phonological associations slowly prepares for the PM-based procedure (Erçetin & Alptekin. 2013). This means that L2 learners' PM system becomes more available to acquire grammatical knowledge, resulting in better learning in PM, and leading to higher proficiencies in L2 learners. Based on the L2 learners' similar neurocognitive patterns to those of L1 speakers, Ullman (2005) suggests that this

advanced level of L2 knowledge was almost like that of L1 speakers in terms of grammatical dependence on the PM system, and depended on the nature of the L2 exposure and instrinsic procedural learning abilities. This suggests that at the processing level, highly proficient L2 learners experience qualitative change in the type of information processing. However, based on a lack of enough evidence concerning their direct interface, this change of L2 proficient learners' type of processing does not necessarily mean a direct conversion from explicit knowledge into implicit knowledge, especially due to the distinct nature of DP memory networks that underpin implicit and explicit knowledge systems (Ullman, 2001, 2004). More studies at the behavioral level should be conducted as a preparatory step for investigating the interface issue. In this context, SLA research has seen quite a few important studies on valid measures of implicit and explicit knowledge.

1.3. Measurement of implicit and explicit knowledge

To gain insight in the nature and operationalization of the two distinct types of linguistic knowledge, a handful of recent studies have investigated possible measurements with high construct validity (Bowles, 2011; R. Ellis, 2005; R. Ellis, et al., 2009; Kim & Nam, 2016; Loewen, 2003; Spada, Shiu, & Tomita, 2015; Suzuki & DeKeyser, 2015; Vafaee, Kachinske, & Suzuki, 2016; Zhang, 2015). The following criteria have been proposed as characteristics or qualities of implicit knowledge:

absence of awareness, time pressure, focus on meaning, consistent responses, certainty about correctness/incorrectness of the responses, no use of metalinguistic knowledge, higher degree of using 'feel', and learnability for children (R. Ellis, 2005, 2006). As criteria for explicit knowledge, the following have been proposed: higher degree of using 'rules', no time pressure, focus on form, variable responses, uncertainty about correctness/incorrectness of the responses, use of metalinguistic knowledge, and learnability for learners with form-focused instruction (R. Ellis, 2005, 2006). Based on these criteria, elicited oral imitation tests (EIT), oral narrative tests, and timed GJTs are interpreted as better measures of implicit grammar knowledge,while untimed GJTs and metalinguistic knowledge tests are regarded as better measures of explicit grammar knowledge with the highest validity for learners of English as L2 (Loewen, 2003; R. Ellis, 2005, R. Ellis, et al., 2009), as well as for learners of Spanish as a HL and L2 (Bowles, 2011).

Time pressure has been found to be an important factor in distinguishing measurements of implicit and explicit knowledge in various tasks (Bowles, 2011; R. Ellis, 2005; Godfroid et al., 2015; Kim & Nam, 2016; Spada et al., 2015; Zhang, 2015). In their studies, time availability meant whether or not learners were under pressure to conduct a task spontaneously, or whether or not they had an opportunity to plan their response carefully before responding. Operationally, to have or not to have time available involved distinguishing tasks that were demanding on learners' short-term

memories from those that allowed L2 learners to utilize their L2 processing capacity fully and comfortably (R. Ellis, 2009, p. 38). Accordingly, three tests—an EIT, oral narrative, and timed GJT—incorporated time constraints, and all of them loaded on the implicit knowledge factor, while the two unpressured tests—an untimed GJT and metalinguistic test—loaded on the explicit knowledge factor (R. Ellis, 2009, p. 60)

An EIT requires learners to focus on meaning rather than form and time pressure, which is inherent to an online and spontaneous natural situation of language use. An EIT that is also reconstructive in nature would have certain features that distinguish it from a test that might allow learners to rely on simple rote repetition of target stimuli. To avoid simple rote repetition and to enhance meaning-focused and spontaneous production, the test needs to include some delay between the presentation and repetition of the stimulus. The EIT is inherently time pressured in that learners listen to each statement only once in real time, and the participants produce their ideas and repeat the statement in their own time, i.e., self-paced (Ellis, 2009, p.79).

Spada, Shiu, and, Tomita (2015) investigated the construct validity of an EIT as a measure of implicit knowledge. 73 EFL learners took part in the study which utilized an EIT, timed aural and written GJTs, a written error correction test (ECT) with three sections—identification, correction, and explanation—and an OPT. The passive construction was the target structure. The results from a factor analysis were that the EIT, timed aural, and timed written GJTs loaded highly onto a factor identified as

implicit knowledge, whereas all the sections in the ECT loaded on the other factor labeled explicit knowledge. The timed written GJT also loaded on explicit knowledge relatively highly, with a .51 loading. They suggested that the EIT was a valid measurement of implicit knowledge, and more studies would be necessary for better understanding of the construct validity of EITs as a measurement of implicit knowledge.

For the purpose of investigating if an EIT is a valid measure of implicit knowledge in a refined way, additional time pressure was added for further study. Kim and Nam (2016) added time pressure to the EIT to see if time pressure makes a difference to the validity of the EIT as a measure of implicit knowledge. 66 adult advanced EFL learners participated in the study. The authors replicated the tests and test content, and the same 17 English structures utilized by Ellis (2005). They manipulated the EIT with or without time constraint. The time limit for each stentence was calculated based on nine native speakers' time for production of each sentence without time pressure. The researchers produced a three-factor model—stronger implicit, weaker implicit, and explicit knowledge. The EIT, regardless of time pressure and grammaticality, measured stronger implicit knowledge. Their study suggests that the EIT is a valid measure of implicit knowledge regardless of time pressure embedded, confirming the previous studies of R. Ellis (2005) and Spada et al. (2015).

Gutiérrez' study (2012) suggested that the grammaticality of test items in written GJTs is a potential variable over time pressure for high construct validity in

separately measuring implicit and explicit knowledge of Spanish. In his study with 53 L2 learners of Spanish at low and high proficiencies, Gutiérrez (2012) utilized a self-paced PowerPoint-slide-show format in the timed GJT. The amount of time that the stimuli remained on the screen varied between 6 and 9 seconds. In the discussion section, he suggested that the grammatical sections in timed and untimed GJTs constitute good measures of implicit knowledge regarding 16 Spanish target structures. In comparison, the ungrammatical sections in timed and untimed GJTs and the metalinguistic knowledge test measured explicit knowledge with high validity. He maintained that grammatical and ungrammatical sentences might lead learners to tap two different knowledge representations. R. Ellis (2005) found that, depending on the tasks, grammaticality is important as well as time constraint. In his study, L2 learners' scores on grammatical items in the untimed GJT loaded on both the implicit and explicit knowledge factors. Thus, Ellis (2015) and Godfroid et al., (2015) excluded the grammatical items only in the untimed GJT as a measure of explicit knowledge; but in the timed GJT, no exclusion was required for the grammatical items. This seems to mean that time constraints play a role in measuring two types of knowledge separately, regardless of the grammaticality of items in the GJT. Since learners can tap either type of knowledge representation when they are given unlimited time, learners can use either type of grammar knowledge. In Ellis' study (2005), the L2 learners seemed to tap both implicit and explicit knowledge for judging the grammaticality of grammatical items

when there was no time pressure, but not for ungrammatical items. However, it is still unclear what variables influence learners to tap which knowledge for grammaticality judgment.

The effects of time constraint have been highlighted in comparisons between timed and untimed GJTs. In studies using L2 learners, significant differences have been found between the two tests, demonstrating the importance of time constraint for separate measures of implicit and explicit knowledge (Ellis, 2009). Bowles (2011) identified time pressure as the sole important factor for written GJTs—both grammatical and ungrammatical—for measuring implicit and explicit grammar knowledge separately. This supports Ellis' results in terms of timed GJTs, but not grammatical items in untimed GJTs. Her study deserves attention in that: 1) R. Ellis' study (2005) required grammaticality for the untimed GJT as a measure of explicit knowledge, and 2) Gutiérrez (2012) found that grammaticality is the important factor in distinguishing measures of two types of knowledge. Later, Zhang (2015) extended R. Ellis' and Bowles' results to Chinese learners of English as a foreign language. The study with 100 university-level students replicated the results of R. Ellis' study (2005) in that the EIT and timed GJT had high and significant loadings onto implicit knowledge, whereas ungrammatical items in the untimed GJT and metalinguistic test loaded onto explicit knowledge. Zhang's study also replicated Gutiérrez's study (2012) in that the EIT, and grammatical items in the timed and untimed GJTs loaded highly onto implicit

knowledge, whereas the metalinguistic knowledge test and ungrammatical items in the timed and untimed GJTs were loaded to explicit knowledge. This result emphasizes the importance of the grammaticality of GJT items for tapping implicit and explicit knowlege separately, but item grammaticality does not seem to override the validity of the EIT as a whole. Therefore, the total items of the EIT tap into implicit knowledge. Zhang's study (2015) also highlights and confirms R. Ellis' study (2005) that when learners answered GJT items under no time pressure, they tapped into either explicit or implicit knowledge freely, except when the items were ungrammatical. Therefore, ungrammatical items led the participants to tapping explicit knowledge.

The relationship between time pressure, grammaticality and accuracy should be clarified for better understanding the proper models for the two types of grammar knowledge. It has been supported that the learners recorded higher scores in grammatical sections than ungrammatical sections, regardless of the existence of time constraints (Gutiérrez, 2012; Loewen, 2009). When judging sentences in terms of grammaticality, learners engage in three processing operations: 1) understanding the meaning, 2) deciding whether or not there is something ungrammatical, and 3) identifying what is incorrect and why it is incorrect (Loewen, 2009; R. Ellis, 2005). According to this explanation, judging ungrammatical sentences requires at least one more operation, which results in lower accuracy (Gutiérrez, 2012; Loewen, 2009). However, this notion does not necessarily mean that judging ungrammatical sentences

requires more time. This was confirmed in Loewen's study (2009), where he found that grammatical sentences require more time than ungrammatical sentences. However, it is not clear how fast the three operations can occur. In other words, it should be clarified whether or not these three operations can indeed occur almost simultaneously and, if they can, in what context this is possible. Moreover, since Gutiérrez' study did not present response time for GJTs, it is hard to conclude at this point whether either the time restriction or the grammaticality of items are, in isolation, important factors for GJTs as measurements of implicit or explicit grammar knowledge.

In addition to time pressure and grammaticality, modality has also been investigated as a variable to explain learners' linguistic knowledge (Bialystok, 1979, 1982; Granena, 2012; Kim & Nam, 2016). The rationale has been that aurality and orality predispose learners' use of implicit knowledge. Granena (2012) utilized GJTs in different modalities to investigate implicit and explicit knowledge of learners of Spanish using three groups: L1 speakers, early L2 learners—age of onset (AoO) was from 3 to 6 years old—and late L2 learners, whose AoO was 16 years old or later. She utilized time pressure and modality to measure implicit and explicit knowledge of Spanish. To measure implicit knowledge, timed visual and timed auditory GJTs were utilized, whereas for explicit knowledge, untimed visual and untimed auditory GJTs were used. As in R. Ellis' study (2005), for the timed visual GJT, 120% of the time that L1 speakers spent in responding to each item was allocated. For the timed auditory GJT, 120% of the

time that L2 speakers spent in responding to each item was also allocated. This means that for the auditory GJT, not only modality but also time pressure was involved. For the untimed auditory GJT, each item was presented twice under no time pressure to respond. It was found out that the effect of modality was qualified by an interaction with group—L1 speakers and early L2 learners performed better on auditory tests than on visual tests, whereas late L2 learners performed better on visual tests than on auditory tests. The researcher suggested that instead of using the timed auditory GJT, a natural auditory GJT—presenting the sentence only once without time pressure—might be a better measure of implicit knowledge of Spanish (Granena, 2012).

Kim and Nam (2016) conducted another study about the effects of test modality. They employed 17 English structures, which were selected based on difficulty, acquisition timing in the developmental process, pedagogical timing, and linguistic aspects of the structures (R. Ellis, 2005). 66 adult advanced EFL learners participated in the study. The researchers manipulated modality for the timed GJT, aural, and written GJTs. As previously mentioned, a three-factor model resulted—stronger implicit, weaker implicit, and explicit knowledge. The aural GJT with time pressure measured both stronger and weaker implicit knowledge. In comparison, the timed written GJT and timed grammatical aural GJT measured weaker implicit knowledge. Finally, the metalinguistic test measured explicit knowledge. They concluded that the timed GJT in aural and written mode measured weaker implicit knowledge. This study suggests that a

continuum should be utilized to explain the two types of knowledge and depending on the measurements, implicit knowledge can be more specified. However, it is difficult to assess the effectiveness of modality as a factor in determining valid measures of implicit and explicit knowledge due to the fact that time constraint was also embedded in the aural and written GJTs. Therefore, it is difficult to tease apart the influence of time constraint from that of modality in the model. Aural GJTs with a natural time constraint and written GJTs without time constraint might measure implicit and explicit knowledge effectively as measures with high validities.

Two studies are noteworthy in that they challenge the findings of previous research by introducing new measures of implicit knowledge. First, Suzuki and DeKeyser (2015) recruited 63 advanced Chinese learners of Japanese as L2. Five particle-related structures in Japanese were selected. The researchers developed an EIT with a built-in word monitoring task and they labeled it an EIM task. The EIT scores were positively correlated with metalinguistic knowledge, not with the probabilistic serial reaction time (SRT) task scores, which was supposed to measure learners' implicit sequence learning ability. In contrast, the word monitoring (WM) test scores were not correlated to metalinguistic knowledge, but with SRT scores among L2 learners with longer residence in Japan. Based on these results, the authors suggest that the EIT measure automatized explicit knowledge, not implicit knowledge. A couple of issues should be addressed concerning the EIM task. First, the participants were instructed to

convert ungrammatical sentences into grammatical sentences. This could have predisposed learners toward tapping explicit knowledge, making them focus on grammar in an analytical way. Second, their EIM task was different from the EITs utilized in previous research in that the WM test was embedded in the EIM task. Therefore, it is difficult to compare DeKeyser and Suzuki's result directly with those in previous research. In this case, a claim is possible that even if the EIM was highly correlated with the metalinguistic test, this does not necessarily mean that the EITs utilized in previous research would have correlated with the metalinguistic test. In addition, the time pressure learners had before they produced imitation sentences was a maximum of eight seconds for every sentence, which may have arguably enabled them to tap explicit knowledge.

Second, Vafaee, Kachinske, and Suzuki (2016) utilized written GJTs, a metalinguistic test, a self-paced reading (SPR) task, and a word-monitoring task (WMT) to measure 79 advanced L2 learners' implicit and explicit knowledge of English. Four target structures—present hypothetical conditional, third-person *s*, simple past/present perfect, and mass/count nouns—were selected due to the difficulty of mastering them and their easiness to incorporate in the tests. The researchers claimed that written GJTs, even with time constraint, might be too coarse to measure implicit knowledge. Instead, they presented an SPR task and a WMT. A series of confirmatory factor analyses demonstrated that the timed, ungrammatical GJT, the untimed, ungrammatical written

GJT, and the metalinguistic test measured explicit knowledge, whereas the SPRT and WMT measured implicit knowledge. They thus concluded that GJTs with/without time pressure and/or grammaticality of the sentences were not fine-grained measures of implicit knowledge. Instead, the GJTs measured two different levels of explicit knowledge.

It seems that there has not been an agreement on valid measures of implicit knowledge in SLA. However, one measure of explicit knowledge has been confirmed in all previous test validity research. Regardless of the number of factors in the final model, metalinguistic tests highly loaded on explicit knowledge in previous research (Bowles, 2011; Ellis, 2005; Kim & Nam, 2016; Suzuki & DeKeyser, 2015; Vafaee, Kachinske, & Suzuki, 2016; Zhang, 2015). This confirms that, on the continuum of implicit and explicit knowledge, the metalinguistic test is positioned in the far end of explicit knowledge as a valid measurement.

More studies are required to investigate the relationship between grammaticality of test items, time pressure, and modality in order to obtain a more comprehensive picture of the construct validity of various measurements. However, the results from previous studies help draw a temporary summary as follows:

First, rigorous time pressure based on native speakers' processing time as in various timed GJTs (Bowles, 2011; Ellis, 2005; Godfroid et al., 2015; Kim & Nam, 2016; Zhang, 2015), seems to predispose learners toward the use of implicit knowledge

and tends to override the grammaticality of test items. In other words, when there is a rigorous time restriction for each stimulus based on L1 speakers' reaction times, implicit knowledge can be measured through timed GJTs regardless of the grammaticality of the items. Rigorous time pressure seems to override modality, too. In Kim and Nam's study (2016), the timed written GJT and timed aural GJT both loaded on the same construct labeled implicit knowledge. This means that as long as time pressure was manipulated in a rigorous manner, different modes did not affect the loadings.

Second, modality is also an important factor. In Kim and Nam's study (2016), the timed written GJT and timed aural GJT loaded differently on weaker implicit knowledge. The timed written GJT loading on implicit knowledge was .61, whereas the timed aural GJT loading was .85. Therefore, the timed aural GJT can arguably explain weaker implicit knowledge more strongly than its written counterpart (Kim & Nam, 2016; Spada et al., 2015).

Third, grammaticality alone does not seem to play a primary role in distinguishing between measurements of implicit from explicit knowledge. When there is no time restriction—as in the untimed written GJTs (R. Ellis, 2005)—or no rigorous time restriction in a timed written GJT (Gutiérrez, 2012), it is possible that ungrammatical items in a written mode can be used to measure explicit grammar knowledge effectively. Moreover, grammaticality seems to play an important role when time pressure conditions are the same. Grammaticality turned out to be important to

distinguish between two constructs of knowledge, labeled as stronger implicit and weaker implicit knowledge. Kim and Nam (2016) found that the ungrammatical items in the timed aural GJT loaded heavily on stronger implicit knowledge, whereas the grammatical counterparts in the same timed aural GJT loaded heavily on weaker implicit knowledge. This demonstrates that, when conditions of modality and time pressure are the same, grammaticality is an important factor in measuring measure weaker and stronger implicit knowledge relatively separately.

Fourth, tasks that address both oral and aural skills seem to predispose learners toward tapping into their implicit knowledge. When EITs and aural GJTs are compared, EITs are confirmed to be more valid measurements of implicit knowledge than aural GJTs (Kim & Nam, 2016). This might possibily be due to EITs' elements of both decision on plausibility and reconstruction/production, whereas GJTs have only a decision/comprehension element. When a task requires a higher cognitive load, it provides a better measure of that knowledge. In support of this argument, Kim and Nam (2016) found that the EIT loaded on stronger implicit knowledge, with or without time pressure, and regardless of the grammaticality of the test items.

Fifth, each test in the battery of tests utilized by R. Ellis (2005) had its own characteristics and that could become more valid measurements by manipulating time pressure, modality, and grammaticality. More studies using different groups of learners, languages, and tests are required in order to investigate validity claims regarding

measurements of implicit and explicit knowledge, and to obtain a battery of tests with high validity for each type of knowledge. For example, direct relationships between modes, time pressure, and grammaticality for the battery of the tests, including GJTs, and their construct validities for measurements of implicit and explicit knowledge are worth investigating further.

1.4. Language learners and two types of learning and knowledge

There is a wide consensus that L1 learners acquire their L1s primarily through implicit learning (e.g., Dörnyei, 2009). When children learn and use language, they use implicit knowledge from implicit learning, which is stored in procedural memory and executed automatically (Paradis, 2004, 2009). Generally, they do not make a conscious attempt to learn the target material until they receive explicit instruction in classroom settings. During automatic implicit learning, L1 learners are not aware of either their learning process or the outcome of it (Dörnyei, 2009). Learning occurs in a natural setting where children are exposed to a considerable amount of natural input.

On the other hand, adult L2 learners utilize a different cognitive system for L2 acquisition, explicit—declarative memory (DM) system, arguably because maturational constraints affect the implicit learning system used in childhood (Bley-Vroman, 1989, 2009; DeKeyser, 2000, 2003; Ullman, 2001). This loss of implicit cognitive mechanisms for language learning forces adult L2 learners to rely on explicit learning

and knowledge. Furthermore, because adult L2 learners start to learn L2s later than L1 speakers do, they usually start to learn L2s in an instructional setting. In class, they are presented with taught language rules, encouraged to derive hypotheses and put them to the test. In terms of input amount, L2 learners' total amount of input is much less than that of L1 speakers.

Heritage language (HL) learners are defined as those who have been raised in a home where a HL is spoken, who speak and understand the HL, and who are bilingual in their heritage language and the dominant language (Valdés, 2001). They have some characteristics of native speakers and some characteristics of L2 learners. Concerning the characteristics shared with native speakers, HL learners start to learn L1s through implicit learning in a natural learning setting first. Their major input mode is aural and stems from family members. In this stage, their knowledge of the L1 is implicit. After the age of 5, when metalinguistic skills develop (Oh, Jun, Knightly, & Au, 2003; Montrul, 2008), they come to learn L1s both implicitly and explicitly. However, HL learners' metalinguistic knowledge might be limited due to their limited exposure to instructional settings relative to L1 learners. Since general cognitive skill acquisition theory is based on the premise of age-related maturational constraints on language learning (DeKeyser, 2007, 2009; Dörnyei, 2009), heritage learners should go through a transition period by the age of six from more implicit learning in terms of syntactic structures—such as relative clauses (Polinsky, 2011)—to more explicit learning as they

mature. In addition to the change in their L1 learning, the amount and frequency of L1 input is reduced or varied as heritage learners acquire and use their dominant language. Resulting from this lack of instruction and input, their L1 knowledge—particularly explicit knowledge—experiences attrition (Polinsky, 2011), which leads to incomplete knowledge representations (Montrul, 2008; Paradis 2004). Therefore, heritage learners' L1 knowledge is similar to native speakers' in that they have implicit knowledge for some aspects of their L1. At the same time, HL learners' knowledge is similar to that of L2 learners' in that their linguistic knowledge is not fully developed. Finally, both HL and L2 learner groups' explicit knowledge might be fragile, but not HL learners' implicit knowledge might not be that as fragile as their explicit knowledge (Allen & Reber, 1980; Montrul, 2008).

However, Bowles (2011)' included HL learners as another group for the research on language learners' implicit and explicit grammar knowledge. Before her study, the majority of studies about the two types of grammar knowledge were about L2 learners (R. Ellis, 2004, 2005, 2006; Ellis, Loewen et al., 2009). However, in this study (Bowles, 2011), the participants were HL learners whose instruction length was no more than 2 years in addition to L2 learners whose instruction length in secondary and post-secondary settings was 6 years on average. The results demonstrated that along with L2 learners, HL learners' scores on the battery of five tests (i.e., an EIT, an oral narrative test, a timed GJT, an untimed GJT and a metalinguistic knowledge test), loaded highly

onto a two-factor model with high construct validity, where time pressure and mode are crucial. Therefore, it can be claimed that HL learners can provide further support for the distinction between implicit and explicit knowledge measures.

1.5. Studies on heritage and L2 learners' linguistic knowledge

Previous studies about HL learners have mainly focused on similarities and differences in the linguistic performances of HL learners and L2 learners. In terms of what I propose to interpret as implicit knowledge, a handful of studies can be categorized as demonstrating that HL learners have an advantage over non-heritage learners in implicit knowledge in terms of phonological, morphological, syntactic, and lexical aspects. In perception tasks of voice onset time (VOT) measurement, Spanish heritage learners were shown to perceive six Spanish consonants' VOT better than L2 learners (Au, Knightly, Jun, & Oh, 2002). Korean heritage learners also demonstrated native-like abilities in the perception of VOT of six Korean consonants in a phoneme perception test (Oh, Jun, Knightly, & Au, 2003), meaning that, in terms of perception, the heritage learners' implicit knowledge of the phonological feature is as solid as that of native speakers of Korean. Spanish heritage learners also performed more accurately than L2 learners on a computer-based, untimed oral production task involving Spanish gender agreement (Montrul et al., 2008). Even though the task was untimed, it could be a measure of implicit knowledge since it was a meaning-based, oral assignment (R. Ellis,

2005, 2006). In a word recognition task aimed at measuring knowledge about gender, French heritage learners were asked to orally imitate the last word in phrases that contained matches and mismatches of gender markers and nouns. When the phrases were grammatically correct, their reaction time was the same as native speakers' and significantly shorter than L2 learners', which might mean heritage learners have: 1) the same implicit knowledge of gender markers as native speakers and 2) better implicit knowledge than adult L2 learners (Guillelmon & Grosjean, 2001). Finally, one study suggests that HL learners might have better implicit and explicit knowledge on various aspects of language than do L2 learners. In a guided narrative test (i.e., measure of implicit knowledge), Korean heritage learners outperformed L2 learners in mimetics, particles, complex predicates, connectives, and honorifics, but not in idiomatic expressions (Lee, Kim, Kong, Hong, & Long, 2005). In this study, the most advanced learners among the heritage learners found honorifics the easiest, which suggests that honorifics might be a complex and potentially proficiency-dependent, but not age-of-onset (AoO) dependent structure.

In contrast, the Korean HL learners in O'Grady, Lee, and Choo (2003) did not show better knowledge about subject and object relative clauses than L2 learners. In a forced-choice picture task, participants heard aural cues only once and were asked to choose the one picture that matched the cue. The interval between each item was eight seconds. Considering the task was in an aural mode and had an element of time

constraint, the participants' implicit knowledge of Korean relative clauses was able to be measured. However, since the Korean heritage learners in the study had not been exposed to Korean input at home, the results might indicate the importance of input and output for young heritage learners rather than informing us about the exact degree of implicit knowledge of the target rule of general heritage learners and L2 learners, respectively.

Regarding explicit knowledge, two studies found that heritage learners do not have an advantage over non-heritage learners. Spanish HL learners did not outperform L2 learners in untimed GJTs in terms of verbal agreement, gender agreement, tense, aspect, mood, or clitics (Au et al., 2002), all of which could have measured participants' explicit knowledge (R. Ellis, 2005). Another study reported that L2 learners had better explicit knowledge about Spanish gender marking. Montrul et al. (2008) found that the L2 learners outperformed Spanish heritage learners in written gender recognition and written picture interpretation in terms of gender agreement accuracy, but not in an oral description task, which might have measured implicit knowledge. Based on these findings, Montrul et al. (2008) suggest that heritage learners and L2 learners have an advantage over each other in different types of modes and knowledge.

On the other hand, in the aforementioned study, Lee et al. (2005) also used a written test (i.e., a potential measure of explicit knowledge) that consisted of multiple-

choice questions and fill-in-the-gap questions. Korean HL learners outperformed L2 learners in all the target features except idiomatic expressions. These results contradict those of the previous two studies that demonstrated L2 learners outperforming HL learners in the untimed GJTs and the written tests that arguably measured participants' explicit knowledge. However, a large gap between the numbers of the two groups—23 HL learners versus only four L2 learners—make the results less conclusive and calls for more research on this issue (Lee et al., 2005).

In sum, HL learners in Spanish and Korean have been shown to outperform L2 learners in oral tasks and in tasks that involve fast and less consciously analyzable linguistic knowledge. This can be indirect evidence supporting the claim that HL learners have stored more implicit linguistic knowledge about their HL than L2 learners have about their L2, presumably because the HL learners have learned their HL implicitly (Montrul, 2008). However, the measurements utilized in the previous studies were not originally designed to measure implicit and explicit knowledge, per se. Therefore, a study with robust construct validity is required to understand the nature of the two groups' knowledge representations more clearly.

To the best of my knowledge, only one study (Kim & Nam, 2016) has recently tried to investigate the direct relationship between different test modalities (especially in GJTs) and test construct validity with regard to measuring implicit and explicit knowledge. At this juncture, this investigation that is the subject of this paper will build

upon HL learning studies by identifying linguistic differences or similarities between HL learners and L2 learners of Korean in terms of implicit and explicit knowledge. In addition, this study will extend the scope of existing research on measurements of implicit and explicit knowledge by considering another novel population, i.e., HL learners of Korean and another variable, i.e., modality.

1.6. Research questions

The following research questions guided this study:

1. How well does a battery of tests (elicited imitation test, aural GJT, written GJT, and metalinguistic test) measure implicit and explicit linguistic knowledge?
2. Do HL and L2 learners differ on their implicit knowledge measured through the elicited imitation test and aural GJT?
3. Do HL and L2 learners differ on their explicit knowledge measured through the written GJT and metalinguistic test?

CHAPTER 2. METHODOLOGY

This study is a cross-sectional quantitative investigation of the implicit and explicit knowledge of native speakers, HL learners, and L2 learners of Korean. This study is a conceptual replication of: 1) previous studies that used a battery of tests in an attempt to measure implicit and explicit knowledge separately (Ellis, 2005; Gutiérrez, 2012), and 2) Bowles' study (2011) in terms of using both HL and L2 learners' performances to validate measurements of implicit and explicit knowledge, and to confirm the similarities/differences of the two groups concerning that knowledge.

2.1. Target structures

In some of the aforementioned studies, 17 language structures were selected and used as target. As a replication study, I tried to select 17 target structures for the current study, too. A handful of researchers have investigated the order of acquisition either by L1 learners of Korean (Cho, 1982; Jeong et al., 2006; Kim & Kang, 2010; Kwon et al., 1979; Lee et al., 2008; Lee & Lee, 2010; Seo & Lee, 1999) or by L2 learners of Korean (Jeong, 2008; Kim, 2006; Seol, 2010; Um, 1989). However, those studies are limited to a couple of target structures such as phonemes (Jeong, 2008; Jeong et al., 2006; Kim, 2006; Kwon et al., 1979), particles (Cho, 1982; Lee et al., 2008; Seol,

2010; Um, 1989), or conjuntions (Kim & Kang, 2010; Lee & Lee, 2010; Seo & Lee, 1999). To my knowledge, few of these studies have considered Korean acquisition order, which covers all aspects of Korean structures comprehensively as in the studies that were based on processibility theory (Pienemann, 1998). Therefore, it is hard to put forward well-established criteria for selecting target structures based on previous studies.

As an alternative, I used two criteria to select target structures for this study; 1) target structures should be problematic for learners and result in frequent and persistent errors, and/or 2) structures should cover a full range of proficiency levels in their pedagogical grading (i.e., the order in which the structures are presented in the textbooks or teachers' pedagogical grading). To satisfy the two criteria, literature on Korean error analysis (Lee, 2003), a couple of textbooks that have widely been used in the United States and in Korea (Cho, Lee, Schulz, Sohn, & Sohn, 2010; Sogang Korean Institute, 2008), and grammar books of Korean were consulted (Kim, Park, Lee, Lee, Jeong, Choi, & Heo, 2005; Kim-Renaud, 2009). Based on the criteria, 17 grammar structures of Korean were selected (Bowles, 2011; Godfroid et al., 2015; Gutiérrez, 2012; R. Ellis, 2005; Zhang, 2015): word order, particle, conjugation, number and counter, possessive, noun as adverb, adverbial suffix, conjunction, tense, negative polarity adverb, nominalization, relativization (Ko & Ku, 2008), complementation, passive, causative, honorifics, and collocation. Table 1 presents the list of the target

structures and a summary of their characteristics in terms of learner errors, teachers' pedagogical grading (Sheffler, 2011), and grammatical types, such as lexical, morphological, and/or syntactical categories.

Table 1.
Target structures in the tests

	Structure	Example of the ungrammatical items	Pedagogical grading	Knowledge type
1	Word order	*Minswu-ka cal kulim-ul kulin-ta. Minswu-Nom well picture-Acc draw-Dec *민수가 잘 그림을 그린다. [c] Minswu-ka kulim-ul cal kulin-ta. Minswu-Nom picture-Acc well draw-Dec 민수가 그림을 잘 그린다. "Minsu draws pictures well."	Beginning	Syntactical
2	Particle (case marker)	*Namtongsayng-i sakwa-lul-man meknun-ta. Male younger brother-Nom apple-Acc-only eat-Dec *남동생이 사과를만 먹는다. [c] Namtongsayng-i sakwa-lul meknun-ta. Male younger brother-Nom apple-Acc eat-Dec 남동생이 사과를 먹는다 [c] Namtongsayng-i sakwa-man meknun-ta. Male younger brother-Nom apple-only eat-Dec 남동생이 사과만 먹는다 "My younger brother eats only apples."	Beginning	Morphological
3	Conjugation	*Elin ai-ka acwu yeyppu-yo. Small child-Nom very pretty-Dec. *어린 아이가 아주 예쁘요. [c]Elin ai-ka acwu yeyppe-yo. Small child-Nom very pretty-Dec. 어린 아이가 아주 예뻐요 "The little child is very pretty."	Beginning	Morphological

Table 1. (cont'd)

4	Number and counter	*kyosil-ey haksayng-i tases-kay iss-ta. Classroom-in students-Nom five-Clf exist-Dec *교실에 학생이 다섯 개 있다. [c]kyosil-ey haksayng-i tases-myeng iss-ta. Classroom-in students-Nom five-Clf exist-Dec 교실에 학생이 다섯 명 있다. "There are five students in the classroom."	Beginning	Morphological
5	Possessive	*Ikestul-un na khemphyuthe-wa phulinthe-ita. These-Top I computer-and printer-Cop/Dec *이것들은 나 컴퓨터와 프린터이다. [c]Ikestul-un nay khemphyuthe-wa phulinthe-ita. These-Top I-Poss computer-and printer-Cop/Dec 이것들은 나의 컴퓨터와 프린터이다. "These are my computer and printer."	Beginning	Morphological
6	Nouns as adverbs	*Swumi-nun nayil-ey mwehay-yo? Swumi-Top tomorrow-at what-do-Q *수미는 내일에 뭐해요? [c]Swumi-nun nayil mwehay-yo? Swumi-Top tomorrow what-do-Q 수미는 내일 뭐해요? "What does Sumi do tomorrow?"	Intermediate	Morphological
7	Adverbial suffix	*Na-nun mikwuk-eyse chenchenhakey wuncenhan-ta. I-Top the UN-in slowly drive-Dec *나는 미국에서 천천하게 운전한다. [c]Na-nun mikwuk-eyse chenchenhi wuncenhan-ta. I-Top the UN-in slowly drive-Dec 나는 미국에서 천천히 운전한다. "I drive slowly in the US."	Intermediate	Morphological

Table 1. (cont'd)

8	Conjunction	*Hankwuke-lul paywuko siph-ciman sewul-ey ka-yo. Korean-Acc learn-Conj want to-but-Conj Seoul-to go-Dec *한국어를 배우고 싶지만 서울에 가요. [c]Hankwuke-lul paywuko siph-ese sewul-ey ka-yo. Korean-Acc learn-Conj want to-thus-Conj Seoul-to go-Dec 한국어를 배우고 싶어서 서울에 가요. "I want to learn Korean, so I go to Seoul."	Intermediate	Syntactical
9	Tense	*Nayil sophwung-un cham caymi-iss-ess-ta. Tomorrow picnic-Toc very fun-be-Pst-Dec *내일 소풍은 참 재미있었다. [c]Nayil sophwung-un cham caymi-iss-ul-kes-ita. Tomorrow picnic-Toc very fun-be-Fut-Dec 내일 소풍은 참 재미있을 것이다. "Tomorrow the picnic will be very fun."	Intermediate	Syntactical
10	Negative polarity adverb	*Hankwukmal-un kyelkho swip-ta. Korean-Toc never easy-Dec *한국말은 결코 쉽다. [c]Hankwukmal-un kyelkho swipci-anh-ta. Korean-Toc never easy-Neg-Dec 한국말은 결코 쉽지 않다. "Korean is never easy."	Advanced	Morphological
11	Nominalization	*Ceyleymi-nun sihem-eyse silswu-hayss-ki-lul al-ass-ta. Ceyleymi-Toc exam-in mistake-do-Pst-Nominal-Acc know-Pst-Dec *제레미는 시험에서 실수했기를 알았다. [c]Ceyleymi-nun sihem-eyse silswu-han-ke-sul al-ass-ta. Ceyleymi-Toc exam-in mistake-do-Pst-Mod it-Acc know-Pst-Dec 제레미는 시험에서 실수한 것을 알았다. "Jeremy knew that he had made a mistake in the exam."	Advanced	Syntactical

Table 1. .(cont'd)

12	Relativization (Ko & Ku, 2008)	*Na-nun yeca-lul chayksang yephey issnun an-ta. I-Toc woman-Acc desk side-Loc exist-Rel know-Dec *나는 여자를 책상 옆에 있는 안다. [c]Na-nun chayksang yephey issnun yeca-lul an-ta. I-Toc desk side-Loc exist-Rel woman-Acc know-Dec 나는 책상 옆에 있는 여자를 안다. "I know the woman who is by the desk."	Advanced	Syntactical
13	Complementation	*Swucengssi-ka khephi-lul cohahanta an-ta. Swucenngssi-Hon-Nom coffee-Acc like-Dec know-Dec *수정씨가 커피를 좋아한다 안다. [c]Swucengssi-ka khephi-lul cohahanun kesul an-ta. Swucenngssi-Hon-Nom coffee-Acc like-Pres-Mod it-Acc know-Dec 수정씨가 커피를 좋아하는 것을 안다. "I know that Sujeong likes coffee."	Advanced	Syntactical
14	Passives	*Khunos-i cal phan-ta. Big clothes-Nom well sell-Dec *큰 옷이 잘 판다. [c]Khunos-i cal phal-lin-ta. Big clothes-Nom well sell-Pass-Dec 큰 옷이 잘 팔린다. "Big clothes sell well."	Advanced	Syntactical
15	Causative	*Emeni-ka aki-lul can-ta. Mother-Nom baby-Acc sleep-Dec *어머니가 아기를 잔다. [c]Emeni-ka aki-lul cay-wun-ta. Mother-Nom baby-Acc sleep-Caus-Dec 어머니가 아기를 재운다. "The mother puts the baby to sleep."	Advanced	Syntactical

Table 1. (cont'd)

16	Honorifics	*Halapeci-kkeyse ppang-ul masisskey meknun-ta. Grandfather-Nom-Hon bread-Acc deliciously eat-Dec-Hon *할아버지께서 빵을 맛있게 먹는다. [c] Halapeci-kkeyse ppang-ul masisskey tusin-ta. Grandfather-Nom-Hon bread-Acc deliciously eat-Hon-Dec-Hon 할아버지께서 빵을 맛있게 드신다. "The grandfather eats bread delightedly."	Intermediate	Lexico, morpho-syntactical
17	Collocations	*Chwuw-ese moca-lul sinnun-ta. Cold-because hat-Acc wear-Dec *추워서 모자를 신는다. [c] Chwuw-ese moca-lul ssun-ta. Cold-thus hat-Acc wear-Dec 추워서 모자를 쓴다. "I put on a hat because it is cold."	Advanced	Lexical

Note: [C] means *the correct sentence with the problematic part(s) corrected. Nom* means *nominative. Acc* means *accusative. Dec* means *declarative. Clf* means *numeral classifier. Top* means *topic. Cop* means *copula. Conj* means *conjunctive. Pst* means *past. Fut* means *future tense. Neg* means *negative. Nominal* means *nominalizer. Mod* means *modifier. Rel* means *relative. Loc* means *locative. Pass* means *passive. Caus* means *causative. Hon* means *honorific.*

2.2. Pilot study I

This is the first of two pilot studies conducted before the main study. The purpose of this study, as a preparatory step before the main study, was to investigate the following: 1) the reliabilities of the test items, 2) the descriptive statistics of three groups with different language backgrounds, and 3) the results of a One-way ANOVA.

2.2.1. Methodology

2.2.1.1. Participants

Thirty-six participants (nine L1 speakers, three HL learners, and 24 L2 learners) participated in the first pilot study; seven of them were males and 29 were females. Their average age was 23.48 years old, with ages that varied from18 to 37. HL learners were in third or fourth-year Korean classes, whereas L2 learners were either in first-year or second year Korean classes. They were studying Korean in the same U.S. institution. The average instruction period of L2 learners was 11.5 months.

2.2.1.2. Tasks

An EIT was developed (Appendix A, 1). It contained 34 sentence stimuli (i.e., two statements for each of the 17 grammar structures). Half of them were grammatical, and half were ungrammatical. The participants listened to the stimuli. First, they were asked to think about the meaning and decide if they agreed with the statements. Then, they repeated the stimuli orally in correct Korean. Participants' imitations were recorded. When the obligatory occasions were created and supplied correctly, the response scored one point. When the obligatory occasions were created, but not supplied or no obligatory occasions were created, the response scored zero points (Erlam, 2009).

Computer-delivered, written, timed and untimed GJTs were designed using E-

Prime 2 (Appendix A, 2). In the timed GJT, participants judged the grammaticality of each stimulus after reading each sentence, whereas in the untimed GJT, they read each sentence and judged grammaticality without time limits. Both GJTs contained the same 68 sentences out of which four sentences were judged for each of the 17 target structures. Half of the sentences were grammatical and half of them were ungrammatical. Participants were asked to choose among *correct/incorrect/I don't know* for each stimulus. The items were randomly distributed for each participant. Total reaction times were also recorded to identify potential differences between the three groups. For the oral EIT, and written GJT, the number of the words in each stimulus was over five Korean words. It was decided based on the pilot study in which several L2 learners imitated the sentences successfully when the word count was less than five.

A computer-delivered metalinguistic knowledge test was designed (Appendix A, 3). For this test, participants read 17 ungrammatical sentences, one sentence for each structure, and selected the best explanation of the error out of three choices. The participants were encouraged to use their explicit knowledge about the target structures. A total percentage accuracy score was calculated out of the total number of points possible.

2.2.1.3. Bio-data questionnaire

The following items of information were obtained through a bio-data questionnaire (Appendix A, 4): participants' age of onset (AoO) of L2 learning, parents' use of Korean at home, participants' use of Korean at home, at school, and in social contexts, input/output amount and mode before and after five and after puberty, past and present learning environment, and Korean proficiency levels.

2.2.1.4. Procedure

In this study, participants proceeded in order of: EIT, written timed GJT, written

untimed GJT, metalinguistic test, and, finally, bio-data questionnaire. After that, participants were asked to participate in a follow-up interview, in which they were asked if they had enough time to read and judge the items for the written timed GJT and their comments about the tests in general. Data collection was done individually.

Data collection for HL learners was conducted in the US. However, data for L2 learners was collected in Korea due to the limited pool of L2 learners in the US.

2.2.2. Results

Table 2 demonstrates the reliability coefficient for each of the four tests. All of Cronbach's alpha coefficients were above .80, indicating that the tests were internally consistent. The item total statistics for each test are in Appendix C, Pilot study I. The focus is the Cronbach's Alpha values if each item is deleted.

Table 2.
Reliability coefficients for the four tests

Test	Items	Participants	Reliability coefficient
Oral imitation	34	36	α=.987
Written Timed GJT	68	36	α=.964
Written Untimed GJT	68	36	α=.952
Metalinguistic knowledge	17	36	α=.843

Table 3 shows the means and standard deviations of scores on the four measures by native speakers (NS), HL and L2 learners. Native speakers scored near ceiling (91% or higher), with very little variance on all tests. Their scores were higher than those of both the HL and L2 learners. The HL learner group outperformed the L2 learners on all measures.

Table 3.
Accuracy scores for the four tests by group

Tests (100%)	NS (n=9)		HL (n=3)		L2 (n=24)	
	M	SD	M	SD	M	SD
Oral imitation	95.8	3.3	69.6	13.3	11.8	12.5
Written Timed GJT	91.0	2.3	51.5	7.4	30.8	10.0
Written Untimed GJT	93.5	2.7	70.6	11.1	44.7	11.5
Metalinguistic knowledge	87.6	6.9	70.6	5.9	40.4	15.6

Participants' scores on the four tests were subjected to separate one-way ANOVAs, with Group as the between-subject factor. There were statistically significant between-group differences on all four tests. Table 4 shows the results of the ANOVAs and post hoc analyses to determine the sources of the between-group differences. In comparison with the results in Bowles' study (2011), two points are noteworthy. Firstly, the HL group's mean accuracy score on the untimed GJT was significantly higher than that of L2 learners. Secondly, L1 and HL groups showed significantly higher mean accuracy scores on the metalinguistic knowledge test than L2 learners. The majority of the L1 learners' major, which was second language acquisition, and HL learners' longer period of instruction than that of L2 learners can explain these results.

Table 4.
Results of one-way ANOVAs

Test	*F*	Results of post hoc analysis (Hochberg's GT2)	Bowles' study (2011)
Oral imitation	201.49**	L1> HL, HL > L2, L1 > L2	The same
Timed GJT	160.40**	L1> HL, HL > L2, L1 > L2	The same
Untimed GJT	78.47**	L1> HL, HL > L2, L1 > L2	The same except HL = L2
Metalinguistic knowledge T	41.75**	HL > L2, L1 > L2	L1> HL, HL = L2, L1 = L2

Note. ** $p < .01$

The Kaiser-Meyer-Olkin value of the data was .79, exceeding the recommended value of .6, and Bartlett's Test of Sphericity reached statistical significance, supporting the factorability of the data. Table 5 presents the correlational matrix for the four tests. All coefficients were .3 and above.

Table 5.
Correlational matrix for the tests

Test	Timed GJT	Untimed GJT	Metalinguistic T
Oral imitation	.71**	.94**	.88**
Timed GJT	---	.73**	.64**
Untimed GJT		---	.81**

Note . **$p < .01$

Table 6 shows the eignenvalues of the two factors and Table 7 shows the pattern and structure matrix from a factor analysis to investigate the underlying structures of the four tests (Ellis, 2005). The results in Table 5 revealed the presence of two components with eigenvalues exceeding .4, explaining 84.0% and 10.0% of the variance in Korean knowledge. This two-component solution explained a total of 94.0 % of the variance. Even though the eigenvalue for the second factor was below 1.0 (.4), it accounted for a meaningful increase in the shared variance: 10%.

Table 6.
Principal component factor analysis

Component	Eigenvalue	Variance	Cumulative
1	3.36	84.05	84.05
2	.40	9.99	94.04

Table 7 demonstrates the pattern and structure matrix of the factor analysis with oblimin rotation. The metalinguistic test, EIT, and untimed GJT loaded heavily at .8 or

higher on Factor 1. The timed GJT loaded heavily at .97 on Factor 2. Factor 1 can be named explicit knowledge. Since the Eigenvalue of Factor 2 is less than 1, it is difficult to name the component implicit knowledge of Korean. Moreover, due to the small sample size of the data and low proficiency levels of the majority of L2 learners in this pilot study, it should be acknowledged that these results neither guarantee nor deny the construct validity of the four measurements for running a factor analysis in the main study.

Table 7.
Loadings for principal component factor analysis

Test	Pattern matrix		Structure matrix	
	Component 1	Component 2	Component 1	Component 2
Meta knowledge	**1.03**	-.11	**.95**	**.59**
Oral imitation	**.93**	.07	**.98**	**.71**
Untimed GJT	**.82**	.19	**.95**	**.75**
Timed GJT	.03	**.97**	**.70**	**.99**

However, in the main study, I decided to use a confirmatory factor analysis (Bowles, 2011; Isemonger, 2007). This is to confirm that the data should fit the two-factor model—i.e., the oral EIT, and aural GJT are valid tests of implicit knowledge—while the untimed GJT and metalinguistic test are good tests of explicit knowledge based on the previous studies (Bowles, 2011; R. Ellis, 2005).

2.2.3. Suggestions

It was expected that HL learners' implicit knowledge measured through the oral EIT and timed GJT would be significantly greater than that of L2 learners (Bowles, 2011). However, HL learners' explicit knowledge measured through the untimed GJT

would not be significantly different from that of L2 learners. In particular, HL learners' scores on the meta-linguistic test would be marginally lower than that of L2 learners due to L2 learners' instruction-oriented learning setting. AoO and input/output would be a significant factor for implicit knowledge. On the other hand, instruction would be a significant factor for explicit knowledge, especially on the meta-linguistic test (Roehr & Gutiérrez, 2009).

The expected discussions would revolve around two major arguments. Firstly, HL and L2 learners' acquisition of Korean is similar in terms of being incomplete and unstable compared to that of L1 speakers, which would be borne out through comparisons between L1 speakers' and HL/L2 learners' knowledge representations. Secondly, HL and L2 learners' acquisition of Korean is different in terms of implicit and explicit knowledge due to their different learning environments, which would point to the significance of HL learners' natural setting in comparison to L2 learners' formal instructional setting. In addition, the contribution of the two groups' different amount of input/output to their two types of Korean knowledge would also be discussed.

2.3. Pilot study II

Based on my committee members' advice during my dissertation proposal defense, and as well as, further email exchanges and in-depth, face-to-face meetings, the following changes were made to the methodology of Pilot study I.

1. A proficiency test was adopted and modified to measure learners' general proficiency in order to investigate RQ 3 thoroughly. Originally, participants' proficiency levels were supposed to be measured through the level of instruction most recently received. However, in the process of recruiting HL learners for Pilot study II, the researcher realized that the majority of the candidates had not received

any formal instruction at the college level. As such, there was no way to measure their proficiency in Korean, so a general proficiency test was required.

2. A narrative test was developed as an additional measurement of learners' implicit knowledge.

3. The timed GJT was modified into an Aural GJT as a more valid measure of implicit knowledge.

4. The word count for each stimulus in the oral EIT, the Aural GJT, and the Written GJT was controlled rigorously.

5. The problematic parts in the stimuli in the metalinguistic test were underlined for higher validity.

6. To enhance reliability, an additional section was added to the previous metalinguistic test, in which participants were asked to find an example of each of the 17 target structures from a passage.

7. The bio-data questionnaire was modified, highlighting *age* as an important reference for measuring learners' input and output levels in Korean.

8. Instead of running an Explanatory Factor Analysis, a Confirmatory Factory Analysis would be employed to investigate the validities of the tests in terms of implicit and explicit knowledge of Korean.

2.3.1. Methodology

2.3.1.1. Participants

Ten participants (one male L1 speaker and nine HL learners) participated in the second pilot study; out of the nine HL learners, two were males and seven were females. Their average age was 21.7 years old, with ages that varied from18 to 28. HL learners' average instruction period was 0.9 months. Two of the nine HL learners received four

months of instruction at a college, and none of the others had formal instruction.

2.3.1.2. Tasks

The oral EIT was modified (Appendix B, 1). The word count was controlled. To prevent participants from imitating without having proper knowledge, the word count for the grammatical sentences became five. This decision was made based on the researcher's close observation from Pilot study I. However, the word count for ungrammatical sentences remained four.

An oral narrative test (Appendix B, 4) was designed to elicit the use of a number of the target structures such as particles, tenses, Sino numbers, noun classifiers, conjunctions, relativization, complementation, and honorifics. The participants read a story that was modified from the oral narrative test from the Marsden Project (Ellis, Loewen, et al., 2009). Participants were asked to read the text twice and then retell the story orally in three minutes. Their narratives were audio-recorded and transcribed. An obligatory occasion analysis was carried out to obtain the percentage of correct suppliance of each target structure (Ellis & Barkhuizen, 2005).

Computer-delivered aural and written untimed GJTs were designed using E-Prime 2 (Appendix B, 2). The minimum word count for the oral EIT was four for ungrammatical sentences and five for grammatical sentences. Since the cognitive load that the participants would experience in the aural and written GJT might be less than that in the oral EIT, the word count for the stimuli in these GJTs was five or more. Non-obligatory adverbs were inserted in the proper positions of the sentences. In the aural GJT, participants judged the grammaticality of each stimulus after listening to each sentence (Bylund, Abrahamsson, & Hyltenstam, 2012; Granena, 2012) without time constraint, whereas in the written GJT, they read each sentence and judged the

grammaticality without time limits.

A two-section metalinguistic knowledge test was designed (Appendix B, 3). The first section is a modified version of the computer-delivered test from Pilot study I (Appendix B, 3, Section 1). Another fourth choice was added to each sentence-level stimulus and the problematic parts were underlined. The second section is a paper-based test. In this test, participants were asked to find examples of 17 specific target structures from the discourse-level text (Appendix B, 3, Section 2). A total percentage accuracy score was calculated out of the total number of points available.

2.3.1.3. Bio-data questionnaire

A more age-oriented questionnaire was developed to investigate participants' input and output levels for each age bracket (Appendix B, 5).

2.3.1.4. Proficiency test

A C-test (Appendix B, 6) was adopted and modified for the proficiency test (Lee-Ellis, 2009). The rationale behind this decision was that 'proficiency*'* means both the 'knowledge' a language learner has and the 'ability' to use that knowledge (Ellis, 2009). Therefore, a desirable test should have two components of measurement: knowledge and the production of knowledge. It is judged that this modified C-test has these two components of measurement. The original C-test was rigorously investigated and found valid and reliable (Lee-Ellis, 2009). In the current study, for a logistical reason, the original five passages were decreased to four passages with comparably high reliability and validity.

Before this decision on the C-test was made, Test of Proficiency in Korean (TOPIK) was considered as a possible option. However, TOPIK has two critical disadvantages: 1) TOPIK takes much longer than the C-test, which makes it difficult for TOPIK to be utilized efficiently, and 2).the reading and listening sections in TOPIK are

formatted such that they consist of multiple-choice questions, which might not measure participants' proficiency holistically. However the C-test has a component of production, which would measure participants' receptive and productive proficiency levels more appropriately. Due to the C-test's more holistic aspect and logistic advantage, it was decided that the test would be utilized in this study.

2.3.1.5. Procedure

The participants proceeded in order of: proficiency test, EIT, narrative test, aural GJT, written GJT, metalinguistic test and, finally, bio-data questionnaire. Data collection was done individually.

2.3.2. Results

Table 8 demonstrates the reliability coefficient the five tests. All of Cronbach's alpha coefficients were above .80 except the first section of the metalinguistic knowledge test.

Table 8.
Reliability coefficients for the four tests

Test	Items	Participants	Reliability coefficient
Oral imitation	34	10	α=.884
Aural GJT	68	10	α=.872
Written (untimed) GJT	68	10	α=.848
Metalinguistic knowledge 1	17	10	α=.708
Metalinguistic knowledge 2	17	10	α=.887

Table 9 shows the descriptive statistics on the five measures by NS, and HL learners.

Table 9.
Accuracy scores for the five tests by 10 participants

	NS (n=1)		HL (n=9)	
Test (100%)	M	SD	M	SD
Proficiency test	95.0	-	34.9	12.0
Oral imitation	91.2	-	61.8	17.0
Narrative test	100	-	92.5	4.8
Aural GJT	94.1	-	69.3	11.3
Written (untimed) GJT	94.1	-	69.8	10.1
Metalinguistic knowledge 1	70.6	-	40.5	16.2
Metalinguistic knowledge 2	17.6	-	19.0	16.0

2.3.3. Suggestions

Table 10 highlights the comparisons between the results of Pilot studies I and II. Generally speaking, the Cronbach alpha coefficients became lower after Pilot study II. For the oral imitation as well as aural and written GJTs, it was decided that additional and non-obligatory adverbs should be readjusted for better reliability, making the minimum word count for the oral imitation, Aural and Written GJTs commonly four. Concerning the metalinguistic test 1, two items—8 and 13—were problematic. The ungrammatical sentences and the four choices were modified for higher reliability (Appendix B, 3, Section 1).

Table 10.
Comparisons between Pilot studies I and II

	Pilot study I		Pilot study II	
	Reliability α	Mean of HL learners	Reliability α	Mean of HL learners
Oral imitation	.987	69.6	.884	61.8
Timed /Aural GJT	.964	51.5	.872	70.6
Untimed GJT	.952	70.6	.848	69.8
Metalingustic test	.843	70.6	.708(Section 1) .887(Section 2)	40.5

2.4. Main study

Based on the previous two pilot studies, the main study was conducted with a total of 114 participants.

2.4.1. Methodology

2.4.1.1. Participants

Three groups of native speakers (n=11), HL learners (n=38), and L2 learners (n=65) participated in this study (N=114). 43 of them were males and 71 of them were females; their average age was 22.98, varying from 18 to 33. HL learners were categorized under two conditions: 1) HL learners born in the US and 2) both parents were Korean and provided opportunities for considerable amounts of input and output of Korean for implicit learning at home. The input/output amounts were measured through the questionnaire that asked about amount of input and output of Korean using a 100% scale. The instruction periods at college level for the HL learners vary from none to 22 months. The data collection was conducted in several college areas in Maryland, Virginia and California. Data collection for the HL learners lasted for approximately eight months in the United States, from Fall 2013 through Summer 2014.

Concerning L2 learners, participants were learners of Korean as a second language. Their minimum period of learning Korean as a second language was 10 months and maximum was 64 months in an instructional setting. All of the L2 learners' L1 was Chinese to control for any discrepancies caused by their L1s and/or L3s in terms of word order, case markers including topic markers, frequent omission of words including plural marker, simple tense system, lack of relative clauses, and honorifics (Sohn, 1999). The data collection was conducted in the International Language Education Center (ILEC) affiliated to a national university in a metropolitan city in

Korea. The L2 learners either used to learn Korean or were learning Korean in the ILEC. The data collection lasted for approximately three months in Fall and Winter, 2014. The 11 native speakers of Korean were undergraduate students at three four-year universities in Busan, whose ages were comparable to the HL and L2 learners of Korean. Their majors varied, but none of the participants' majors or minors were related to linguistics or languages.

2.4.1.2. Tasks

The modified oral EIT from Pilot study II was used, which controlled the word count. In the test, the minimum word count for the majority of the grammatical sentences was five to keep participants from mimicking the sentences without processing the meanings and getting one point for the mere act of mimicking. However, the word count for the ungrammatical sentences was four because participants had to modify the incorrect sentences to get a score. The oral narrative test in Pilot study II was modified by altering difficult Korean expressions. However, the main ideas remained the same. Participants were asked to read the text twice carefully. Their recalling performances were audio-recorded and transcribed. An obligatory occasion analysis was carried out to obtain the percentage of correct suppliance of each target structure (Ellis & Barkhuizen, 2005).

The computer-delivered aural and written untimed GJTs from Pilot study II were used. Since the cognitive load that the participants would experience in the aural and written GJT might be less than that in the oral EIT, the word count for the stimuli in these GJTs was five or more. To regulate the meanings and word counts of the sentences in both GJTs, if necessary, non-obligatory adverbs were inserted in the proper positions. In the aural GJT, participants judged the grammaticality of each stimulus after listening to each sentence, whereas in the written GJT, they read each sentence and judged the

grammaticality. Participants took both GJTs without time limits.

The two-section metalinguistic knowledge test from Pilot study II was translated in Chinese for Chinese L2 learners of Korean by a Chinese PhD student. Her major was Korean language and linguistics in the national university where the data collection was conducted. The original English version was used for the HL learners and the Chinese version was used for the L2 learners of Korean. For the native speakers of Korean, the researcher developed a Korean version of the metalinguistic knowledge test. The first section is a modified version of the computer-delivered test from Pilot study II with the fourth choice added to each stimulus and with problematic parts underlined. The second section is a paper-based test in which the three groups of participants were asked to find examples of 17 specific target structures from the text in Korean. The instructions were in English, Chinese, or Korean. For each section, an accuracy score was calculated out of the total number of points available and the scores for both sections were summed up. Finally, raw scores were converted into a 100% scale.

The proficiency test was analyzed based on the Korean morphemes in the text, i.e., the smallest unit that has meaning (Ko & Ku, 2008). The total number of morphemes was decided to be 172 after the researcher consulted with the co-rater in an exchange of emails and several face-to-face meetings. Each correctly answered morpheme was given one point and the total point for each participant was converted into a 100% scale.

2.4.1.3. Bio-data questionnaire

The modified version of questionnaire from Pilot study II was used. For Chinese L2 learners, a Chinese graduate student whose major was Korean literature and linguistics developed a Chinese version.

2.4.1.4. Procedure

Participants proceeded individually in order of: the proficiency test (C-test), EIT, narrative test, aural GJT, untimed written GJT, metalinguistic test, and finally bio-data questionnaire. This order is the same as the instruments in previous studies (Ellis, 2005; Bowles, 2011) except the proficiency test. Like any study in which participants take a couple of tests in a fixed sequence, potential test order effects were unavoidable in the current study. Considering the fact that this study is about implicit and explicit knowledge and learners' different levels of awareness of target structures, the current order—i.e., from the least awareness to the most awareness—might be better than the the other way around. However, ideally speaking, counterbalancing the tests would have dealt with this test order effect (S. Loewen, personal communication, June 6, 2016).

The data collection time for each individual varied, but it lasted as little as one and a half hours for native speakers of Korean and as much as two and a half hours for either HL learners or L2 learners. At the end of the data collection, all participants were paid 25.00 in U.S. dollars or 25,000 in Korean won.

2.4.1.5. Analyses

The reliabilities of the five tests and more detailed tests were calculated using Cronbach alpha. For examining the interrelationships between the five tests, Pearson product moment coefficients were run. For research question 1, which asked about implicit and explicit knowledge of the participants and about the model fitting of the data, four major CFAs were carried out as follows: 1) implicit/explicit model with the written GJT as an observed variable for explicit knowledge (Bowles, 2011), 2) implicit/explicit model with the written ungrammatical GJT as an observed variable for explicit knowledge (Ellis, 2005; Philp, 2009; Zhang, 2015), 3) grammatical/ ungrammatical model (Gutiérrez, 2012), and 4) one-factor model with explicit

knowledge as the only latent variable (DeKeyser, 2003). For research question 2, which asked about the three groups' knowledge assessed using the EIT and the aural GJT, One-way ANOVAs were employed with the aural/oral elicited imitation and aural GJT both separately and combined. For research question 3, which asked about the three groups' knowledge assessed using the written GJT and the metalinguistic knowledge test, One-way ANOVAs were run with the ungrammatical written GJT and metalinguistic test both separately and combined.

Table 11 shows the Cronbach's alpha coefficients for the battery of tests.

Table 11.
Reliability coefficients for the five tests

Test		Items	Participants	Reliability coefficient
Aural/oral EIT		34	114	α=.94
Narrative test		-	114	*r*=.98
Aural GJT		68	114	α=.85
Written GJT		68	114	α=.87
Ungrammatical		34	114	α=.87
Metalinguistic knowledge test	1	17	114	α=.75
	2	17	114	α=.85
	Total	34	114	α=.78
Proficiency (C-test)		172	114 (38)	*r*=.99

Note. *Ungrammatical* means the ungrammatical items in the written GJT.

All of the reliability coefficients were above .80 except of the metalinguistic knowledge test. Concerning the narrative test, the researcher rated the test twice. The interval between the two ratings was one and a half years. The intra-rater reliability was *r*=.98. In terms of the proficiency test, due to logistical reasons, only part of the total

participants' C-test scores were used for the inter-rater reliability. 38 C-test scores (33.3%) out of the total 114 obtained from Rater 1 were randomly selected and compared with the selected 38 scores from Rater 2 using the intraclass correlation coefficient. The inter-rater reliability was r=.99.

CHAPTER 3. RESULTS

3.1. Descriptive statistics

Table 12 presents the results of descriptive statistics of the battery of tests from all three groups.

Table 12.
Descriptive statistics for the five tests by group

	NS (n=11)		HL (n=38)		L2 (n=65)	
Test (100%)	M	SD	M	SD	M	SD
Aural/oral EIT	94.65	3.68	58.20	19.95	46.02	15.96
Narrative test	95.11	1.66	76.80	11.61	56.05	12.37
Aural GJT	93.85	5.50	66.60	11.60	64.66	9.78
Written GJT	95.86	1.59	66.56	11.65	70.61	10.19
Written Ungra GJT	96.49	3.20	55.96	18.33	63.62	16.81
Metalinguistic knowledge test	1 84.49	7.57	48.40	18.12	66.79	27.87
	2 36.36	14.60	26.12	14.74	47.91	19.02
	Total 60.43	9.43	37.15	14.24	57.35	20.37
Proficiency (C-test)	96.59	1.31	46.35	12.83	60.11	17.02

To compare the three groups' general proficiency of Korean, a one-way ANOVA was run using the scores of the C-test (Lee-Ellis, 2009). This written-mode test measures the participants' general proficiency and involves a controlled production aspect. A post-hoc test revealed that the native speakers' proficiency was significantly different from those of HL and L2 learners. Moreover, L2 learners' proficiency was significantly higher than that of HL learners, as demonstrated in Table 13.

Table 13.
Results of one-way ANOVA on the proficiency test

Test	*F* (*p* value)	Results of post hoc analysis
Proficiency (C-test)	48.86 (*p*=.000)	**NS > L2, **NS > HL, **L2 > HL

3.2. Construct validity of the tests

Research question 1 was; how well does the battery of tests (EIT, narrative test, aural GJT, written GJT, metalinguistic test, and C-test) measure implicit and explicit linguistic knowledge?

Table 14 presents the correlation matrix for HL and L2 learners' scores on the battery of tests.

Table 14.
Correlational matrix for the six tests

	Narrative	Aural GJT	Written GJT	Written Ungra GJT	Metalinguistic knowledge test	Proficiency test (C-test)
Aural/oral EIT	.723**	.696**	.616*	. 495**	.326**	.496**
Narrative	-	.506**	.333**	.301**	.089	.216*
Aural GJT		-	.811**	.639**	.475**	.642**
Written GJT			-	.804**	.656**	.741**
Written Ungra GJT				-	.577**	.698**
Metalinguistic knowledge test					-	.711**

Note. ** means Correlation is significant at the 0.01 level (2-tailed).
* means Correlation is significant at the 0.05 level (2-tailed).

All of the tests were significantly correlated with each other at the 0.01 level. The written GJT was highly correlated with the aural GJT, *r*=.811, whereas the

ungrammatical items in the written GJT were moderately correlated with the aural GJT, *r*=.639. The metalinguistic knowledge test was weakly correlated with the aural/oral EIT, *r*=.326. Likewise, the proficiency test was moderately correlated with the aural/oral EIT, *r*=.496. However, the narrative test was not related to the metalinguistic test. It is noteworthy that the written GJT was highly correlated with the proficiency test, *r*=.741, and the metalinguistic test was also highly correlated with the proficiency test, *r*=.711.

Dozens of confirmatory factor analyses (CFA) were run using AMOS version 23.0.0, either with a two-factor model or with a one-factor model. Depending on the numbers of the latent factors and observed variables, the results were divided into four categories: four observed variables (the EIT, aural GJT, written GJT, and metalinguistic test), five observed variables with the narrative test in addition to the four observed variables, five observed variables with the C-test in addition to the four observed variables, and six observed variables with the narrative test and C-test in addition to the four observed variables.

3.2.1. Two-factor model with four observed variables (OVs): Implicit-explicit knowledge model using the EIT, aural GJT, written GJT and metalinguistic test

3.2.1.1. Default model

In this model, two different modes—aural and written—were highlighted. The two latent variables were labeled implicit and explicit knowledge (Bowles, 2011; Ellis, 2005, 2009; Kim & Nam, 2016; Spada et al., 2015). For implicit knowledge, the observed variables were the aural/oral EIT and aural GJT. For explicit knowledge, the observed variables were the written GJT and metalinguistic test. The results of the analysis are presented in Figure 1, which is titled implicit-explicit model with written GJT. The summary statistics for the model fit are χ^2= .410, df=1, p= .522, normed fit

index (NFI) = .998, root mean square error of approximation (RMSEA)= .000.

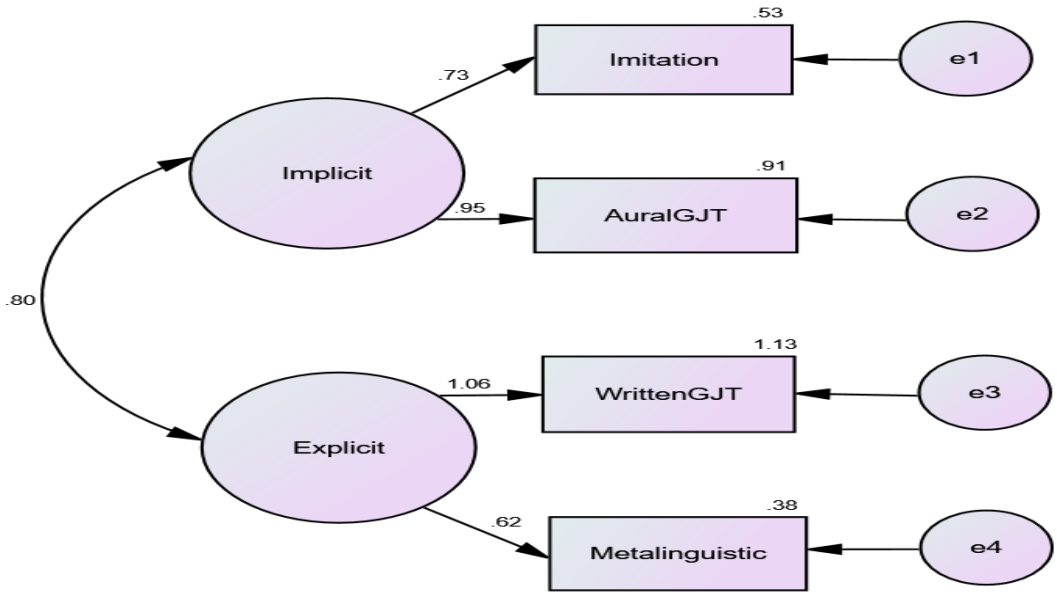

Figure 1. 2 Factor 4 observed variables (OVs), default model: Implicit-explicit model with written GJT

At a glance, the indices seem good enough as evidence for a good model fitting. However, as Figure 1 demonstrates, the estimate of the standardized regression weight of the whole written GJT for explicit knowledge is 1.064, which is above 1. This makes the squared multiple correlation of written GJT above 1, at 1.132. Moreover, e3, the error variance of the whole written GJT is negative at -15.464. Based on these problematic Heywood cases—which could potentially be caused by a combination of a small sample size and only two indicators per factor, nonidentification of the model, or the presence of outliers (Kline, 2015, p. 158)—it was decided that this default model be modified based on previous studies (Brown, 2015; Byrne, 2010; R. Ellis, 2005). Rival model 1 is the modified model of the default model.

3.2.1.2. Rival model 1: *written ungrammatical GJT*

Figure 2 illustrates the results of the CFA of implicit-explicit model with written ungrammatical GJT as an observed variable of explicit knowledge. The summary statistics for the model fit are χ^2 = .48, *df*=1, *p*= .49, NFI = .997, RMSEA = .000. The low nonsignificant χ^2 value points to a good fit for this model. The NFI, which is greater than .95, indicates a good model fit. The RMSEA, an important parsimonious index, finally indicates that this model fits the current set of data very well. Even though the standardized regression weight for the metalinguistic test was .65, which was slightly less than the desirable level of .7 (Byrne, 2010), this model fits the data very well (Brown, 2015; Byrne, 2010)

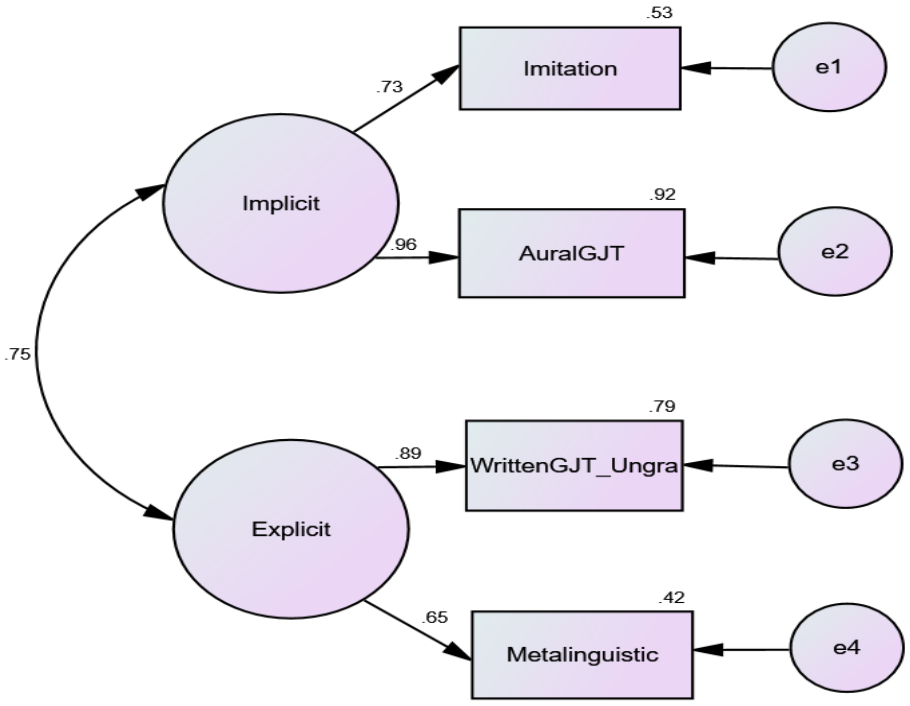

Figure 2. 2 Factor 4 OVs Rival model 1: Implicit-explicit model with ungrammatical items in written GJT

3.2.2. One-factor model with four observed variables: Explicit knowledge model using the written GJT, metalinguistic test, EIT, and aural GJT

3.2.2.1. Default model

The results from a CFA using a one-factor model with the four observed variables are presented in Appendix E (See 1F-4-Default. 4 OVs Default Explicit). All of the tests were grouped into the only latent variable, explicit knowledge. The summary statistics for this model fit are χ^2 = 20.573, *df*=2, *p*= .000, NFI = .914, RMSEA = .302, which evidence the poor fit of this model.

This explicit-only model produced modification indices that recommended covarying two pairs of error terms: 1) EIT and aural GJT, and 2) written GJT and metalinguistic test. Table 15 demonstrates the details of the two pairs of error terms whose modification indices are above 9, and that have theoretical relevancy in terms of aural and written modes.

Table 15.
Modification indices from the one-factor model

Pairs of error terms	M.I.	Par Change
e3 ↔ e4 (imitation test ↔ aural GJT)	11.430	27.138
e1 ↔ e2 (written GJT ↔ metalinguistic test)	9.228	22.155

Based on the results in Table 15, two more rival CFAs were run. First, the one-factor model was employed with the error terms of imitation and aural GJT covaried. Second, another one-factor model was run with the error terms of written GJT and metalinguistic test covaried. Figure 3 demonstrates the covaried model between the error terms of the imitation test and aural GJT.

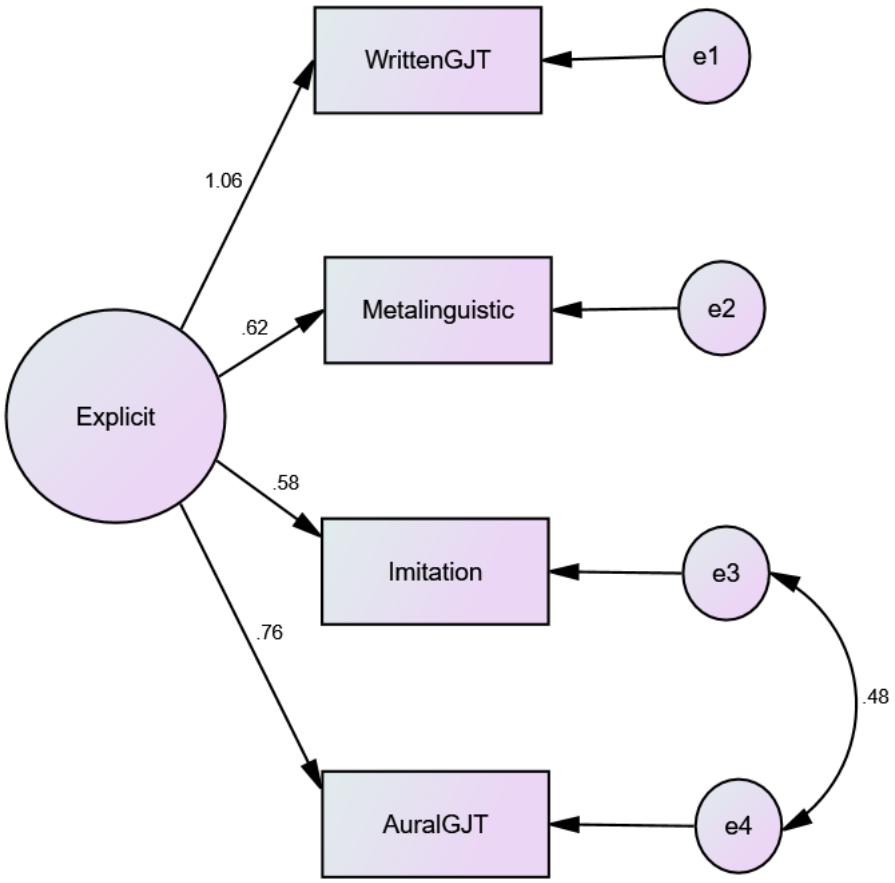

Figure 3. 1 Factor 4 OVs Rival 1: One-factor model of explicit knowledge with one set of covaried error terms between imitation test and aural GJT

The summary statistics for the model fit are χ^2 = .410, *df*=1, *p*= .522, NFI = .998, RMSEA = .000. Figure 3 demonstrates that the estimate of standardized regression weight of the written GJT for explicit knowledge is abnormal at 1.064, which is above 1. Moreover, e1, the error variance of the whole written GJT is negative at -15.464. Thus, it was decided that this rival model is not admissible (Brown, 2015; Byrne, 2010).

Figure 4 demonstrates the covaried model between the error terms of written GJT and metalinguistic test.

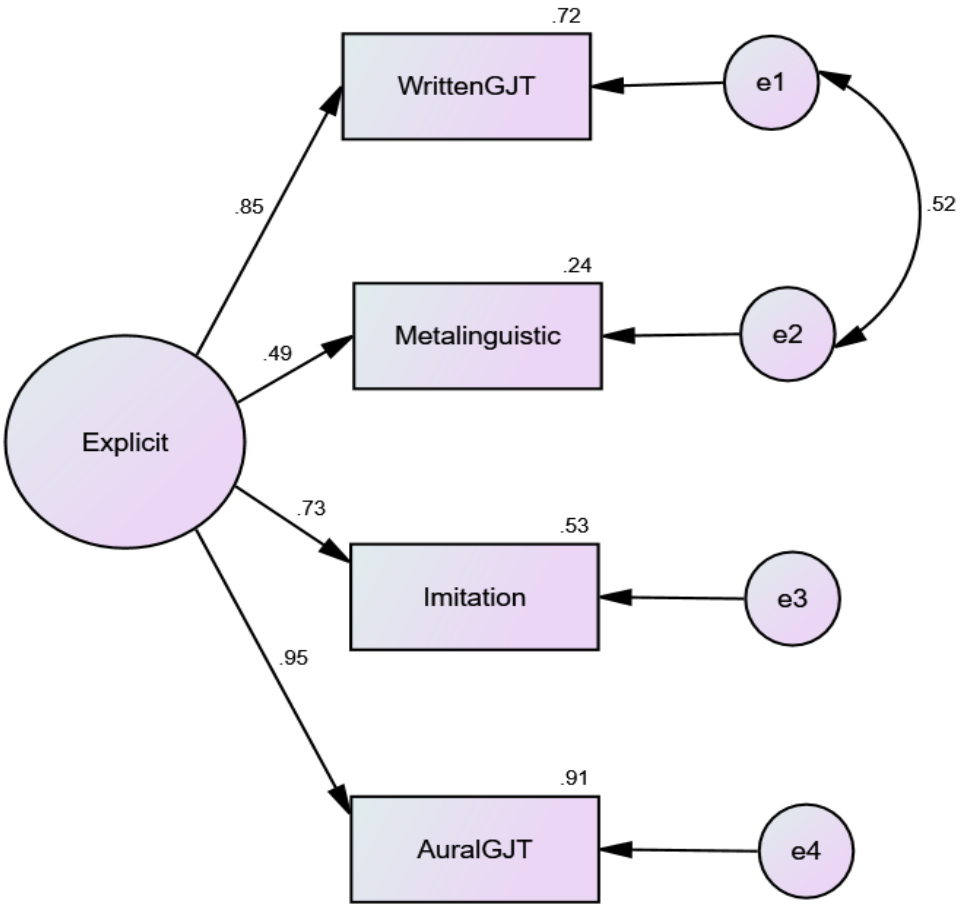

Figure 4. 1 Factor 4 OVs Rival 2: One-factor model of explicit knowledge with one set of covaried error terms between written GJT and metalinguistic test

The summary statistics for the model fit are χ^2 = .410, df = 1, *p* = .522, NFI = .998, RMSEA= .000. However, in this model, the standardized regression weight of the metalinguistic test was .49, which is much lower than the desirable level of .7, and even lower than that of .65, which was the standardized regression weight of the metalinguistic test for the Rival model 1 (See Figure 2).

3.2.3. Two-factor model with five observed variables: Implicit and explicit knowledge model using the imitation test, aural GJT, written GJT, metalinguistic test, and C-test

Since the C-test has literacy and form-focused elements like the written GJT and the metalinguistic test, the researcher decided to use the C-test as another observed variable, which was expected to load on explicit knowledge. Figure 5 demonstrates the the five observed variables of the expanded version of the previous model illustrated in Figure 1.

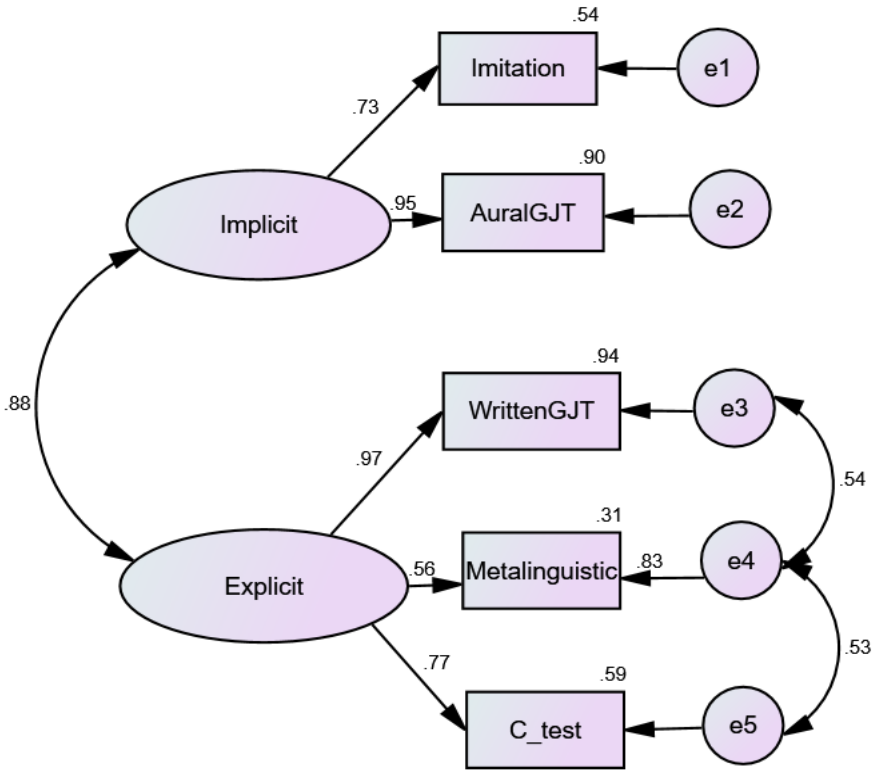

Figure 5. 2 Factor 5 OVs C-test Rival model 1: Implicit vs. explicit model with two sets of covaried error terms

However, in Figure 5, based on the recommendation of modification indices of the two-factor and five-observed-variable model with the C-test (See Appendix E. 2F-5-C-test 5 CVs Default), two sets of error terms were correlated between 1) the written GJT and metalinguistic test, and 2) the metalinguistic test and C-test. The summary statistics for the model fit are χ^2 = .66, *df* = 1, *p* = .42, NFI = .998, RMSEA = .000.

These indices support that this is a good model for the data set.

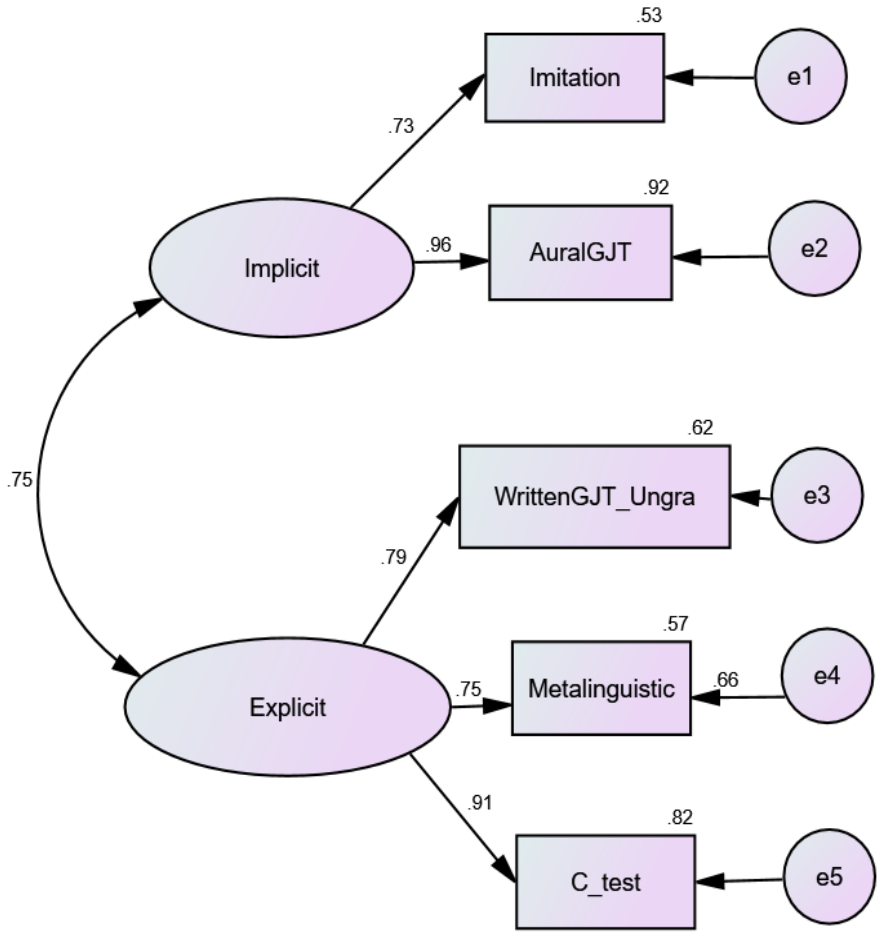

Figure 6. 2 Factor 5 OVs C-test Rival model 2: Implicit vs. explicit model with ungrammatical items in written GJT

Figure 6 demonstrates the results of the CFA with the same five observed variables as the model in Figure 5. This time, however, instead of whole items in the written GJT, the ungrammatical items in the written GJT were utilized. The summary statistics for the model fit were χ^2 = 7.749, *df*=4, *p*= .101, NFI = .972, RMSEA = .096. Since the RMSEA index was not statistically significant, it was decided that two sets of error terms would be correlated, following the recommendation indices. The results are presented in Figure 7.

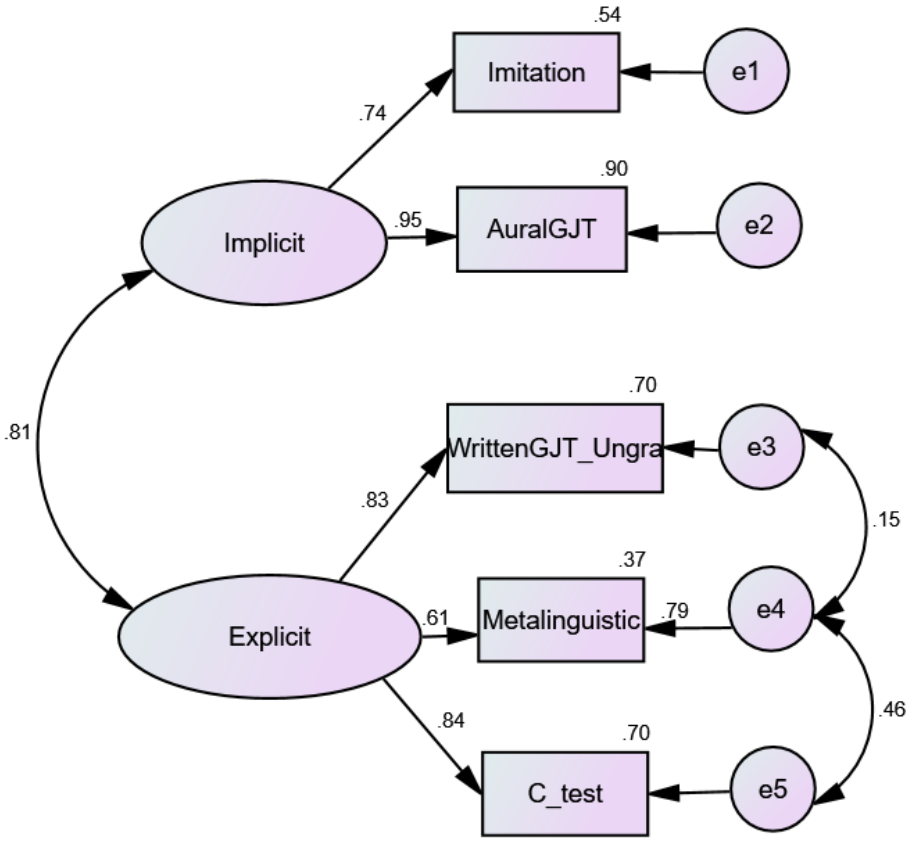

Figure 7. 2 Factor 5 OVs C-test Rival model 3: Implicit vs. explicit model with ungrammatical items in written GJT with two covaried error terms between written GJT ungrammatical items and metalinguistic test, metalinguistic test and C-test

Following the recommendation of modification indices from Figure 6, two sets of error terms were correlated between: 1) the ungrammatical items in written GJT and metalinguistic test, and 2) the metalinguistic test and C-test. The fit indices became much better. Figure 7 shows that the results of the summary statistics for the model fit were χ^2 = .677, *df* = 1, *p* = .411, NFI = .998, in comparison with .972 in Figure 6, and RMSEA = .000, in comparison with .096 in Figure 6. These indices confirm that this model fits the data set very well.

3.2.4. Two-factor model with six observed variables: Implicit and explicit knowledge model using the imitation test, aural GJT, narrative test, written GJT, metalinguistic test, and C-test

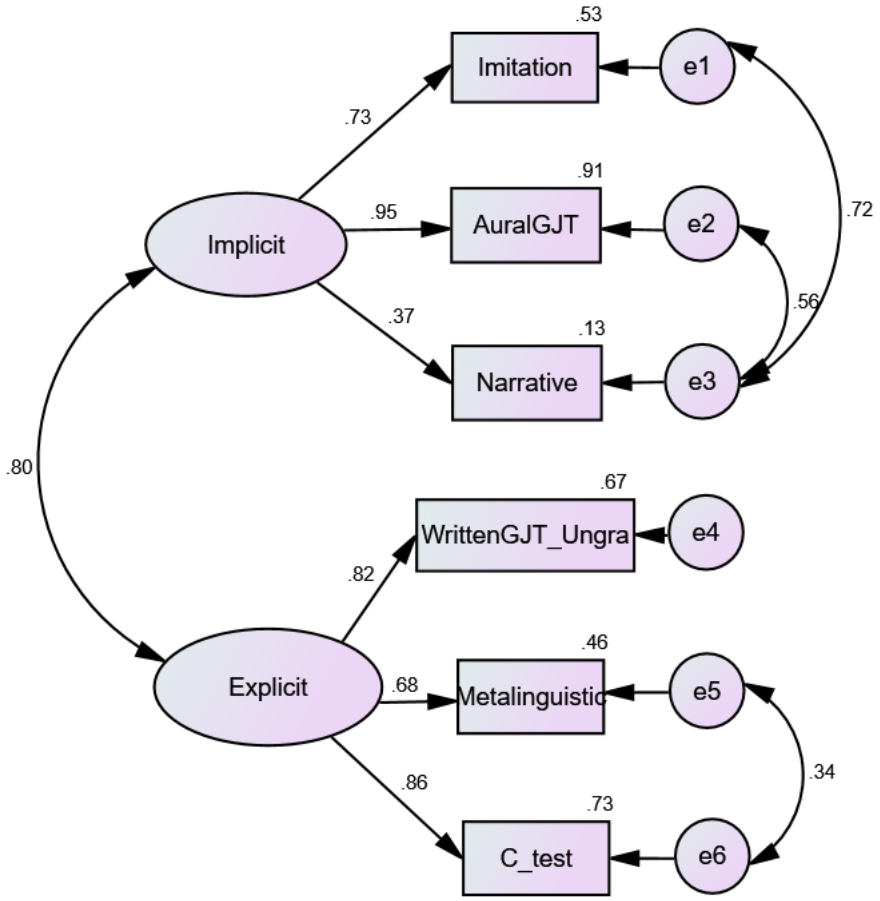

Figure 8. 2 Factor 6 OVs Rival model 2: Implicit vs. explicit model with ungrammatical items in written GJT, three sets of covaried items

The researcher decided to add the narrative test as another observed variable to the two-factor and five-observed-variable model with the C-test, because the narrative test has orality and meaning-focused elements. It was expected that the narrative test would load on implicit knowledge. Figure 5 demonstrates the results of the CFA adding the narrative test to the previous five variables in Figure 6. Based on the recommendation of modification indices, three sets of error terms were correlated

between: 1) the imitation test and narrative test, 2) the Aural GJT and narrative test, and 3) the metalinguistic test and C-test. In Figure 8, the summary statistics for the model fit are χ^2 = 8.323, *df* = 7, *p*= .305, NFI = .986, RMSEA = .019.

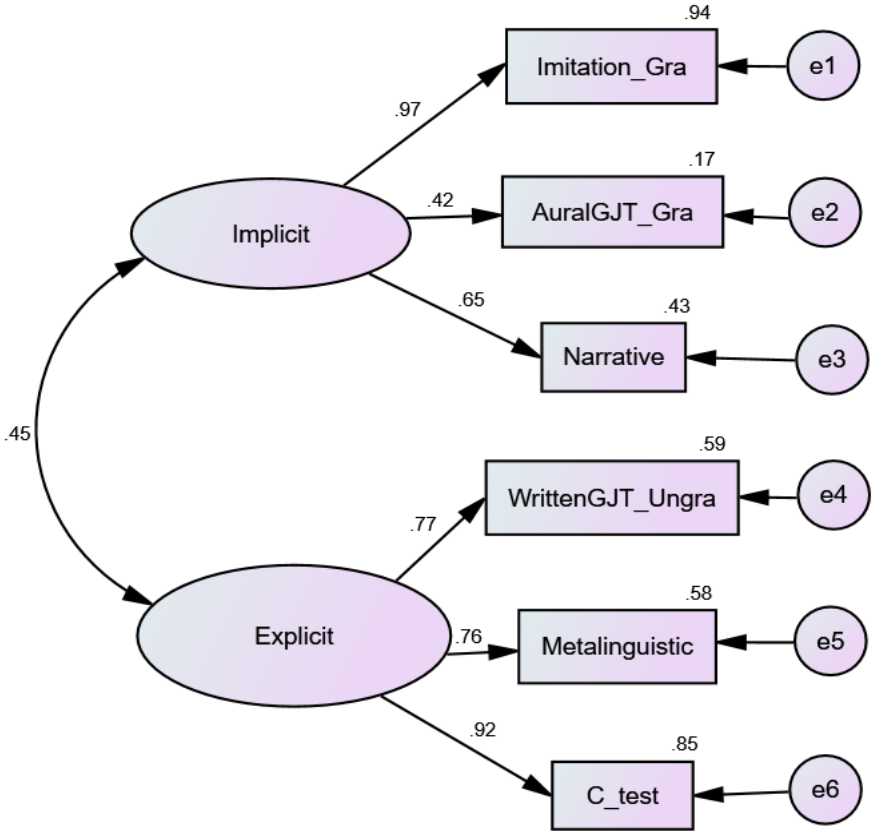

Figure 9. 2 Factor 6 OVs Rival model 6: Implicit (orality+grammatical) vs. explicit (literacy+ungrammatical) model

Finally, the researcher decided to combine two elements in a CFA: grammaticality and modality. It was expected that the narrative test and the grammatical items in the imitation test and Aural GJT would load on implicit knowledge, whereas the ungrammatical items in the Written GJT, metalinguistic test and C-test would load on explicit knowledge. In Figure 9, the summary statistics for the model fit are χ^2 = 11.339, *df* = 8, *p* = .183, NFI = .953, RMSEA = .064. The RMSEA index was above the desirable level of .05 (Brown, 2015).

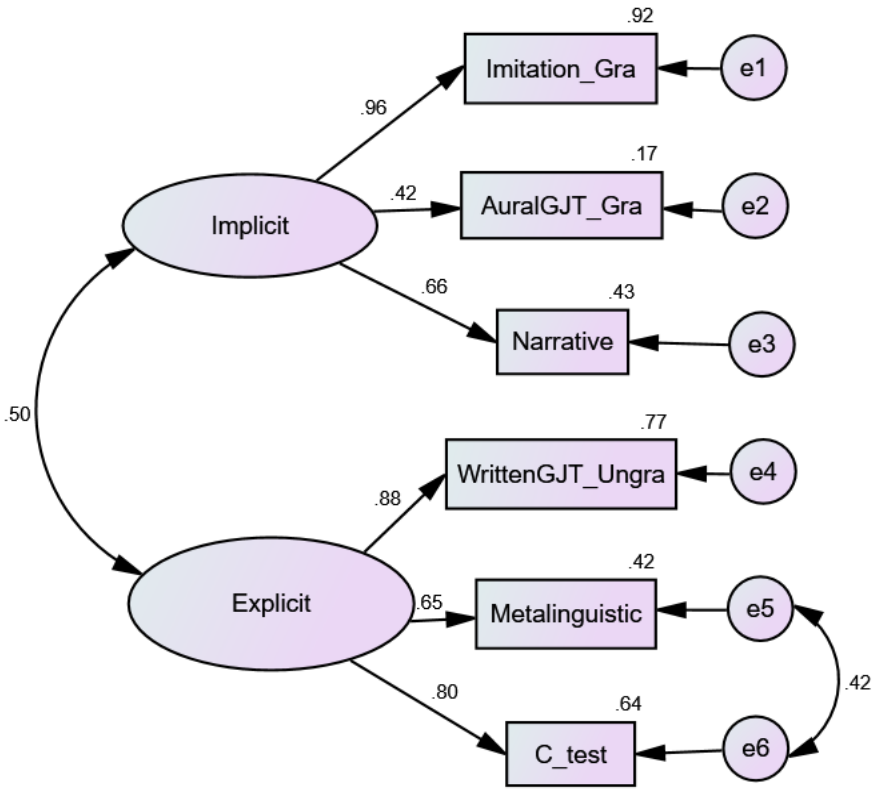

Figure 10. 2 Factor 6 OVs Rival model 6: Implicit (orality+grammatical) vs. explicit (literacy+ungrammatical) model with ungrammatical items in writtenGJT, one set of covaried error terms

Following the recommendation of modification indices from Figure 9, two error terms were correlated between the metalinguistic test and C-test. The fit indices became better. In Figure 10, the statistics for the model fit are χ^2 = 8.323, *df* = 7, *p* = .305, NFI = .966, RMSEA = .043. In this model, the standardized regression weight of the grammatical items of the aural GJT was .42, which is much lower than the desirable level of .7.

Table 16 summarizes the results of all the CFAs that were employed; the summary of the important indices from all CFAs is in Appendix E.

Table 16.

Summary of the important indices from the major CFAs

Observable variable (O.V.)	Factor	Models	INDEX					
			NFI (≥ .90)	RMSEA (.00≤RMSEA≤ .05)	χ^2 ($p \geq .05$)	*df*	CMIN/DF (0≤CMIN/DF≤2)	AIC (smaller than comparison model)
4 OVs	2	**Figure 1**. 2F-4-Default. 4 OVs Default Implicit vs. explicit	.998	.000	0.410 (*p*=.522)	1	.410 Heywood case	26.410
EIT, Aural GJT, **Written GJT,** Metalinguistic		**Figure 2**. 2F-4-Rival 1. 4 OVs Ungrammatical items in written GJT	.998	.000	0.483 (*p*=.487)	1	.483	26.483
	1	**Figure 3.** 1F-4-Rival-1. 1 Covaried error terms btw imitation and aural GJT	.998	.000	0.410 (*p*=.522)	1	.410 Heywood case	26.410
		Figure 4. 1F-4-Rival-2. 1 Covaried error terms btw written GJT and metalinguistic test	.998	.000	0.410 (*p*=.522)	1	.410	26.410
5 OVs	2	2F-5-C-test-Default 5 CVs Default: Implicit vs. explicit	.927	.269	25.201 (*p*=.000)	3	8.400	59.201
EIT Aural GJT Written GJT Metalinguistic **C-test**		**Figure 5.** 2F-5-C-test-Rival-1. 2 Covaried error terms btw written GJT and metalinguistic test, metalinguistic test and C-test	.998	.000	.656 (*p*=.418)	1	.656	38.656
		Figure 6. 2F-5-C-test-Rival-2. Ungrammatical items in written GJT	.972	.096	7.749 (*p*=.101)	4	1.937	41.749
		Figure 7. 2F-5-C-test-Rival-3. 2 Covaried error terms btw written GJT_ungra and metalinguistic test, metalinguistic test and C-test	.998	.000	0.677 (*p*=.411)	1	.677	38.677
6 OVs	2	2F-6-Rival-2. Ungrammatical items in written GJT	.873	.217	46.283 (*p*=.000)	8	5.783	84.283
EIT **Narrative test** Aural GJT Written GJT Metalinguistic C-test		**Figure 8.** 2F-6-Rival-3. Ungrammatical items in written GJT. 3 Covaried error terms btw aura GJT and narrative, narrative and imitation, metalinguistic and C-test	.986	.019	5.191 (*p*=.393)	5	1.038	49.191
		Figure 9. 2F-6-Rival-5. Orality+grammatical vs. Literacy+ungrammatical	.953	.064	11.339 (*p*=.183)	8	1.417	49.339
		Figure 10. 2F-6-Rival-6. Orality+grammatical vs. Literacy+ungrammatical. 1 covaried error terms btw metalinguistic test and C-test	.966	.043	8.323 (*p*=.305)	7	1.189	48.323

Table 17.
Chi-squared difference test results for models with overall good model fit indices

Observed variables		Model	χ^2	*df*	$\Delta\chi^2$	*Difference btw dfs*	*p*
4 Imitation Aural GJT Written GJT Metalinguistic test		1F-4OVs-Rival 1	0.410	1	-	-	-
		1F-4OVs-Rival 2	0.410	1	0	0	*P>.05*
		2Fs-4OVs-Default	0.410	1	0	0	*P>.05*
5 (4 OVs + C-test)	Whole items in written GJT	2Fs-5OVs-Default	25.201	3	-	-	-
		2Fs-5OVs-Rival 1	0.656	1	24.545	2	*P<.05*
	Ungra. items in written GJT	2Fs-5OVs-Rival 2	7.749	4	-	-	-
		2Fs-5OVs-Rival 3	0.677	1	7.072	3	*P>.05*
6 (5 OVs + Narra-tive test)	Ungra. items in written GJT	2Fs-6OVs-Rival 2	46.283	8	-	-	-
		2Fs-6OVs-Rival 3	5.191	5	41.092	3	*P<.05*
	Oral/ Aural +Gra. Vs. Lit.+ Ungra.	2Fs-6OVs-Rival 5	11.339	8	-	-	-
		2Fs-6OVs-Rival 6	8.323	7	3.016	1	*P>.05*

Note. OV means observed variable, and F means factor.

Models 1 Factor (F) -4-Rival 1, 2 F-5-Rival 2, and 2 F-6-Rival 5 were compared to the other nested models with acceptable fit indices in each category of the observed variables. Formal chi-squared difference tests were conducted by $\Delta\chi^2_{(df1-df2)} = \chi 2_{df1-df2}$ and were distributed as a chi-squared distribution with $df=df1-df2$ (Brown, 2015). Table 17 shows the results produced by the chi-squared difference tests. The tests demonstrate that two models were statistically better than their comparison models. First, in the category of the 2-factor model with five observed variables, (i.e., EIT, aural

GJT, written GJT, metalinguistic test, and C-test), the Rival 1 model was statistically better than the default model, $\Delta\chi^2_{(2)}$=24.545, *P*<.*05*. The Rival 1 model has two sets of error terms between: 1) written GJT and metalinguistic test, and 2) metalinguistic test and C-test; whereas the default model does not have covaried error terms. Second, in the category of 2-factor models with six observed variables (i.e., EIT, narrative test, aural GJT, ungrammatical items in the written GJT, metalinguistic test, and C-test), the Rival 3 model was statistically better than the Rival 2 model, $\Delta\chi^2_{(3)}$=41.092, *P*<.*05*. The Rival 2 model is the default model that has the ungrammatical items in the written GJT, whereas the Rival 3 has three sets of error terms between: 1) aural GJT and narrative test, 2) narrative test and imitation, and 3) metalinguistic test and C-test. However, the chi-squared difference test results should be interpreted only within a category of models with the same observed variables, since this test is based on nested models (Brown, 2015). Therefore, the formal chi-squared difference test results do not provide all of the necessary information to select the best model across models with different numbers of observed variables.

The next step was to examine the model fit indices via factor loadings of the observed variables in order to decide the best model. The results are in Tables 18 through 20.

Table 18.
Factor loadings of models with good model fit indices (4 observed variables)

Model	Imitation	Aural GJT	Written GJT	Written GJT Ungra	Metalinguistic
2F-4-Rival 1	.73	.96	-	.89	.65
1F-4-Rival1	.58	.76	1.06	-	.62
1F-4-Rival2	.73	.95	.85	-	.49

Note. All of the factor loadings are significant at the .001 level.

When 2 F-4-Rival 1 and 1 F-4-Rival 2 are compared, 2 F-4-Rival 1 is judged to have a better fit. First, the factor loading of the metalinguistic test in 1 F-4-Rival 2, .49, is below the desirable level, whereas that of 2 F-4-Rival 1 is good enough at .65. This difference means that the metalinguistic test in 2 F-4-Rival 1 explains 42% of the variance in the explicit knowledge construct, whereas in 1 F-4-Rival 2, the test explains only 24%. This undesirably low factor loading of the metalinguistc test, which is less than .5, could result in removing the factor from the path diagram, which worsens the results of the CFA. Thus, 2 F-4-Rival 1 has a better set of factor loadings on explicit knowledge than 1 F-4-Rival 2. Second, discriminant validity of 2F-4-Rival 1 is better than that of 1 F-4-Rival 2. Concerning factors, 2F-4-Rival 1 presents the two latent variables using two factors for each. By comparsion, in 1F-4-Rival 2 model, the same four variables are grouped into one factor. When other things are equal, a model with fewer observed variables per factor has a higher fit than a model with more indicators per factor (MacCallum et al., 1996). The reason is that more observed variables per factor provide a more powerful, precise test than a rival model with fewer observed variables (MacCallum et al., 1996). 1F-4-Rival 2 has four variables for a factor, whereas 2F-4-Rival 1 has two variables for each factor of the two. Third, theoretically a one-factor model cannot explain the current data of HL learners. If the one-factor is labeled explicit knowledge, there is not much explanation left for the 38 HL learners, who must have relatively little explicit knowledge, but also considerable implicit knowledge due to their early AoO, and also a considerable amount of input/output of Korean at home and in their social communities. Moreover, considering the fact that the 15 HL learners out of the total 38 had not received any Korean instruction at an institute, the one-factor

model labeled explicit knowledge looks problematic to explain this set of data.

Table 19.
Factor loadings of models with good model fit indices (6 observed variables)

Model	Imita-tion	Aural GJT	Narrative test	Written GJT	C-test	Meta-linguistic	Imitation_ Gra	AuralGJT_ Gra	Written_ GJT Ungra
2F-6-Rival 6	-	-	.66	-	.80	.65	.96	.42	.88
2F-6-Rival 3	.73	.95	.37		.68	.86	-	-	.82

Note. All of the factor loadings are significant at the .001 level.

Both models demonstrate a small factor loading of less than .6. The aural GJT_Grammatical items' factor loading in 2F-6-Rival 6 on implicit knowledge is .42. The narrative test's factor loading in 2F-6-Rival 3 on implicit knowledge is .37, which is lower than .6.

Table 20.
Factor loadings of models with good model fit indices (5 observed variables with C-test)

Model	Imitation	Aural GJT	Written GJT	Written GJT Ungra	Metalinguistic	C-test
2F-5-Rival3	.74	.95	-	.83	.61	.84
2F-5-Rival1	.73	.95	.97	-	.56	.77

Note. All of the factor loadings are significant at the .001 level.

2F-5-Rival 3 shows a better set of factor loadings on implicit and explicit knowledge than 2F-5-Rival 1, especially concerning the factor loadings of the metalinguistic test on explicit knowledge. Therefore, 2F-5-Rival 3 is a better model of the data than 2F-5-Rival 1.

When 2F-4-Rival 1 with the four observed variables is compared with 2F-5-Rival 3 with the additional C-test, 2F-5-Rival 3 is a more comprehensive model. 2F-4-

Rival 1 has four observed variables, whereas 2F-5-Rival 3 has five in total, including the C-test. When the data set is explained with a more complex five-variable model, choosing a simpler rival model with one less observed variable could lead to ignoring the significance of discriminating power, which in turn may lead to explaining the data set in an underidentified way. In other words, 2F-5-Rival 3 provides more information than 2F-4-Rival 1, which gives a more comprehensive explanation of the two-factor model by adding the C-test as another valid observed variable.

Another reason for selecting 2F-5-Rival 3 as the best model is that the two sets of covaried error terms in the model can be explained substantially—theoretically or conceptually. Usually, methodological effects cause covaried error terms (Brown, 2015). In CFA construct validation studies, covaried error terms are necessary to explain method covariance, such as in the analysis of observed variables obtained from different assessment modalities (Brown, 2015). In a questionnaire of multiple items, the effects are associated with similarly-worded, or reverse-worded items. From this perspective, two questions arise in the current study: 1) why and how are the errors not associated with the latent variable, explicit knowledge? and 2) why are they correlated? For the first question, the two sets of error terms of the writtenGJT_Ungrammatical items, metalinguistic test, and C-test are not associated with explicit linguistic knowledge due to their additional meaning-oriented reading process as well as form-focused processing. Since the participants had unlimited time for the tasks, they could have focused on meaning for comprehension as well as forms for grammatical accuracy. The latent variable—explicit knowledge—underlying the observed variable might not have explained their meaning-focused process and knowledge (R. Ellis, 2005; 2009). For the second question, concerning their correlations, covarying error terms means that the

involved indicators are similar in some aspects (Brown, 2015). The written GJT_Ungrammatical items and metalinguistic test are correlated arguably due to their sentence-level reading, whereas the metalinguistic test and C-test are correlated due to their paragraph-level reading. In fact, the metalinguistic test has two sections: sentence-level processing and discourse-level processing. In the sentence-level processing, the participants were instructed to choose the best explanation of the ungrammatical part in the sentence. In the discourse-level processing, they were asked to find examples of 17 target structures from the discourse-level text. Sentence-level meaning-oriented reading involves lexical access and from-clause-to-sentence integration using syntactic information, whereas discouse-level meaning-oriented reading, in addition to the previous processing for sentence-level processing, involves genre familiarity, discourse style, internal and external coherence, and building a macrostructure (Danks & End, 1987). The difference could have resulted in two separate sets of correlations: 1) one between error terms of the written GJT and metalinguistic test from sentence-level processing, and 2) the other between error variances of the C-test and metalinguistic test from discourse-level processing. Therefore, compared to the other models, 2F-5-Rival 3 model (Figure 10) was determined to be the best model based on the good model-fit indices and factor loadings.

3.3. Implicit knowledge

Research question 2 was; do the groups differ on the EIT and the aural GJT?

To answer this research question, the values of two observed variables (i.e., aural/oral imitation and aural GJT for implicit knowledge), were summed up and a one-way ANOVA was employed for the three groups.

Table 21 shows the results of the one way ANOVAs for the three groups concerning aural/oral EIT and aural GJT, both separately and combined.

Table 21.
Results of one-way ANOVAs on test scores for implicit knowledge

Test	*F* (*p* value)	Results of post-hoc analyses
Aural/oral imitation	40.82 (*p*=.000)	**NS > HL, **NS > L2, **HL > L2
Aural GJT	39.65 (*p*=.000)	**NS > HL, **NS > L2
Aural/oral imitation and Aural GJT	46.02 (*p*=.000)	**NS > HL, **NS > L2, *HL > L2

Note. The symbol > indicates that the first group's scores are significantly higher than those of the second group. One asterisk means that $p < .05$, and two asterisks mean that $p < .001$. Depending on the results from the tests of homogeneity of variances for each test, appropriate post-hoc tests were employed (Field, 2009).

For the aural/oral EIT and aural GJT separately and combined, native speakers showed significantly higher scores than HL or L2 learners. Concerning the aural/oral EIT, HL learners' knowledge was significantly larger than that of L2 learners. However, in the aural GJT, HL learners' mean score was not significantly different from that of L2 learners. When the two tests' scores were combined, HL learners demonstrated a significantly greater implicit knowledge than L2 learners did.

3.4. Explicit knowledge

Research question 3 was; do the groups differ on the Written GJT, the Metalinguistic test, and the C-test?

The three variables for explicit knowledge, which are written ungrammatical GJT, metalingustic test, and C-test, were summed up and a one-way ANOVA was run for the three groups. Table 22 demonstrates the results.

Table 22.
Results of one-way ANOVAs on test scores for explicit knowledge

Test	*F* (*p* value)	Results of post-hoc analyses
Written Ungrammatical GJT	25.51 (*p*=.000)	*NS > HL, **NS > L2,
Metalinguistic test	21.36 (*p*=.000)	**NS > HL, **L2 > HL,
C-test	48.86 (*p*=.000)	*NS > L2, **NS > HL, **L2 > HL
Written Ungrammatical GJT and Metalinguistic test	25.47 (*p*=.000)	*NS > L2, **NS > HL, **L2 > HL
Written Ungrammatical GJT, Metalinguistic test, C-test	41.47 (*p*=.000)	*NS > L2, **NS > HL, **L2 > HL

Note. The symbol > indicates that the first group's scores are significantly higher than those of the second group. One asterisk means that the significance is $p < .05$, and two asterisks means that $p < .001$. Depending on the results from the tests of homogeneity of variances for each test, appropriate post-hoc tests were employed (Field, 2009).

For the written ungrammatical GJT and metalinguistic test both separately and combined, native speakers demonstrated significantly higher results than the other two groups. Concerning the written ungrammatical GJT, HL learners' knowledge was not significantly different from that of L2 learners. However, on one hand, concerning the metalinguistic test, L2 learners' knowledge was significantly greater than that of HL learners. On the other hand, native speakers' metalinguistic knowledge was not significantly different from that of L2 learners. When both tests were combined, L2 learners' explicit knowledge was significantly greater than that of HL learners. When the C-test was added, L2 learners' explicit knowledge was significantly greater than that of the comparison group.

To fully understand the relationships between the tests and the learner groups in terms of the two types of linguistic knowledge, a discriminant function analysis (DFA)

was employed. The purpose was to see how the tests, in context of two functions, could discriminate between the native speakers, HL learners, and L2 learners. Table 23 demonstrates the summary of the results.

Table 23.
Summary of discriminant functions

Function	Eigenvalue	% of Variance	Cumulative %	Canonical correlation	Wilk's Lambda	Chi-Square	*p*
1	1.727	64.7	64.7	.796	.189	181.69	.000
2	.942	35.3	100	.696	.515	72.35	.000

The DFA identified two discriminant functions. Function 1 accounted for 64.7% of the total variance, canonical R^2 =.63, and Function 2 accounted for 35.3% of the total variance, canonical R^2 =.48. In combination, Functions 1 and 2 significantly differentiated HL and L2 groups, $\Lambda = 0.189$, $\chi^2(10) = 181.69$, p =.000. Removing Function 1 also indicated that Function 2 significantly differentiated HL and L2 learner groups, $\Lambda = 0.52$, $\chi^2(4) = 72.35$, p =.000.

Table 24 presents the standardized canonical discriminant function coefficients.

Table 24.
Standardized canonical discriminant function coefficients

Factor	Function 1	Function 2
Imitation	1.075	-.274
Aural GJT	.595	.201
Written ungrammatical GJT	-.099	.101
Metalinguistic test	-.846	-.229
C-test	-.625	1.066

The EIT, along with the aural GJT, had the opposite effect in comparison to the written ungrammatical GJT, metalinguistic test, and C-test concerning Function 1,

which differentiated the EIT/aural GJT from the written ungrammatical GJT/metalinguistic test/C-test. Comparatively, the EIT had a negative relationship with Function 2, whereas the written ungrammatical GJT and C-test showed positive relationships. Even though the aural GJT loaded on both Functions positively, the loading for Function 1 is stronger than that for Function 2, which was expected. In contrast, the metalinguistic test loaded on both Functions negatively. The researcher expected that there would be a negative relation of the test to Function 1 and a positive relation to Function 2. However, the magnitude of the negative loading to Function 1 is greater than that to Function 2. The small and negative loading to Function 2 may be related to the test's smallest loading to the explicit knowledge in the CFA model (See Table 20). Thus, these arguably evidenced the validity of this DFA. Based on the results, with due caution, the researcher suggests that Function 1 relates more to implicit knowledge, whereas Function 2 relates more to explicit knowledge.

Table 25 provides two functions at the group centroids.

Table 25.
Functions at group centroids

Group	Function 1	Function 2
L1	1.686	2.635
HL	1.435	-.843
L2	-1.124	.044

In terms of the mean function scores for each group, Function 1, consisting of the EIT and the aural GJT, differentiated L1 and HL groups from L2 learners. HL learners demonstrated a larger mean score than L2 learners. However, Function 2, consisting of the written ungrammatical GJT, metalinguistic test, and C-test, differentiated L1 and L2 groups from HL learners. HL learners showed a lower mean score than L2 learners. In sum, HL and L2 learners were two different groups in terms

of implicit and explicit linguistic knowledge, and L1 speakers had the largest amounts of both types of linguistic knowledge.

Figure 11 presents the visual representation of the group centroids. Function 1 separates the L1 and HL groups from L2 groups clearly. This supports that Function 1 is more related to implicit knowledge. In comparison, Function 2 does not differentiate the HL group from L2 group. Instead, Function 2 separates the L1 group from the other two groups. Considering the fact that this data set encompasses the whole groups from native speakers of Korean, HL learners, to L2 learners, the amount of explicit knowledge of native speakers seems to be much larger than the other two groups' due to the L1 speakers' education at schools. That might be why this DFA failed to differentiate the HL and L2 leaner group's explicit knowledge effectively.

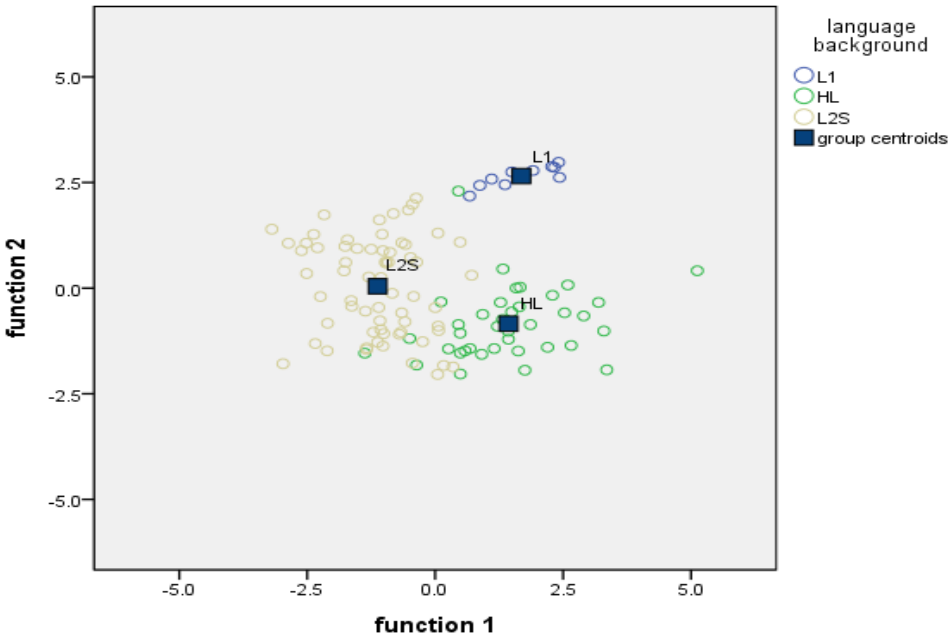

Figure 11. Canonical discriminant functions

CHAPTER 4. DISCUSSIONS

With this study, I investigated HL and L2 learner's implicit and explicit linguistic knowledge of Korean, focusing on test validity and comparisons between the two types of knowledge for each group. The results summarize that as the best model fit, a two-factor model with five observed variables—i.e., the imitation test, aural GJT, written GJT, metalinguistic test, and C-test—demonstrated the best results. Concerning implicit knowledge, the HL learners showed significantly better results in the EIT and aural GJT. In terms of explicit knowledge, the L2 learner group performed significantly better in the written GJT, metalinguistic test, and C-test.

4.1. Research question 1: Measurements

The first research question asked whether scores on the five tests would load on two separate factors—one representing implicit knowledge, and the other representing explicit knowledge.

4.1.1. Valid measurements

Concerning valid tests for measuring implicit and explicit linguistic knowledge relatively separately, several types of tests have been investigated and found valid. For implicit knowledge, aural/oral EITs (Erlam, 2009; Kim & Nam, 2016; Spada, Shiu, & Tomita, 2015), oral narrative tests (Bowles, 2011; Ellis, 2005), and timed GJT (Bowles, 2011; Ellis, 2005, Kim & Nam, 2016; Zhang, 2015) have been studied and found valid. In comparison, for explicit knowledge, the untimed written GJT (Bowles, 2011), ungrammatical items in untimed written GJTs (Ellis, 2005; Zhang, 2015), and metalinguistic tests (Bowles, 2011; Elder, 2009; Ellis, 2005; Kim & Nam, 2016) have

been investigated and found valid. In addition, more tests have been studied with the intention of measuring implicit knowledge even if the focus of some studies was not exclusively the validity of the measurements: word monitoring tasks (Godfroid, 2015; Suzuki & DeKeyser, 2016) and aural GJTs (Abrahamsson, 2012; Abrahamsson & Hyltenstam, 2008; Bialystok, 1979, 1982; Granena, 2012; Kim & Nam, 2016).

The results of the EIT in the current study replicated the results of previous studies, which supported the claim that the EITs tap implicit knowledge (Bowles, 2011; R. Ellis, 2005; Spada et al., 2015; Zhang, 2015). Spcifically, Kim and Nam (2016) found that the EIT loaded on strong implicit knowledge, whereas timed aural and written GJT loaded on weaker implicit knowledge. The differences between the two tests were indirectly confirmed in the current study. In this study, both of the EIT and aural GJT loaded on implicit knowledge. However, the EIT demonstrated significantly lower mean scores of HL and L2 learners compared to those of the aural GJT. This discrepancy is potentially due to the EIT's production element, which the aural GJT does not have and, therefore, represents an additional task component to the aural mode of the EIT. For native speakers, the difference in the scores of the aural GJT and the EIT was not significant, M = .802, p = .640 (See Table 12). However, the difference between the HL learners' scores for the two tests was significant, M = -8.39, p < .001; and so were the L2 learners' results, M = -18.64, p < .001. Moreover, the HL learners' EIT scores, M=58.20, were significantly higher than those of L2 learners, M= 46.02, p=.001. However, concerning the aural GJT scores, the HL group, M=66.60, was not different from the L2 group, M=64.66, p=.367. These results suggest that different tasks require different cognitive loads, leading HL and L2 learners to tap into knowledge differently to varying degrees. In the current study, the EIT and aural GJT were similar in: 1) using natural time constraints, and 2) using aural mode except the EIT required production

process in addition to decision on grammaticality, just like the aural GJT. According to Laufer and Goldstein (2004), strength of knowledge can be explained using two sets of concepts: *active/passive* and *recall/recognition*. They suggested that a hierarchy of four degrees of strength exist from the strongest to the weakest in the order of active recall, passive recall, active recognition, and passive recognition. They claim that stronger knowledge requires deeper processing (Laufer & Goldstein, 2004). Considering that L2 learners have a limited attentional capacity (McLaughlin, Rossman, & McLeod, 1983), the cognitive load that tasks require should be appropriate compared to learners' individual capacity and proficiency levels for successful performance. When cognitive loads for EIT and aural GJT are compared in the current study, the EIT most likely requires learners to go through deeper processing of stronger knowledge. This might have resulted in the discrepancy of their mean scores. In addition, the EIT's deeper processing might have taken a larger toll on the L2 learners, reflecting their smaller amount of implicit knowledge than that of HL learners. However, this claim should be supported by further research on grammar knowledge because Laufer and Goldstein's study (2004) was about vocabulary.

4.1.1.1. Aural GJT

Considering L2 learners' relatively high mean score on the aural GJT compared to their EIT score, how learners process linguistic information when they do not meet the limits of their cognitive capacity might provide useful hints. When the cognitive capacity of proficienct L2 learners is more than the cognitive load that a test requires for measuring implicit knowledge, their remaining cognitive capacity would raise their monitoring and awareness level. This could keep learners from depending on only spontaneous and effortless implicit knowledge, and sequentially enabling them to tap into explicit knowledge. This seems to suggest that the short sentences in the aural GJT

did not use up L2 learners' cognitive capacity. Therefore, either artificial time constraints or more complex sentences could have enabled learners to access implicit knowledge relatively exclusively, as planned.

The relatively strong loading of the Aural GJT on implicit knowledge demonstrates that modality can be another important factor for measuring two types of linguistic knowledge relatively separately. The results can be explained and supported from two perspectives. First, aurality/orality—aural/oral language talk or conversational interaction—is natural, therefore spontaneous, whereas literacy is not. L1 speakers do not learn how to segment streams of sound consciously or intentionally. They just listen and pick up the phonological information during a narrow period, which ranges from the ages of 1 to 5 (Hulstijn, 2015; Paradis, 2009) or 6 (Abrahamsson, 2012) and, in a timely manner, produce the L1 after they are exposed to continous input; primarily they acquire the language implicitly. Therefore, speech—orality—is considered as the primary, fleeting, and unconscious form of language in natural communication (Danks & End, 1987). Comparatively, in literacy acquisition, learners learn consciously and intentionally how to decode the written language in words, phrases, sentences, and discourse (Horowitz & Samules, 1987, p. 9). All *living* languages are primarily used through the aural/oral medium and languages remain alive even without their writing systems, making literacy secondary. Thus, literacy—written language text—is a secondary, artifactual, permanent, and conscious form of communication, which restructures consciousness (Horowitz & Samules, 1987). In addition to the ideas of primary orality and secondary literacy, implicit linguistic knowledge is generally said to be primary, stable, and pervasive, whereas explicit knowledge is generally said to be secondary, unstable, and peripheral for language learners (Dörnyei, 2009; N. Ellis, 1994; R. Ellis, 2004; R. Ellis et al., 2009; Reber, 1993). Such arguments can

generally—still arguably—be summed up as claiming that implicit knowledge acquired through aurality/orality should be primary, whereas explicit knowledge obtained through literacy should be secondary, especially for L1 speakers and even highly proficient L2 learners. Therefore, it follows that implicit and explicit knowledge could be measured through different modalities because different modes prevail in different types of learning, resulting in different types of knowledge (Bialystok, 1979; Montrul, 2008; Granena, 2012). Accordingly, basic linguistic knowledge of adult heritage speakers—early bilinguals—seems to be acquired in childhood like an L1. HL learners' processing and storing of what is heard should be automatic and accurate like L1 speakers due to the two groups' similar age of onsets (AoOs). This means that HL learners' knowledge should be similar to L1 speakers' to some degrees, but different from L2 learners' (Montrul, 2004, 2008). This prediction was confirmed from the results that implicit knowledge measured from the aural/oral elicited imitation (EI) test and aural GJT of HL learners was significantly larger than that of L2 learners.

Second, the aural GJT—as a means for measuring aurality—has an inherent time constraint, which is similar to timed written GJTs. Previous studies used written GJTs with time pressure to measure the implicit knowledge of learners (Bowles, 2011; Ellis, 2005; Godfroid et al., 2015; Gutiérrez, 2012; Zhang, 2015). In the current study, the aural GJT was utilized for the same purpose. The timed GJTs in previous studies and the aural GJT in the current study have one thing in common: time constraints. For the timed written GJTs, 120 % of the time that native speakers had spent in judging the grammaticality of the items in the GJTs was allocated *artificially*. On the other hand, the aural GJT in the current study is inherently time-constrained. It is maintained when humans hear the sound stream of L1 or L2, their attention-limited phonological storage holds the information for about two seconds (Ardila, 2003; Cole & Pickering, 2015).

Afterward the information decays when it is not rehearsed sub-vocally using a sub-vocal rehearsal system in the phonological loop—a slave component of the central executive in their working memory (Baddeley, 2003). It is hard to tell that no participant engaged in subvocalization, but the researcher found that no participant engaged in audible subvocalization. Therefore, it seems that the learners' time for sub-vocal rehearsal could have been somewhat limited, if not eliminated. The aural GJT had natural time constraints and this factor arguably facilitated the learners' access to implicit knowledge like timed written GJTs. Nonetheless, the natural aural GJT might not completely have prevented the participants from sub-vocally repeating what they heard and from focusing on the problematic parts in the GJT items. If they repeated, these attention-drawing processes would hinder them from accessing implicit knowledge totally separately from explicit knowledge. To suppress the learners' potential sub-vocal rehearsal, making the items in aural GJTs longer and more complex might be a solution to the issue of potential sub-vocal rehearsal. Moreover, combining time pressure with the aural element might make aural GJTs (Granena, 2012; Kim & Nam, 2016) and EIT (Kim & Nam, 2016) more fine-grained as valid measures of implicit knowledge, distinguishing differences in representations of linguistic knowledge between HL and L2 learners. Actually, in previous research, aural GJTs have been utilized for the purpose of eliciting implicit knowledge (Abrahamsson, 2012; Abrahamsson & Hyltenstam, 2008; Bialystok, 1979, 1982; Granena, 2012) and this received empirical support (Kim & Nam, 2016). In the current study, the natural aural GJT was arguably supported as an authentic way for gauging implicit knowledge similar to timed written GJTs, highlighting orality as a valid factor like time constraints in GJTs. This addition would enrich the thread of research on valid measurements for implicit and explicit linguistic knowledge.

4.1.1.2. Written GJT

Concerning the written GJT, two major factors—time pressure and grammaticality—have been highlighted in previous research. Time pressure has been an important factor in studies for L2 learners to distinguish tests for implicit knowledge from those for explicit knowledge in written GJTs (Bowles, 2011; Ellis, 2005, Godfroid et al., 2015; Kim & Nam, 2016; Zhang, 2015). The assumption is that, under time pressure, learners resort to automatic and proceduralized processing, leading them to access implicit knowledge (Ellis, 2005). However, without time pressure, learners can tap into either explicit or implicit knowledge. In further explaining the relationship between time constraints and the linguistic knowledge that learners access, grammaticality seems to play an important role, depending on the item similarities. When items in written GJTs are repeated in timed and untimed contexts sequentially, the grammaticality of the items could be an important factor in measuring implicit and explicit knowledge separately. In studies using L2 learners, R. Ellis (2005) and Zhang (2015) found that only the ungrammatical items in the untimed written GJTs loaded highly onto the factor of explicit knowledge, but not grammatical items. This demonstrates that the grammaticality plays an important role for learners in accessing explicit knowledge when there is no time constraint. This means that if the items of a GJT have a rigorous restriction, implicit knowledge can be measured through timed GJT regardless of the grammaticality. This was also confirmed in the current study. It is noteworthy that R. Ellis (2005) and Zhang (2015) utilized the same items for the timed and untimed written GJTs. In comparison, Bowles (2011) utilized, in the untimed GJT, different tokens of the same type of items from the timed GJT. The results were that the entire untimed GJT, regardless of their grammaticality, loaded highly onto the factor of explicit knowledge, which attenuated the importance of grammaticality in the untimed

written GJT. These different results could demonstrate the confounding learning effects of repetition on learners when the same sentences were administered consecutively in the timed and untimed written GJTs. In other words, learners might tap into linguistic knowledge differently, depending on the item similarities or differences in two sequential GJTs. When the items in the two GJTs are the same, their learning effects might automatize the learners' grammaticality judging process. In this case, the different types of knowledge, which learners are supposed to access due to time pressure in timed and untimed GJTs, might be blurred, enabling learners to process items in the untimed GJT more quickly as a whole. Thus, processing grammatical items in the untimed written GJT becomes more proceduralized and requires a less analytic approach. This means that in the untimed GJT, to a lesser degree, learners need to analyze the items consciously or take advantage of time as planned by researchers. When the items are different tokens in the GJTs, however, grammatical items in the untimed written GJT still require some degree of conscious analysis (Bowles, 2011; Loewen, 2009), making absence of time constraints an important factor for measuring explicit knowledge. This is also true for a sequence of aural and written untimed GJTs as substantiated in the current study where the same items were utilized in the two consecutive GJTs. Regardless of the different modes, only ungrammatical items in the untimed GJT loaded highly onto explicit knowledge. Therefore, different modalities do not affect the learning effect generated from the same items in two consecutive GJTs. In summary, grammaticality can be an important factor in measuring implicit and explicit knowledge separately when the presented items are the same in two consecutive GJTs, and the second GJT is not under time constraints. However, if the items are different tokens for the same target structures, time pressure, in itself, is a significant factor for measuring the two types of knowledge relatively separately. In addition, these results hold true

regardless of modality.

4.1.1.3. C-test

In previous studies, a C-test has been designed for the purpose of gauging the readability of L1 speakers related to comprehension and aptitude (Taylor, 1957), and later used for L2 learners (Lee-Ellis, 2009; Oller, 1972; Tremblay, 2011; Tremblay & Garrison, 2010). In this study, the C-test was first utilized to gauge the participants' proficiency, where the participants engaged in decoding while reading the passages with blanks, and encoding while filling up the gaps through writing in visual mode. Unexpectedly, the C-test turned out to be a valid measure of explicit knowledge, which can be justified based on Ellis' criteria (2009) to operatinalize the constructs of L2 implicit and explicit knowledge. First, in terms of the degree of awareness, a C-test involves heavy literacy dependence and a written mode that is associated with a controlled production aspect, which enhances learners' monitoring of linguistic forms. Therefore, a C-test naturally encourages learners to use 'rules' to respond correctly. Second, the time limit for the C-test in the current study was 20 minutes. Considering the fact that almost all participants finished the test in time—with the exception of a couple of low-level participants—time pressure for the test was quite limited. This ample time could restrict learners from utilizing automated and spontaneous knowledge for the C-test. Third, the C-test requires focus on form. It primarily asked for correct forms of Korean structures such as particles, conjugations of the verbs and adjectives, conjunctives, and collocational words. The learners were supposed to pay careful attention to all the candidates they could think of and determine the correct forms for the blanks. Fourth, regarding systematicity of Ellis (2009), the C-test resulted in variable responses, which was confirmed by the highest standard deviations (SDs) among the tests for both groups in the current study (See Table 12). Finally, in terms of

learnability, the C-test favored L2 learners who have received form-focused instruction. This was confirmed by the significantly better score of L2 learners compared to that of HL learners in the results (See Table 13). In addition, C-tests could be a good candidate as a written counterpart of EITs. Its reading/written mode and production elements would make the test a valid measurement of explicit knowledge compared to EIT's aural/oral mode, and its production elements as a valid measure of implicit knowledge. Therefore, in addition to the aforementioned criteria that Ellis suggested (2009), modality—orality and literacy—could be a valid candidate as a criterion to operationalize the contructs of L2 implicit and explicit knowledge relatively separately.

In sum, the topic of fine-grained and valid measurements of implicit and explicit knowledge requires more rigorous study in the future, but such studies should be conducted with a comprehensive battery of tests, which contains a whole gamut of tests concerning dichotomies such as orality/literacy, with and without time pressure, decision/production, and meaning/form. Therefore, EITs, timed/untimed written GJTs, aural GJTs, metalinguistic tests, and C-tests—along with other new measures such as a word monitoring test—should be investigated in *one* study with proper rival models to find if the tests measure two types of knowledge with construct validity.

Table 26 summarizes the five tests based on the criteria to separate implicit and explicit linguistic knowledge of HL and L2 learners of Korean. This table demonstrates the tests according to the categories of grammaticality, time pressure, modality, and production. Time pressure, aural/oral modes seem to be important factors for measures of implicit knowledge, whereas limited or no time pressure and visual mode seem to be influential on measures of explciit knowledge. Concerning production, the EIT and C-test, which are at the ends of the continuum between implicit and explicit knowledge, have a production element. When cognitive load is enhanced using a production test,

learners might have a strong tendency to utilize either implicit or explicit knowledge relatively exclusively. That might mean that learners cannot tap into both types of knowledge with flexibility when they engage in a more cognitively taxing task. This postulation is supported by the results of the DFA (See Table 24). The EIT and C-test's standardized canonical discriminant function coefficients for Fuctions 1 and 2 are highest among the factors. Therefore, deeper processings of tasks with a production element seem to tap into stronger and pure knowledge.

Table 26.
Five tests and criteria to separate implicit and explicit knowledge

Category	Test	EIT	Aural GJT	Written GJT	Meta-linguistic test 1	Meta-linguistic test 2	C-test
Grammaticslity	Ungrammatical	Yes	Yes	Yes	Yes	n/a	Yes
	Grammatical	Yes	Yes	Yes	No	n/a	Yes
Time pressure		Yes	Yes	No	No	No	Limited
Modality	Aurality	Yes	Yes	No	No	No	No
	Orality	Yes	No	No	No	No	No
Production		Yes	No	No	No	No	Yes

Note. * means that the time pressure and production elements of the C-test were limited because 1) the time limit was 20 minutes, and 2) they were supposed to produce relevant syllables in context, not whole words or sentences.

4.1.2. Models

Regarding the proper factor model of implicit and explicit knowledge, results of the current study confirmed that a two-factor model was valid, which aligns with the findings of previous studies (Bowles, 2011; R. Ellis, 2005; Zhang, 2015). The three previous studies' scopes have been extended from learners of English as L2 (R. Ellis, 2005), to Spanish learners of Spanish as FL and HL (Bowles, 2011), and to learners of

English as FL (Zhang, 2015). These studies, as well as the current study, found the two-factor model of implicit and explicit knowledge valid regardless of language, target structures, or types of learners. In the currenty study, the two-factor model also seems to be favored over a one-factor model. Among the total 32 CFAs using the data set, six models showed good fit indices (See Appendix E or Table 16 for a summary version). For models with four observed variables, one two-factor model (2 Factor 4 Observed variables Rival 1) and one one-factor model (1 Factor 4 Observed variables Rival 2) demonstrated good model fit indices without Heywood cases. Even if the two-factor model's factor loadings were stronger than those of the one-factor model, the model fit indices were comparable with each other. However, when the number of observed variables increased from four through five to six, none of the one-factor models presented good model fit indices, whereas the two-factor models demonstrated four models with good fit indices. These results support that two-factor models explain the data set in a more valid way than one-factor models regardless of various contexts such as numbers or combination types of observed variables. In this case, the two-factor model might have better discriminant validity than the one-factor model by explaining the data set with more discriminating power. In comparison, the one-factor model explains the data in an underidentified way, increasing the risk of empirical underidentification (Brown, 2015).

Moreover, the results of the discriminant function analysis (DFA) also supported the two-factor model (See Tables 19-20). In the statistical analyses, the data of native speakers were also included and this confirmed that one of the factors in the two-factor model is highly likely to be implicit knowledge rather than an automatized type of explicit knowledge. Moreover, the first factor explains a total 64.7 % of the variance. This is the majority of the variance, which is also in line with the claims that

implicit knowledge is primary whereas explicit knowledge is secondary and peripheral (Dörnyei, 2009; N. Ellis, 1994; R. Ellis et al., 2009; Reber, 1993; Rebuschat, 2013). (See Results section for detailed information):

The results of the current study suggest that adding HL learners' linguistic data to L2 learners' is a great support for investigating the nature of L2 learners' linguistic knowledge. Previous research suggests that the concept of L2 learners' implicit and explicit knowledge can be explained using a dissociated dichotomy (Bowles, 2011; Ellis, 2005; Spada et al., 2015; Zhang, 2015). However, DeKeyser (2003) explains L2 learners' knowledge using the concepts of proceduralized or automatized explicit knowledge and analyzed explicit knowledge. When a data set comes from only L2 learners, it can be posited that L2 learners' knowledge measured through an EIT, timed GJT, or aural GJT might be either implicit knowledge or proceduralized explicit knowledge (DeKeyser, 2003; Suzuki & DeKeyser, 2015). However, when data from L2 and HL learners are combined and the sample size is large enough, the results should be interpreted from a new perspective. Thus, it is logical to presume that HL learners, due to their special learning environment since birth, should possess a considerable amount of implicit knowledge and varied degrees of explicit knowledge, depending on their periods of instruction. If the two groups do not violate test invariance and the equivalence of the measurement model is determined from multiple-group solutions using CFAs, the L2 learners' *presumed implicit knowledge* should arguably be as implicit as the HL learners', not *proceduralized explicit knowledge*. However, if the two groups' data violates any significant measurement invariance, this means that the tests measure different skills/constructs in the groups. In such cases, the discrepancy suggests that the nature of HL learners' implicit knowledge is different from that of L2 learners, which might be proceduralized explicit knowledge. Thus combining the HL group's

data with L2 learners' could help interpret CFA results correctly, qualifying similarities and differences of HL and L2 learners' two types of linguistic knowledge. However, it is too early for a final verdict. For more fine-grained and valid measurements, EITs, timed written GJTs, and aural GJTs along with other measures should be investigated in *one* study with HL and L2 learners using proper rival models.

4.2. Research questions 2 and 3: Similarities and differences of the two groups

Research questions 2 and 3 concern similarities or differences between HL and L2 learner groups' two types of knowledge. HL and L2 learners' learning trajectory is different from L1 speakers' in terms of AoO, input, and ultimate attainment. In addition, HL learners' language learning profile is also different from L2 learners' regarding AoO, input, and types of linguistic knowledge. Therefore, it is necessary to investigate the roles of AoO and input for explaining those differences between L1, HL, and L2 learner groups.

4.2.1. Various learners

HL and L2 learners' linguistic knowledge of a target language is similar in that it consists of incomplete implicit and explicit linguistic knowledge compared to the knowledge and the ultimate attainment of native speakers (Montrul, 2008). Previous research demonstrates that, in varying degrees, L1 monolinguals possess larger implicit and explicit knowledge than the compared groups —both in orality and literacy (Bowles, 2011; Ellis, 2005; Montrul, 2008). These are presumably attributed to the combination of early AoO and ample input (Bley-Vroman, 1990; Lenneberg, 1967). In comparison to L1 speakers, HL learners do not receive enough or sustained input except for considerable initial exposure at a very early age in the context of family and community.

Adult late L2 learners usually do not receive input before age 14, which indicates a lack of input *and* late AoO. In the current study, a rough measure of the three groups' self-reported input amounts[1] from the bio-data questionnaire demonstrates that the L1 groups' input amount was significantly larger than those of the HL group and L2 group (F=800.79, p<.001) throughout their lives, before age 14 (F=823.01, p<.001), after age 14 (F=340.86, p<.001), and after age 18 (F=340.86, p<.001). These results suggest that the two comparison groups' unsustained input throughout their lives, *and* especially, the L2 group's late exposure to Korean might contribute to the different characteristics of linguistic knowledge (Muñoz, 2014).

The L1 to L2 learners' differences in linguistic knowledge can be explained by the Fundamental Difference Hypothesis (FDH) (Bley-Vroman, 1990). According to the hypothesis, children acquire their L1s through Universal Grammar (UG) using domain-specific and deductive linguistic mechanisms, whereas L2 learners utilize domain-general and inductive problem-solving mechanisms due to a loss of plasticity and progressive brain lateralization (Birdsong, 2005). Therefore, in the current study, the result that there are significant differences in the amounts of two types of linguistic knowledge between L1 speakers and L2 learners arguably indicate that the two groups' linguistic mechanisms might be different qualitatively as well as quantitatively. On the other hand, the L1 learners' differences in linguistic knowledge from HL learners demonstrate the importance of amount and nature of input. In terms of both implicit and

[1] **Table 27.** *The input amounts by groups (%)*

Age	Group	L1(n=11)	HL(n=38)	L2(n=65)
Total		100	27.21	7.05
Before 14		100	31.41	0
After 14		100	21.60	16.51
After 18		100	17.44	22.88

Note. This was measured roughly using their self-reports. The input amounts were converted in percentage scale by group. The question items in the questionnaire dealt with natural context such as input from parents, relatives, friends, and community schools. After the age of 18 in college, an additional question about regular class was added.

explicit knowledge, HL learners' linguistic knowledge is significantly smaller than that of L1 speakers. Even if HL learners' AoO is similar to L1 speakers, early AoO is not good enough to guarantee that HL learners' sizes and ultimate attainments of implicit and explicit knowledge are comparable to L1 speakers. Actually, the HL learners' input amount was significantly smaller than that of L1 speakers during every time period in question, emphasizing the importance of ample, sustained, and proper input for the two types of knowledge to develop throughout their life-long language learning process.

4.2.1.1. Input and age

Comparisons between the HL and L2 groups' AoO, input amount, and size of linguistic knowledge suggest a more complex picture. In the current study, the total amount of input of HL learners was significantly larger than that of L2 learners (F=175.392, p<.001). If input amount is the only factor to influence two types of linguistic knowledge, HL learners' both types of knowledge should be larger than those of L2 learners. However, this study showed that only implicit knowledge of HL learners was significantly larger than that of L2 learners, but not explicit knowledge. Therefore, this result suggests that the input amount does not explain every aspect of two types of linguistic knowledge between the two groups. In addition to input amount, AoO and instruction, should also be important factors for the explanation.

A review of the input table demonstrates that the HL learners received a significantly larger amount of input than the L2 learners before 14 years of age—an approximate terminus among the ending ages in critical periods such as age 12 (Scovel, 2000), ages 12-13 (Lenneberg, 1967), and age 15 (Johnson & Newport, 1989). However, their input amounts decreased as they became more assimilated into the society where their dominant language was used. After age 18, the HL learners' input amount became significantly smaller than the L2 learners', even though the HL learners' implicit

knowledge was significantly larger than that of the L2 learners. This means that AoO and considerable amounts of input are important factors in explaining HL learners' large base of implicit knowledge. Concerning the L2 learners, before age 14, their input amount was none. After age 14, the L2 learners' input was still significantly smaller than that of HL learners (F=7.253, p=.008). However, after age 18, when the L2 learners received instruction and took courses in college, their input amount was significantly larger than that of the HL learners (F=5.304, p=.023). This means that the L2 learners were exposed to a considerable amount of input while they were living and learning in Korea. The L2 learners' explicit knowledge was significantly larger than that of HL learners' where linguistic knowledge is concerned. Considering the facts that the L2 learners started learning Korean after age 14 and received their significantly large amount of input from instruction after age 18, the researcher suggests that as far as explicit knowledge is concerned, AoO is not as important as the amount and nature of input for both L2 and HL learners.

According to the FDH (Bley-Vroman, 1990), children access a domain-specific linguistic mechanism for their L1 acquisition, whereas adults access domain-general cognitive mechanisms for their L2. This idea has been developed with the neuro-cognitive approach (Paradis, 2004) suggesting that domain-specific linguistic mechanisms using UG lead to primarily implicit learning and, therefore, primarily implicit knowledge (Bley-Vroman, 1990; DeKeyser, 2000; Ellis, 2009). In comparison, domain-general cognitive mechanisms using L2 learners' L1 inventory lead to an explicit learning process and primarily explicit knowledge (Bley-Vroman, 1990; DeKeyser, 2000; Ellis, 2009). The HL learners' larger implicit knowledge than that of L2 learners attests that the HL learners' learning process at an early age is basically the same as that of L1 speakers: natural and implicit learning due to their early AoO and a

significantly larger amount of input than L2 learners. However, sustained input afterwards decides the sizes and types of linguistic knowledge, guaranteeing the same ultimate attainment as native speakers'. However, L2 learners' larger explicit knowledge attests that their learning mechanism and input type of the learning are different from those of HL learners in nature. Thus HL learners' larger implicit knowledge and L2 learners' larger explicit knowledge are relevant to; 1) the FDH (Bley-Vroman, 1990), and 2) CPH. First, the FDH suggests that early simultaneous L2 learners' domain-specific and UG-related learning mechanism concerns implicit knowledge, and late L2 learners' domain-general and non-UG-related mechanism concerns explicit knowledge (Montrul, 2009). Second, CPH suggests that obtaining implicit knowledge requires ample amount of input during a proper time period—early AoO (Lenneberg, 1967). Accordingly, the postulation is supported that unlike implicit knowledge, explicit knowledge does not require early AoO as much as ample analysis-focused input after puberty (DeKeyser, 2000).

4.2.1.2. Orality and literacy

Modality should be emphasized more when the amounts of HL and L2 learner groups' linguistic knowledge are compared due to the two groups' different advantages in terms of listening and reading skills. Most studies using time constraints as a factor in written GJTs investigated L2 learners' two types of knowledge, not HL learners' (Ellis, 2005; Granena, 2012; Gutiérrez, 2012; Zhang, 2015). Unlike L2 learners, HL learners spend their early learning period with their Korean-speaking family members. They start to acquire the phonological segments of Korean in aural/oral modes. Thus, using a written mode might not let HL learners access their implicit knowledge as well as an aural mode, especially when they do not have enough literacy or code-focused explicit instruction. Actually, Bowles (2011) compared HL and L2 learner groups' knowledge

using written GJTs with or without time constraints. In her study, the HL learners were taking college instruction just as their L2 counterparts. Therefore, the two groups' reading skills of the target language were comparable. However, in the current study, 15 of the 38 HL learners have not received college instruction in Korean, whereas the L2 learners have considerable amounts of literacy from instruction at college. These unequal reading skills between the two groups might have confounded the comparison results in favor of L2 learners, rendering the two groups' implicit knowledge unjustifiably unbalanced in favor of the L2 learners. In this context, the researcher presumed that using modality as a factor might let HL learners assess implicit knowledge with validity.

HL and L2 groups' differences in their linguistic knowledge have been investigated in terms of one group's advantages over the other in different types of knowledge (Montrul, Foote, & Perpinan, 2008). That is to say that HL learners are better at oral tasks, whereas L2 learners are better at written tasks (Matsunaga, 2003; Montrul et al., 2008). This was substantiated in the results that demonstrate that HL learners showed significantly larger implicit knowledge than L2 learners. A post-hoc t-test using the results of the aural and written GJTs demonstrates the HL groups' considerably smaller explicit knowledge than that of L2 learners'. Even though the HL groups' difference between the written and aural GJT scores were not significantly different, $M = -.038$, $p = .967$, that of the L2 groups' was significant, $M = 5.95$, $p < .001$. These results could be interpreted that HL learners, with limited explicit knowledge and more implicit knowledge, outperformed the L2 learners on the aural GJT. However, when the HL learner group took the written GJT, the extra time did not help them due to their lack of explicit knowledge to draw on. That the HL learners exhibited roughly the same scores on both GJTs confirms this argument. In comparison, the L2 learners, with

considerable explicit knowledge, were able to take advantage of the extra time to employ that their explicit knowledge, which was larger than that of HL learners. This means that L2 learners were able to supplement their smaller amount of implicit knowledge with their larger explicit knowledge in the untimed written GJT (Ellis, 2009; Loewen, 2009). This suggests that untimed written GJTs measure both implicit and explicit knowledge, making a coarse measure of explicit knowledge. Therefore, an additional factor—such as grammaticality—should be necessitated to measure explicit knowledge in a more valid way.

The connection between oral tasks and a large amount of implicit knowledge can be explained through the interplay of input modes along with AoO and input amounts. Due to early AoO and home-based implicit learning context, L1 and HL learners are equipped with basically the same phonological inventory since birth as L1 monolinguals (Montrul, 2009). Unlike L1 speakers or HL learners' well-established phonological knowledge, L2 learners tend to tap into L1 segmental and supra-segmental phonological features when they do not have proper L2 inventory to access (Abrahamsson, 2012; Bley-Vroman, 1990). This slows the processing of their L2 (Munro & Derwing, 1995), i.e., Korean, and makes L2 word-recognition difficult (Bradlow & Pisoni, 1999). Therefore, it could be inferenced from the data of the current study that their implicit linguistic knowledge—measured using aurality/orality—should be naturally smaller than that of HL learners of Korean. L2 learners' advantage over HL learners in explicit knowledge—measured using literacy—was also confirmed from the results in the current study. The L2 learners' significantly larger explicit knowledge could be due to 1) HL learners' very limited amount of code-focused and literacy-centered explicit learning of Korean in established schools, and 2) L2 learners' learning Korean through reading/writing-centered instruction in college after a critical period

when an explicit learning mechanism is more available than implicit learning. In short, AoO, input amount and modality are three major factors that explain the discrepancies between L1, HL and L2 groups' two types of knowledge in Korean.

4.2.1.3. Learner variances

When the test results of the HL and L2 learner groups were broken down, statistically significant differences were found only in the aural/oral EI and metalinguistic knowledge test, but not in the aural and written GJTs. This discrepancy might be explained from two perspectives concerning their task characteristics. First, the aural GJT in the current study did not require high cognitive load on the L2 learners. In previous research, L2 and HL learners' linguistic knowledge was measured using more cognitively taxing oral tasks such as an oral picture description task in Spanish (Montrul, Foote, & Perpinan, 2008), an oral production test in Japanese (Matsunaga, 2003), or a spoken word recognition test in French (Guillelmon & Grosjean, 2001). However, in the current study, the aural GJT requires neither correction nor production; it only requires receptive—decision—skills to process relatively shorter sentences consisting of 5.5 words on average. This is shorter than 6.3 Spanish words in a Spanish-as-a-foreign-language situation (Bowles, 2011), 8.1 English words in an ESL situation (Ellis, 2009), and 8.7 English words in an EFL situation (Zhang, 2015). The low processing load imposed on the L2 learners from judgment-oriented and manageable items in the aural GJT's could be the reason for a smaller difference found in the accuracy scores in the aural GJT between the two groups. Longer sentences with more words could have demonstrated the two groups' linguistic knowledge significantly differently. Second, the L2 learners in the current study are not Korean as a Foreign Language (KFL) learners, but KSL, who have been exposed to listening to natural and casual Korean in their learning contexts. This could have made the L2 learners'

correctness in aural GJT considerably high. For learners of Korean as a KFL, their aural GJT scores might not have been as high as those of L2 learners, resulting in a larger gap between the KFL and HL groups. In addition, the L2 learners' proficiencies were relatively high, with their average instruction period being 19.75 months in Korean-as-a-second-language context. In sum, due to the short items in the aural GJT, the L2 learners' long stay in Korea and high proficiency levels, the aural GJT might have been easy for the L2 learners.

Likewise, the two comparison groups demonstrated a significant difference in mean scores in the metalinguistic test in favor of the L2 learners. However, in the written GJT, the L2 group's mean score was not significantly different from that of the HL group. This non-significance might be due to the postulation that decision-based written GJTs requires only moderately analyzed knowledge compared to production-based written tasks (such as a C-test), which needs a considerable amount of analyzed knowledge, attention to structure, and form-meaning coordination (Birdsong, 1989). Another reason can be the simple structures in the written GJT items, which consisted of 5.5 Korean words on average. Even though HL learners do not have an advantage over L2 learners in reading skills, reading the short sentences might not have been too difficult for the HL learners. In fact, all of the HL learners exposed to easy Korean literacy at an early age learned how to read and write Korean at the age of 6 on average. In other studies, HL learners' literacy was not significantly different from that of L2 learners in reading comprehension (Matsunaga, 2003), gender agreement through written recognition and interpretation tasks (Montrul, Foote, & Perpinán, 2008), and gender agreement through untimed written GJT (Montrul, Foote, & Perpinán, 2008). Therefore, it suffices to say that the discrepancies between the oral EIT and aural GJT as well as between the metalinguistic test and untimed GJT would mean learner variances

from different tasks. In sum, different tasks measure different linguistic knowledges. Even in cases where several tasks are meant to measure the same type of linguistic knowledge, each task could demonstrate its own characteristics, depending on their cognitive processing load on specific learner groups. The more cognitive load learners experience, the more likely they are to tap implicit knowledge for spontaneous and effortless responses. The EIT requires more cognitive efforts for comprehension in aural mode and for production in oral mode. In comparison, the aural GJT requires only comprehension in aural mode, allowing more time to tap explicit knowledge with awareness. To compensate for this low cognitive load, GJTs should have proper time constraints for better measuring implicit knowledge, regardless of their modality (Kim & Nam, 2016). Time constrants could be essential when sentences are relatively short, as evidenced in the current study.

The HL learners' knowledge reflects their position between L1 speakers and L2 learners. HL learners don't receive enough naturalistic input to develop their implicit knowledge as well as L1 speakers; they also don't demonstrate enough explicit knowledge so that this knowledge is as developed as L2 learners. Therefore, it seems that their primary advantage over L2 learners lies in implicit knowledge from their early AoO and considerable amounts of natural input.

4.2.1.4. C-test for various types of learners

When researchers interpret various groups' results of a C-test as a proficiency test, care is due, as a C-test might not be an effective measure of proficiency for HL learners. Since the test measures primarily explicit knowledge, HL learners' proficiency might result in very low compared to their true profiency when implicit knowledge is taken into account. In comparison, for L2 learners as a foreign language, a C-test might unwarrantedly reflect higher of profieicny. This is due to their form-focused instruction

in a visual mode, focusing on explicit knowledge in proficiency. Finally, a C-test for an L2 learner as a second language could present a more balanced indication of proficiency between explcit and implicit knowledge than that of an L2 learner of a foreign language due to the former learners' balance between form-focused instruction in a visual mode and their exposure to natural learning contexts of L2.

In a comparison study between the three typles of L2 learners, a C-test alone might not be a good measure of proficiency because the results would be unjustly in favor of L2 learners and unfairly unfavorable to HL learners. In a foreign language context, L2 learners learn their L2s in primarily visual, written-modes. Conversely, in a second language context, L2 learners learn in written and spoken modes. Either way, L2 learners have an advantage over HL learners in a written-mode test because HL learners start to learn primarily in a speech mode. In addition, the reading passages in the C-test could be varied in regards to length, abstractness, and formality, making C-tests more difficult for HL learners whose learning is speech-oriented.

Using a C-test as a sole proficiency measurement for HL learners can be inherently misleading due to the test's written mode and HL learners' non-homogeneous literacy skills. In Bowles' study (2011), the HL and L2 learners were enrolled in Spanish and literature classes at a university in the US, guaranteeing homogeneity in the same levels between the two groups. In the current study, however, the two groups' proficiency scores were significantly different (F=18.631, p<.001) in favor of the L2 learners. The reasons can be summed up as follows. The HL learners in the current study were from three different areas in the US, and 15 out of 38 of the participating HL learners (39.5 %) have not received any college-level instruction. These factors could have aggravated the HL learners' potential heterogeneity in taking the C-test, especially because the HL learners who were without instruction learned only casual Korean from

family and relatives in aural/oral modes. Therefore, they were not familiar with the types of written passages in the C-test where considerably long and dense passages were used, and registers were different from their casual Korean. The majority of the HL learners debriefed that the topics for the third and fourth passages were unfamiliar and that they were more or less clueless in taking the proficiency test. This evidences that the reading discourse was not in accordance with their language-learning context—HL learners' limited literacy development. In comparison, the L2 learners in this study were studying Korean as a second language at a university. In fact, the L2 learners were expected to obtain a proper level in the Test of Proficiency in Korean (TOPIK) to be admitted to a college or graduate program. This test includes a reading section, whose selected passages for reading and those selected for the C-test might not be very different from one another. This similarity might have enhanced the L2 learners' scores of the C-test. In sum, the two groups' heterogeneous learning contexts would make it difficult to compare the two groups' proficiency levels using only the C-test.

As a solution to the C-test's limitations as a proficiency test, a couple of alternative tests could be used. For instance, the TOPIK itself could be a candidate as it consists of listening, reading, and writing; the addition of a listening section might compensate the limitation of evaluating only explicit knowledge through a C-test. Yet, because the TOPIK is a test designed for L2 learners of Korean, its validity as a proficiency test for HL learners has yet to be proven. The caveat is that all of the L2 learners in the current study have taken the TOPIK at least once and, at most, six times. Therefore, L2 learners' practice effect should be taken into consideration. Thus, designing proficiency tests for HL learners in comparison with L2 learners deserves more attention based on the nature of HL learners' language-learning and linguistic knowledge.

Another alternative is combining HL learners' accuracy scores on tests that measure implicit and explicit knowledge. From the perspective of implicit and explicit knowledge, this could be a more balanced measure of proficiency (Elder & Ellis, 2009; Philp, 2009). When scores of implicit and explicit knowledge are combined, the two groups' proficiencies seem to be measured more comprehensively. For the purpose of comparing the linguistic knowledge of HL and L2 learners, researchers have utilized various proficiency tests such as vocabulary *and* cloze parts (Montrul et al., 2008, Montrul & Foote, 2014), a skill-balanced proficiency test designed for a specific language (Montrul, 2005; Montrul et al., 2008), a self-report (Montrul, 2005; 2006; Montrul et al., 2008), a C-test (Montrul, 2006), and the learners' enrollment status (Bowles, 2011). From the perspective of balance between the implicit and explicit knowledge of various types of L2 learners, the proficiency test above should be carefully designed and utilized using appropriate proficiency measures undergo further investigation. As such, research comparing HL and L2 learners, especially concerning the balances between orality and literacy, as well as implicit and explicit knowledge.

4.3. Pedagogical implications

The current study provides pedagogical ideas about how the delayed acquisition of Korean influences the incomplete acquisition of two types of linguistic knowledge of naturalistic HL and instruction-oriented L2 learner groups. For HL learners, their delayed explicit learning of Korean in school and not-enough quality of input from limited learning context attributes to incomplete acquisition, especially regarding explicit linguistic knowledge. For L2 learners, incomplete acquisition via late AoO is ascribed to their delayed implicit and explicit learning. In addition, their lack of brain plasticity takes a toll on implicit learning as demonstrated in the results of this study.

The key issue, thus, involves how much HL and L2 learners' incomplete acquisition can be solved through instruction, depending on their re-exposure effect (Montrul, 2008). Concerning HL learners, more instruction will facilitate their acquisition of explicit knowledge through analyzing skills they have with their majority language. On the other hand, it is assumed that L2 learners acquire their explicit knowledge of Korean through the same skills from their L1 explicit learning and knowledge. Concerning L2 learners' implicit knowledge, exposure to more aural input might not remarkably facilitate L2 learners' acquisition of implicit knowledge due to the interference of their phonological system in L1 and late AoO—lack of brain plasticity. Accordingly, instruction at college should strike a balance between the two groups' unequal, at the same time, incomplete linguistic knowledge and language skills. College curriculum and instruction should, thus, be modified based on the results in the current study. For the best effectiveness, college curriculum in teaching HL learners can be provided in two tracks via two separate courses for the two different groups. However, in cases where the two groups are forced into one class, assigning them different roles in pair activities could be a solution to the one-track learning situation.

CHAPTER 5. LIMITATIONS

The problem of unequal sample sizes in the current study is noteworthy. I think that collecting more data from HL learners to make the HL and L2 groups' sample sizes equal would not influence the model fit indexes in the two-factor model. One potential reason is that HL learners' status of implicit and explicit knowledge will not change with a larger sample size. Logically, they should have a considerable amount of implicit knowledge acquired since birth and they should also have less explicit knowledge from their limited instruction. To prove this, a CFA was employed using only data collected from the HL learners with instruction in college. The two-factor model also fits the modified data well. Therefore, the researcher came to a temporary conclusion that the results might not change significantly, even if the sample sizes between the two groups become equal. In other words, the unequal sample sizes of more L2 learners and less HL learners might have influenced the original two-factor model in a negative way, compared to that of the one-factor model. Even when the group sample sizes were unfavorably unequal, the two-factor model still held. Thus, it is reasonable to think that more data from HL learners will not influence the validity of the two-factor model.

In actuality, the unequal sample sizes between the two groups might not be as important as the sample size of this study. A small sample size in a CFA could cause a false rejection of models based on TLI and RMSEA (Hu & Bentler, 1999), Heywood cases, and distorted statistical power and precision of the parameter estimates (Brown, 2015). Even if the sample size of the current study is acceptable (Mitchell, 1993[2]; Stevens, 1996[3]), from a more conservative view, a larger sample size is recommended

[2] Mitchell (1993) suggests that a desirable sample size is from 10 to 20 times of the number of observed variables.

[3] Stevens (1996) suggests a 15-time sample size of the number of observed variables.

(Joreskog & Sorbom, 1989[4]). Moreover, considering the recommendation that each latent variable should have a minimum of three indicators for best evaluating the acceptability of solutions (Brown, 2015), the current study might require more participants—a sample size of 200—as well as more indicators.

Proficiency levels of the two comparison groups, which were measured through a C-test did not match. Therefore, the comparisons between the two groups' implicit and explicit knowledge should be considered with due caution. It is noteworthy, nonetheless, that even though the HL group's proficiency level was significantly lower, the HL learners' implicit knowledge was significantly larger than that of the L2 learners. More HL learners with higher proficiency scores on the C-test would produce higher accuracy rates in the written GJT and metalinguistic test, resulting in a smaller gap in explicit knowledge. In the EIT and aural GJT, the HL learners would obtain higher mean scores, widening the gap between the two groups. However, it is difficult to predict exactly how the two groups' matching proficiency levels would influence the results of the CFAs, therefore, the measurement validity of the two-factor model. Considering that a C-test is likely to primarily measure the explicit knowledge of L2 learners due to its written modality and ample time component, proficiency levels of HL and L2 learner groups should be measured with caution.

[4] Joreskog & Sorbom (1989) present a conservative view concerning a desirable sample size. When the number of observed variables is less than 12, 200 participants are desirable.

CHAPTER 6. FUTURE STUDIES

Using various factors of HL and L2 learners will shed insight on the validity of measurements for implicit and explicit knowledge. For instance, dividing L2 learners based on their proficiency levels and running two separate CFAs might provide further ideas on studies about the interface between explicit knowledge and implicit knowledge. When L2 learners learn Korean in the Focus-on-Forms learning context, the low-proficiency learners have much more explicit knowledge than implicit knowledge. This would result in a one-factor model—explicit knowledge—from a CFA. However, for high-proficiency learners, the results might be that their implicit knowledge, *if any*, is comparable to their explicit knowledge. This would guarantee the two-factor model's measurement validity. This difference—or even similarity—between the results from the two CFAs using the two groups regarding low and high proficiency levels would give valuable suggestions regarding the possibility of interface between the two types of linguistic knowledge. Furthermore, adding another type of data from learners of Korean as a foreign language (KFL) could enrich the results of this study. Their major input is from code-focused instruction in literacy; therefore, the nature of their input would be different from that of learners of Korean as a second language (KSL). When three types of learners' data—i.e., HL, KSL, and KFL learners—are combined and if the two-factor model still holds, it would be concluded that the three groups of HL, KSL, and KFL learners do not demonstrate group variances for the tests. This invariance will confirm the construct validity of the measurements.

Valid measurements of implicit and explicit linguistic knowledge are required in SLA. More measurements should be investigated concerning their validities and reliabilities. In the current study, as receptive—decision—tests, aural and written GJTs

have been utilized. However, as productive tests for explicit knowledge, a valid counterpart of an aural/oral EIT has not been developed. Results from an oral production task were compared with those from written recognition and comprehension tasks (Montrul et al., 2008), but oral production tasks were not directly compared with written production tasks. Since productive skills require more processing and attention than receptive—decision—skills, production tasks would be more affected by incomplete acquisition than by comprehension tasks. However, it is unknown how the receptive/productive dichotomy is related or unrelated to time pressure, grammaticality, and modality. In fact, the dichotomy of decision/production was also studied as another variable in investigating the characteristics of linguistic knowledge (Ellis, 2009) in addition to aforementioned factors. However, the dichotomy turned out to be invalid in the current study. More studies are due on this topic.

The direction of future research should be two-fold. First, previous measures that have been found relatively valid should undergo more elaboration to be more refined in utilizing time constraint, modality, grammaticality, and decision/production. Second, more new measures should be developed and their relationship with the previous measures should be investigated from the perspective of the continuum between implicit and explicit knowledge. Each measure's relative position should also be estimated in the continuum, not dichotomy (Hulstijn, 2015; Williams, 2005). In sum, the following depiction in Table 28 requires far more studies in the future to complete.

Table 28.

Implicit and explicit knowledge and relevant measurements

Speakers	L1							*L1*	
		HL learners			L2 as 2nd language		L2 as Foreign language		
Constructs	Pure IM	Stronger IM		Weaker IM				- - -	EX
	Pure IM	(Less pure) IM	-	Automatized/proceduralized EX				- - -	EX
Measures	?	EIT, Word monotoring test	-	Timed written, aural GJT	Untimed Aural GJT	Untimed written GJT	Ungrammatical items in untimed written GJT, C-test	- - -	Meta linguistic or lingual test

APPENDICES

APPENDIX A. Stimuli (Pilot study I)

A-1. Stimuli for Elicited Imitation Test
A-2. Stimuli for the Timed and Untimed Grammaticality Judgment Test
A-3. Stimuli for the Metalinguistic Knowledge Test
A-4. Background questionnaire

A-1. Elicited Imitation Test
1-1. *아이들이 잘 그림을 그린다. (Children draw pictures well)
1-2. 봄에 예쁜 꽃이 많이 핀다. (Many beautiful flowers bloom in spring)
2-1. *종이를 손에 가끔 베인다. (People often cut their hands with a piece of paper)
2-2. 한국사람은 영화와 노래를 좋아한다. (Koreans like movies and songs)
3-1. *어제에 한국의 경제가 안 좋았다. (Korean economy slowed down yesterday)
3-2. 많은 아이들이 오늘 공원에서 운동한다. (Many children exercise in the park today)
4-1. *미국에서 천천하게 운전해야 한다. (You should drive slowly in the US)
4-2. 텔레비전 소리는 크게 해야 들린다. (To listen, you should keep up the volume of TV)
5-1. *한국말은 결코 쉽다. (Korean is never easy)
5-2. 사람들은 한국 문화를 전혀 모른다. (People never know Korean culture)
6-1. *많은 사람들이 서울에 살라요. (Many people live in Seoul)
6-2. 서울과 부산은 아주 가까워요. (It is very close from Seoul to Busan)
7-1. *여기에 사람이 오십 개 있다. (Here are 50 people)
7-2. 도서관은 보통 육 층이면 좋다. (Usually a six-floor library is good)
8-1. *미국의 오바마는 너 친구이다. (Obama in the U.S. is your friend)
8-2. 지금 한국의 대통령은 여자이다. (Now, the president of Korea is a woman)
9-1. *학생은 학교에 가지만, 공부를 한다. (Even though students go to school, they study)
9-2. 비가 많이 오지만, 수영을 한다. (Even though it rains a lot, I swim)
10-1. *사람은 시간이 빨리 가기를 알지 못한다. (People do not know that time flies)
10-2. 학생들은 시험에 실수한 것을 안다. (Students know that they made mistakes in the exam)
11-1. *내년에 세계 인구가 많이 늘었다. (Next year, world population increased a lot)
11-2. 지난 해 올림픽은 참 재미있었다. (The Olympics were very interesting last year)
12-1. *친구가 공부 잘 하는 멋있다. (Friends who study well are cool)
12-2. 한국 사람이 좋아하는 것은 노래이다. (What Korean people like is songs)
13-1. *젊은이들이 커피를 좋아한다 안다. (I know that young people like coffee)
13-2. 프랑스가 월드컵에서 우승한 것은 놀랍다. (It is surprising that France won the World Cup)
14-1. *스마트폰이 한국 사람에 의해 만들었다. (Smart phones were invented by Korean people)

14-2. 요즈음 서점에서 한국책들이 잘 읽힌다. (These days, Korean books read well in the bookstores)
15-1. *보통 엄마가 아기를 잔다. (Usually mothers put their babies to sleep)
15-2. 보통 언니가 동생에게 옷을 입힌다. (Usually an older sister dresses her younger sibling)
16-1. *할아버지께서 밥을 맛있게 먹는다. (The grandfather eats boiled rice deliciously)
16-2. 부모님께서는 한국에 계신다. (My parents are in Korea)
17-1. *겨울에 추우면 모자를 신는다. (People wear hats when it is cold in winter)
17-2. 사람은 행복하면 활짝 웃는다. (People have big grins on their faces when they are happy)

A-2. Stimuli for the Timed and Untimed GJTs
1-1. *책 민호 읽는다. (Minho read a book)
1-2. *민지가 예쁘게 아주 화장을 했다. (Sooni had beautiful makeup)
1-3. 유미가 친구에게 편지를 쓴다. (Yumi writes a letter to a friend)
1-4. 민수가 친구를 영주에게 소개한다. (Minsu introduces his friend to Youngju)
2-1. *남동생이 사과를만 먹는다. (My younger brother eats only apples)
2-2. *칼에 사과를 잘랐다. (I cut an apple with a knife)
2-3. 민수가 친구에게 매달 선물을 보낸다. (Minsu sends a present to his friend every month)
2-4. 수영씨가 오늘도 영화관에 갔다. (Suyoung went to the theater)
3-1. *수미는 내일에 뭐 해요? (What will Sumi do tomorrow?)
3-2. *나는 어제에 쇼핑을 갔다. (I went shopping yesterday)
3-3. 수희는 오늘 약속이 있다. (Suhee has an appointment today)
3-4. 올해 민수는 매우 바쁠 것이다. (Minsu will be busy this year)
4-1. *한국 학생들은 열심하게 공부한다. (Korean students study hard)
4-2. *도서관 안에서는 조용게 공부한다. (People study in silence in the library)
4-3. 이 그림들은 비싸게 팔린다. (These pictures sell at high prices)
4-4. 여자가 남자보다 빠르게 말한다. (Women speak faster than men)
5-1. *이 책은 여간 어렵다. (This book is very difficult)
5-2. *수미는 결코 우는 여자이다. (Sumi is never a woman who cries)
5-3. 민수가 아직 안 왔어요. (Minsu has not come yet)
5-4. 이 곳에는 미국 사람밖에 안 간다. (Only Americans go here)
6-1. *한국 사람과 일본 사람은 달아요. (Korean people and Japanese people are different)
6-2. *수정씨는 아침에 10km 를 걸러요. (Sujeong walks 10 kilometers in the morning)
6-3. 한국어는 연습하면 쉬워요. (Korean is easy if you practice)
6-4. 어린 아이들이 소리를 질러요. (Young children cry out)
7-1. *일월 스무 다섯 일이 내 생일이다. (My birthday is January 25)
7-2. *나는 열 다섯 번 버스를 기다린다. (I wait for a bus, number 15)
7-3. 민수는 커피 네 잔을 마셨다. (Minsu drank four cups of coffee)
7-4. 언니가 사과 열 한 개를 샀다. (My older sister bought eleven apples)

8-1. *이것들은 나 컴퓨터와 프린터이다. (These are my computer and printer)
8-2. *수미가 너 밥을 먹는다. (Sumi eats your boiled rice)
8-3. 그의 회사는 여기서 멀다. (His company is far from here)
8-4. 어제 친구의 결혼식에 갔다. (Yesterday I went to my friend's wedding)
9-1. *한국어를 배우지만 서울에 가요. (Even though I learn Korean, I go to Seoul)
9-2. *배가 아파서 영화관에 가요. (Because I am sick to my stomach, I went to the theater)
9-3. 기숙사에 살기 때문에 요리를 안해요. (Because I live in a dormitory, I do not cook)
9-4. 비가 와도 여행을 가요. (Even if it rains, I will go on a trip)
10-1. *민수는 시험에서 실수했기를 알았다. (Minsu knew that he had made a mistake on the exam)
10-2. *나는 운동함이 어렵다. (It is difficult for me to exercise)
10-3. 민지는 숙제가 많기 때문에 못 잔다. (Minji cannot sleep because he has a lot of homework)
10-4. 학생들은 겨울에 눈이 오기를 기다린다. (Students wait for snow)
11-1. *지난 수요일에는 날씨가 좋아요. (The weather was fine last Wednesday)
11-2. *내가 어렸을 때 서울에 살 것이다. (I will live in Seoul when I was a child)
11-3. 작년에 서울에 갔다. (I went to Seoul last year)
11-4. 다음 달에 한국에 있을 것이다. (I will be in Korea next year)
12-1. *이것이 민수가 어제 음식 먹었다. (This is the food that Minsu ate yesterday)
12-2. *학생이 한국어를 공부하는 손을 들었다. (The student who studies Korean raised their hands)
12-3. 내가 지금 읽는 책은 춘향전이다. (The book that I am reading is Chun-hyang-jeon)
12-4. 이것이 여름에 하와이에서 입을 옷이다. (These are the clothes that I will wear in Hawaii)
13-1. *나는 민수가 김치를 좋아하기를 몰랐다. (I did not know that Minsu liked Kimchi)
13-2. *나는 수미가 공부했기를 알았다. (I knew that Sumi had studied)
13-3. 성미가 책읽기를 좋아하는 것을 알았다. (I knew that Seongmi liked reading books)
13-4. 기차가 6 시에 떠나는 것을 몰랐다. (I did not know that the train would leave at 6)
14-1. *큰 옷이 잘 판다. (Large clothes sell well)
14-2. *밥이 맛있게 그릇에 담았다. (The boiled rice was put into the bowl deliciously)
14-3. 그 집이 민수에게 팔렸다. (The house was sold to Minsu)
14-4. 도둑이 경찰관에게 잡혔다. (The thief was caught by the police officer)
15-1. *민수가 수미에게 선물을 안는다. (Minsu pressed presents on Sumi)
15-2. *친구가 나에게 그림을 본다. (My friend showed me a picture)
15-3. 내가 동생에게 책을 읽힌다. (I have my younger sibling read a book)
15-4. 누나가 아기에게 우유를 먹인다. (I feed the baby milk)
16-1. *수미야, 이것을 할아버지께 주어라. (Sumi, give this to your grandfather)
16-2. *아버님께서 방에서 잘 잔다. (My father is sleeping well in the room)

16-3. 서울에 가시면 전화하세요. (Please call me when you get to Seoul)
16-4. 할아버지께서 창문을 여십니다. (The grandfather opens the window)
17-1. *아이들이 목이 커져서 말을 안 들어요. (Children do not listen to me because they get stubborn)
17-2. *그 말을 듣고 가슴이 활동했다. (The words made my heart race)
17-3. 그는 자세를 가다듬고 인터뷰를 했다. (He interviewed after he became composed)
17-4. 그 말을 듣고 뛸 듯이 기뻤다. (I jumped for joy to hear the news)

A-3. Stimuli for the Metalinguistic Knowledge Test

*민수는 축구를 해서 잘 인기가 많다. (Minsu is popular because he plays soccer well) -The adverb should come in front of the verb that it is modifying. -The topic subject particle is wrong: 민수가 is correct. -The conjunction –서 is awkward. The conjunction 니까 is better to express the reason or cause in the main clause.
*민수를 오렌지 주스가 마셔요. (Minsu drinks orange juice) -The particles after the two nouns are awkward. -Subjects should be followed by objects. Thus 주스가 should come first in the sentence. -The verb conjugation is awkward. 시어 should not be contracted.
*나는 오늘에 학교에 가서 시험을 두 개 쳤다. (I took two exams at school today) -When 오늘 is used as an adverb, -에 should be dropped. -The locative particle '에' should be '에서' when the verb is 'go' -To describe '과목,' a Sino-Korean numeral '이' should be used to denote 'two.'
*헤밍웨이는 늙어서 쓸쓸게 죽어갔다. (Hemingway died a lonely death when he got old) -When an adjective ends with '하다,' the correct adverbializing suffix is '히.' -For the past tense of '죽다,' the past tense marker '었' should be used, not '갔.' -The phrasal connector '어서' is awkward; the connector '-르 때' correctly describes 'when he was old.'
콜라는 도무지 몸에 좋다. (Coke is never good for health) -The adverb '도무지' requires a negative element within the same sentence. - The adverb '도무지' should come in the beginning of the sentence to put emphasis on the adverb. -The particle '에' after '몸' should be changed to a subject particle.
자동차가 흔들리니 손잡이를 꼭 자워요. (Hold onto the strap tightly because the car shakes) -The verb in the main clause is a 'ㅂ-regular' verb. Therefore 'ㅂ' is not weakened to a semivowel [우]. -The phrasal connective '–니' is not correct here. A cause-effect connector should be used. -The adverb in the main clause modifies the whole clause. Therefore '꼭' should come before '손잡이를.'

*지난 주에 시장에서 개 두 개를 샀다. (I bought two dogs at the market) -개 is a classifier for inanimate objects like apples. -The correct Korean number for two is 둘. -When a noun becomes an adverb for time, '에' is unnecessary.
*이제 한 권 책을 소개합니다. (Now I introduce a book) -When a numeral is followed by a classifier, the genitive-particle deletion is not allowed. -In this sentence, the object particle is unnecessary. -To begin a sentence, adverbs should be avoided.
*비가 왔어서 등산 못 갔어요. (I could not go mountain climbing because it rained) -Conjunctive –어서 can never be preceded by a past tense marker. Therefore, 왔어서 should be 와서. -When the verb is a transitive verb, the object has to have an object particle '을.' -It is correct to use another negative word '안' to describe the subject's subjective decision.
*나는 특히 노래함이 좋다. (I particularly like singing) -When a verb ends with '하다,' the nominalization suffix should not be '함.' -The adverb should be placed right in front of the verb that it is modifying. -When the sentence has '특히,' a special adverb, the subject should have the generic subject particle. Therefore '내가' is correct.
*지난 주말에 백화점에 쇼핑을 가요. (I go shopping to the department store last weekend) -The tenses do not agree between the adverbial clause and the verb. -When the verb is 'go' or 'come,' the correct locative particle is '에서,' but not '에.' -'쇼핑가다' is a one word, which cannot be separated with the object particle, '을.'
*인호는 파는 친구가 오렌지를 샀다 (Inho bought oranges that his friend was selling) -'오렌지' is modified by the relative clause, so the clause should be in the order of Subject , then Verb. -The second '가' should be 는, another subject particle. -The relationship between '인호' and '친구' is possession. Therefore, a possessive particle should be used like인호'의' 파는 친구가.
*저는 운전하기 몰라요. (I do not know how to drive) -To mean the know-how of a skill, the bound noun '줄' should be used. -'운전하기' is an object and this needs an object particle, '를.' -'저' is a honorific term so the verb '몰라요' should be in agreement in terms of honorifics.
*토끼가 사자에게 먹는다. (Rabbits are eaten by lions) -토끼 is the object and 사자 is the agent of the verb. The verb should be changed to a passive voice. -The subject is the topic of the sentence, so the subject particle should be the topic particle, '는.'

-The particle ‘에게’ is a dative particle and should be changed to an inclusive particle, ‘도.’
*의사가 아기에게 약을 먹는다 (The doctor feeds the baby medicine) -The subject 의사 makes the baby eat the medicine. Therefore the verb should have a causative suffix, 이. -The subject particle 가 should be changed to 께서, an honorific particle for mother. -The verb is a transitive verb which requires two objects (direct and indirect) and should be ordered with the direct object first and the indirect object second.
*부모님께서 오늘 밥을 안 먹는다. (My parents do not eat boiled rice today) -The verb should have the honorific form for the subject. -The topic subject marker should be added to ‘께서,’ resulting in ‘께서는.’ -The negative marker ‘못’ should be used instead of ‘안’ to describe a situation that does not allow them to eat rice.
*이번 사고로 아이들이 겁을 삼켰다. (Children got scared because of this accident) -The predicate is a Korean collocation and ‘겁을’ should be followed by ’먹었다.’ -To denote the cause-effect relationship, ‘사고,’ accident, is described better using ‘때문에,’ than ‘로.’ -The subject of the whole sentence is accident, ‘사고.’ Therefore the particle ‘로’ should be either a topical subject marker ‘는’ or a regular subject marker, ‘가.’

A-4. Background Questionnaire

1. Research code: _____ Gender: _____ Age: _____ University: _____
2. Current Korean class level or course name: _____
- Class standing: Major _____ Minor _____
-The Korean language is your 1) heritage language_____ 2) foreign language_____
-Specify any Chinese or Japanese courses you have taken so far _____

3. Place of birth _____
-If you were not born in the US, at what age did you come to the US: _____ years old
-How long have you studied Korean as a heritage language or a foreign language _____ years ___ months since _____ (year)
-List all institutes (For example, Michigan State University)
_____
-List all courses you took previously (For example: Korean 101)
_____
-List all books you learn with (For example: Integrated Korean Beginning 1)
_____

4. Check all the family members who you have lived with for over 6 months of your life **that are native speakers of Korean.**
-Grandmother, grandfather, mother, father, brother(s), sister(s), relatives, spouse (significant other)
-Biological Father's ethnic background _____, Biological Mother's ethnic background _____

5. When you were a child, what was your first language (First language is the language your parents communicate with you before your age of 5?
-English_____, Korean_____, Both_____
-Any other languages _____
-When growing up, I have received exposure of Korean language and culture.
NA___ never____, rarely____, sometimes_____, often_____, almost always _____,
6. Have you ever lived in Korea for more than one month?
-Yes____, No____
-If yes, at what age(s) _____ For how long? _____ year(s) _____ month(s)
7. Have you ever studied in Korea?
-If yes, list the school level or program (for example, K-12, college, summer school, study abroad, etc)

-For how long? _____ year(s) _____ month(s)
8. Have you ever studied Korean at other formal non-college institution in the US? (For example, Saturday school, Sunday school, high school extra curriculum activity)
-Yes____, No____
-If yes, List institution _____
-At what age _____ for How long? _____ year(s) _____ month(s)

9. Have you visited Korea for less than one month?
-Yes_____, No_____
-If yes, at what age(s) _____ For how long? _____ year(s) _____ month(s)
Reason(s) of visit
_____

10. How often do you speak Korean with the following people?

	NA	1.never	2. rarely	3.sometimes	4.often	5.always
Friends						
Significant other/spouse						
Korean classmates / teacher						
Grandparent(s)						
Mother						
Father						
Sibling(s)						
Relative(s)						
Others (specify)						

11. How often do the following people speak Korean to you?

	NA	1.never	2. rarely	3.sometimes	4.often	5.always
Friends						
Significant other or spouse						
Korean classmates or teacher						
Grandparent(s)						
Mother						
Father						
Sibling(s)						
Relative(s)						
Others (specify)						

12. Please tick your other uses or exposure of Korean

	1.never	2. rarely	3.sometimes	4.often	5.always
I watch Korean/TV					

movies					
I read books, newspapers, magazines in Korean					
I write email, journals, in Korean					
I listen to Korean music					
Other(s) _____					

13. I am confident communicating in

	1.strongly agree	2. agree	3.not sure	4.disagree	5.strongly disagree
Korean					
English					
Other _____					
Other _____					

14. I am confident in the following Korean language skills

	1.strongly agree	2. agree	3.not sure	4.disagree	5.strongly disagree
Speaking					
Listening					
Reading					
Writing					
Grammar					
Honorifics (polite style)					
intimate/casual form (*panmal*)					
Other(s) _____					

15. If you have every taken a standardized test/exam of Korean,
-Name(s) of the test/exam _____
-Score(s) _____

16. What do you think of this study? Any comments and questions are welcome.
_____
_____
_____
_____

_____
_____

17. How have you studied Korean grammar? Please share your strategies and experiences.

_____
_____
_____
_____
_____
_____

18. How have your teachers of Korean taught Korean grammar? Please explain about that in detail.

_____
_____
_____
_____
_____
_____

19. How are the tests, quizzes, and examinations for evaluating Korean grammar in class?

_____
_____
_____
_____
_____
_____
_____

20. Writing in Korean

- When did you learn how to write Korean? At the age of _____ in the year of _____
- How did you learn how to write Korean? Who taught you to write Korean?

APPENDIX B. Stimuli (Pilot study II)

B-1. Stimuli for Elicited Imitation Test
(The highlighted words are adverbs or adjectives that have been added due to the word count)

1.1-1. *아이들이 잘 그림을 그린다. (Children draw pictures well)
2.1-2. 봄에 예쁜 꽃이 많이 있다. (There are many beautiful flowers in spring)
3.2-1. *손이 종이를 가끔 베인다. (People often cut their hands with a piece of paper)
4.2-2. 한국 사람은 영화를 매우 좋아한다. (Koreans like movies very much)
5.3-1. *어제에 날씨가 안 좋았다. (Yesterday the weather was not good)
6.3-2. 오늘 공원에서 많은 아이들이 논다. (Many children hang out in the park today)
7.4-1. *미국에서 천천하게 운전해야 한다. (You should drive slowly in the US)
8.4-2. 아이들은 텔레비전 소리를 크게 한다. (Children keep up the volume of TV)
9.5-1. *한국어는 결코 쉬운 말이다. (Korean is never easy)
10.5-2. 사람들은 한국의 김치를 전혀 모른다. (People never know Korean kimchi)
11.6-1. *많은 사람들이 서울에 살라요. (Many people live in Seoul)
12.6-2. 한국의 서울과 부산은 아주 가까워요. (It is very close from Seoul to Busan in Korea)
13.7-1. *여기에 사람이 삼백 개 있다. (Here are 300 people)
14.7-2. 우리는 지금 칠 층에 있다. (We are on the seventh floor now)
15.8-1. *오바마는 너 친한 친구이다. (Obama is your close friend)
16.8-2. 지금 한국의 날씨는 아주 좋다. (Now, the weather in Korea is very good)
17.9-1. *학생은 학교에 가지만, 공부를 한다. (Even though students go to school, they study)
18.9-2. 비가 많이 오지만, 수영을 한다. (Even though it rains a lot, I swim)
19.10-1. *사람들은 밤에 운동함을 싫어한다. (People do not like exercising at night)
20.10-2. 학생들은 시험에 실수한 것을 안다. (Students know that they made mistakes in the exam)
21.11-1. *내년에 한국 사람 수가 늘었다. (Next year, Korean population increased)
22.11-2. 지난 해 올림픽은 참 재미있었다. (The Olympics were very interesting last year)
23.12-1. *노래를 잘 하는 멋있다 친구가. (Friends who sing well are cool)
24.12-2. 여자는 운동을 좋아하는 남자를 좋아한다. (Women like men who are good at sports)

25.13-1. *너는 학생들이 커피를 좋아한다 안다. (I know that young people like expensive coffee)
26.13-2. 사람들은 시간이 가는 것을 모른다 (People do not know that time goes)
27.14-1. *스마트폰이 학생들에게 잘 판다(Smart phones are sold well to students)
28.14-2. 요즈음 한국 책이 잘 읽힌다. (These days, Korean books read well)
29.15-1. *엄마가 밤에 아기를 잔다. (Mothers put their babies to sleep at night)
30.15-2. 보통 언니가 동생에게 옷을 입힌다. (Usually an older sister dresses her younger sibling)
31.16-1. *할아버지께서 밥을 맛있게 먹는다. (The grandfather eats boiled rice deliciously)
32.16-2. 지금 아버지하고 어머니께서 한국에 계신다. (My father and mother are in Korea now)
33.17-1. *보통 축구할 때 살금살금 뛴다. (Usually people run stealthily when they play soccer)
34.17-2. 기분이 좋을 때 활짝 웃는다. (People have big grins on their faces when they feel good)

B-2. Stimuli for the Aural and Written Grammaticality Judgment Tests
(The highlighted words are adverbs or adjectives that have been added due to the word count and that could be removed for higher Cronbach's Alphas)
1.1-1. *오늘 많이 민호가 책을 읽는다. (Today Minho reads books a lot)
2.1-2. *민지가 예쁘게 아주 화장을 했다. (Minji had very beautiful makeup)
3.1-3. 유미가 친구에게 매일 편지를 쓴다. (Yumi writes a letter to a friend every day)
4.1-4. 민수가 친한 친구를 영주에게 소개한다. (Minsu introduces his close friend to Youngju)
5.2-1. *남 동생이 고기와 사과를만 먹는다. (My younger brother eats only meat and apples)
6.2-2. *보통 사람들은 칼에 사과를 자른다. (Usually people cut an apple with a knife)
7.2-3. 민수가 친구에게 매달 선물을 보낸다. (Minsu sends a present to his friend every month)
8.2-4. 수영씨가 오늘 아침에도 영화관에 갔다. (Suyoung went to the theater this morning, too)
9.3-1. *민수는 내일에 영화를 볼 것이다. (Minsu will watch a movie tomorrow)
10.3-2. *나는 어제에 백화점에 쇼핑을 갔다. (I went shopping to a department store yesterday)
11.3-3. 수희는 오늘 중요한 약속이 있다. (Suhee has an important appointment today)
12.3-4. 올해 민수는 회사에서 바쁠 것이다. (This year, Minsu will be busy in his company)
13.4-1. *한국 학생들은 보통 열심하게 공부한다. (Korean students usually study hard)
14.4-2. *아이들이 도서관 안에서 조용게 공부한다. (Children study in silence in the library)

15.4-3. 이 그림들은 아주 비싸게 팔린다. (These pictures sell at very high prices)
16.4-4. 여자가 남자보다 조금 빠르게 말한다. (Women speak a little faster than men)
17.5-1. *이 책은 학생들에게 여간 어렵다. (This book is not difficult for students at all)
18.5-2. *수미는 결코 많이 우는 여자이다. (Sumi is never a woman who cries a lot)
19.5-3. 민수와 친구가 아직 안 왔어요. (Minsu and his friend have not come yet)
20.5-4. 여기는 한국 사람밖에 안 온다. (Only Koreans come here)
21.6-1. *한국 사람과 일본 사람은 달아요. (Korean people and Japanese people are different)
22.6-2. *수정씨는 매일 아침 10km 를 걸러요. (Sujeong walks 10 kilometers every morning)
23.6-3. 한국어는 열심히 재미있게 연습하면 쉬워요. (Korean is easy if you practice diligently and interestingly)
24.6-4. 어린 아이들이 어디서나 소리를 질러요. (Young children cry out everywhere)
25.7-1. *일월 스무 일이 내 생일이다. (My birthday is January 20)
26.7-2. *나는 열 다섯 번 버스를 기다린다. (I wait for a bus, number 15)
27.7-3. 민수는 커피 네 잔을 마셨다. (Minsu drank four cups of coffee)
28.7-4. 언니가 사과 열 한 개를 샀다. (My older sister bought eleven apples)
29.8-1. *이것은 나 컴퓨터와 프린터이다. (These are my computer and printer)
30.8-2. *수미가 너 밥을 맛있게 먹는다. (Sumi eats your boiled rice deliciously)
31.8-3. 그의 회사는 여기서 매우 멀다. (His company is very far from here)
32.8-4. 어제 친구의 결혼식에 비행기를 타고 갔다. (Yesterday I flew to a friend’s wedding)
33.9-1. *서울에 가지만, 한국어를 배울 것이다. (Even though I go to Seoul, I will learn Korean)
34.9-2. *배가 아파서 영화관에 빨리 가요. (Because I am sick to my stomach, I go to the theater quickly)
35.9-3. 기숙사에 살기 때문에 요리를 안 해요. (Because I live in a dormitory, I do not cook)
36.9-4. 비가 많이 와도 여행을 가요. (Even if it rains a lot, I will go on a trip)
37.10-1. *민수는 시험에서 실수를 했기를 알았다. (Minsu knew that he had made a mistake on the exam)
38.10-2. *나는 밤에 운동함이 매우 어렵다. (It is difficult for me to exercise at night)
39.10-3. 민지는 숙제가 많기 때문에 못 잔다. (Minji cannot sleep because she has a lot of homework)
40.10-4. 아이들은 조용히 책 읽기가 어렵다 (It is difficult for children to read books quietly)
41.11-1. *지난 수요일에는 날씨가 아주 좋아요. (The weather is quite fine last Wednesday)
42.11-2. *내가 어렸을 때 서울에 살 것이다. (I will live in Seoul when I was a child)

43.11-3. 작년 가을에 오빠하고 서울에 갔다. (I went to Seoul with my older brother last fall)
44.11-4. 다음 달에 한국에 있을 것이다. (I will be in Korea next month)
45.12-1. *이것이 민수가 어제 음식 먹었다. (This is the food that Minsu ate yesterday)
46.12-2. *학생이 한국어를 공부하는 손을 들었다. (The student who studies Korean raised their hands)
47.12-3. 내가 지금 읽는 책은 해리포터이다. (The book that I am reading is Harry Potter)
48.12-4. 이것이 여름에 하와이에서 입는 옷이다. (These are the clothes that I wear in Hawaii)
49.13-1. *나는 민수가 김치를 좋아하기를 몰랐다. (I did not know that Minsu liked Kimchi)
50.13-2. *나는 수미가 어제 공부했기를 알았다. (I knew that Sumi studied last night)
51.13-3. 성미가 책을 좋아하는 것을 알았다. (I knew that Seongmi liked reading books)
52.13-4. 기차가 6 시에 떠나는 것을 몰랐다. (I did not know that the train would leave at 6)
53.14-1. *여기서는 큰 옷이 잘 판다. (As for here, large clothes sell well)
54.14-2. *그 예쁜 집이 수미에게 보았다. (The pretty house was seen by Sumi)
55.14-3. 그 넓은 집이 민수에게 팔렸다. (The spacious house was sold to Minsu)
56.14-4. 그 사람이 경찰에게 잡혔다. (The person was caught by the police)
57.15-1. *민수가 수미에게 많은 선물을 안는다. (Minsu presses many presents on Sumi)
58.15-2. *민호가 친구에게 그림하고 사진을 본다. (Minho shows his friend a picture and a photo)
59.15-3. 내가 동생에게 한국 책을 읽힌다. (I have my younger sibling read a Korean book)
60.15-4. 민지가 아기에게 맛있는 우유를 먹인다. (Minji feeds the baby delicious milk)
61.16-1. *수미가 할아버지께 좋은 선물을 준다. (Sumi gives a good present to her grandfather)
62.16-2. *아버지께서 방에서 혼자 잘 잔다. (My father sleeps well in the room alone)
63.16-3. 한국어 선생님께서 키가 아주 크십니다. (The Korean teacher is very tall)
64.16-4. 할아버지께서 지금 집에서 운동을 하신다. (My grandfather is exercising at home)
65.17-1. *아이들이 목이 커져서 말을 안 들어요. (Children do not listen to me because they get stubborn)
66.17-2. *그 말을 듣고 가슴이 운동했다. (The words made my heart race)
67.17-3. 그는 자세를 가다듬고 인터뷰를 했다. (He interviewed after he became composed)
68.17-4. 그 말을 듣고 뛸 듯이 기뻤다. (I jumped for joy to hear the news)
B-3. Stimuli for the Metalinguistic Knowledge Test

Section 1.

1.*민수는 잘 축구를 해서 인기가 많다. (Minsu is popular because he plays soccer well) -The adverb '잘' should come in front of the verb that it is modifying. -The correct adverb is '전혀' to emphasize the adjective '많다.' -The correct position of adverb '잘' is between '인기가' and '많다.' -When the conjunction '–서' is modified by '잘,'' – 서'should be changed to'지만' to express the reason or cause in the main clause.
2.*민수는 오렌지 주스이 마셔요. (Minsu drinks orange juice) -'주스' is an object. Therefore, an object particle is necessary. -When the noun ends with a vowel, the correct particle is '가,' not '이.' -Subjects should come first in a sentence. Thus '주스이' should come before '민수는.' -The verb '마셔요' requires a locative particle 에서.
3.*나는 오늘에 학교에 가서 시험을 두 개 쳤다. (I took two exams at school today) -When '오늘' is used as an adverb, '-에' should be dropped. -The temporal particle '에' should be '에서' when the verb is 'go' -'오늘에' is not correct because the sentence is about the past tense, '쳤다.' -'오늘에' is an adverb and should be in front of the subject '나는.'
4.*그는 늙어서 쓸쓸게 죽어갔다. (He died a lonely death when he got old) -When an adjective ends with '하다,' the correct adverbializing suffix is '히.' -'쓸쓸게' should be placed in the beginning of the sentence because '쓸쓸게' modifies the whole sentence. -Because the tense is the past, '쓸쓸게' should be conjugated accordingly. -The phrasal connector '늙어서' should be '늙었을 때' when followed by an adverbial expression.
5.*콜라는 전혀 몸에 좋다. (Coke is never good for health) -The adverb '전혀' requires a negative element within the same sentence. -The adverb '전혀' should come in the beginning of the sentence to put emphasis on the subject. -'전혀' requires an object. Therefore, the particle '에' after '몸' should be changed to an object particle '을'. -When a sentence has '전혀', the topic marker should not be used.
6.*지하철이 흔들리니까 손잡이를 꼭 자워요. (Hold onto the strap tightly because the car shakes) -The verb '자워요' is a 'ㅂ-regular' verb. Therefore 'ㅂ' should be kept in the stem, '잡'. -The conjugation should be in deferential style using '십시오' when this is announced in a subway station.

-‘자워요’ should be a passive voice in the sentence. ‘잡혀요’ is correct.
-‘자워요’ is a verb. Therefore this does not require an adjective, ‘꼭.’

7.*지난 주에 시장에서 개를 <u>두 개</u> 샀다. (I bought two dogs at the market)
-‘개’ is a classifier for inanimate objects like apples.
-The correct Korean number for two is ‘둘.’
-The correct Sino-Korean number for two is 이.
-‘두 개’ is a subject that is associated with ‘사다’, a verb. Therefore ‘두 개가’ is correct.

8. Low reliability *이제 <u>한 권 책을</u> 소개합니다. (Now I introduce a book)
-When a numeral is followed by a classifier, the genitive-particle deletion is not allowed.
-In this sentence, the object particle is unnecessary.
-To begin a sentence, adverbs should be avoided.
-The numeral ‘한’ modifies ‘책,’ the noun. Therefore ‘한’ should be followed by the noun instead of the classifier.

Modified *이제 <u>책을 일 권</u> 소개합니다. (Now I introduce a book)
-When you count an object, a different numeral than ‘일’ should be used.
-The order of the words is awkward. ‘책을’ should come after ‘권,’ because ‘권’ modifies the noun, ‘책.’
-The object particle should come after ‘권,’ because ‘권’ is the object of the transitive verb, ‘소개합니다.’
-The classifier is not correct. A different classifier should be used for ‘책.’

9.*어제 비가 <u>왔어서</u> 등산을 못 갔어요. (I could not go mountain climbing yesterday because it rained)
-Conjunctive ‘–어서’ can never be preceded by a past tense marker. Therefore, ‘왔어서’ should be ‘와서.’
-‘왔어서’ is a transitive verb. Therefore ‘비 ‘ requires an object marker.
-Logically it is correct to use a negative word ’안’ in front of ‘왔어서’ in this sentence.
-Conjunctive ‘어서’ should be replaced ‘지만’ to mean ‘even though’.

10.*나는 특히 <u>노래함이 좋다</u>. (I particulary like singing)
-When a verb ends with ‘하다,’ the nominalization suffix should not be ‘함.’
-‘좋다’ is a transitive verb and ‘노래함’ should be an object of the verb. ‘을’ should be used instead of ‘이’.
-To agree with ‘특히,’ ‘노래함이’ should be ‘노래함은’ to make this a topical expressions.
-‘좋다’ is an adjective. Therefore we should use a verb ‘좋아한다.’

11.*지난 주말에 백화점에 <u>쇼핑을 가요</u>. (I got shopping to the department store last weekend)
-The tenses do not agree between the adverbial clause ‘지난 주말’ and the verb.
-When the verb is ‘go’ or ‘come,’ the correct locative particle is ‘백화점에서.’

-‘쇼핑가다’ is a one word, which cannot be separated with the object particle, ‘을.’
-‘쇼핑에 가요’ is the correct collocation. Accordingly ‘백화점에서’ should be ‘백화점에’to mean a destination.

12.*인호는 파는 친구가 오렌지를 샀다. (Inho bought oranges that his friend was selling)
-‘오렌지’ is modified by the relative clause, so the clause should be in the order of Subject , then Verb.
-The ‘가’ should be ‘는’, another subject particle.
-The ‘가’ should be ‘에게서’ to refer to a person that 인호 buys oranges from.
-The relationship between ‘인호’ and ‘친구’ is possession. Therefore, a possessive particle should be used like인호’의’ 파는 친구가.

13. Low reliability *저는 아직도 운전하기 몰라요. (I do not know how to drive yet)
-To mean the know-how of a skill, the bound noun ‘줄’ should be used.
-‘운전하기’ is an object and this needs an object particle, ‘를.’
- The verb ‘몰라요’ should be’모르세요’ because ‘저’ is a humble word.
-‘운전하기’ requires an object such as ‘차를’ or ‘버스를’ in front of it.

Modified
*저는 아직도 운전하기를 몰라요.
-To mean the know-how of a skill, the bound noun ‘줄’ should be used. Therefore ‘운전할 줄을’ is correct
-‘운전하기’ is an object in itself. Therefore, this does not need an object particle, ‘를.’
- The verb ‘몰라요’ should be’모르세요’ because ‘저’ is a humble word.
-‘운전하기’ requires an object such as ‘차를’ or ‘버스를’ in front of it.

14.*보통 쥐가 고양이에게 먹는다. (Usually mice are eaten by cats)
-‘고양이’ is the agent of the verb. The verb should be changed to a passive voice.
-‘고양이’ is the topic of the sentence, so the particle should be the subject particle.
-The particle ‘에게’ is a dative particle and requires a causative verb, ‘먹인다.’
-Usually, mice do not eat cats. Therefore, ‘쥐’ and ‘고양이’ should be switched.

15.*의사가 아기에게 약을 먹는다. (The doctor feeds the baby medicine)
-The subject 의사 makes the baby eat the medicine. Therefore the verb should have a causative suffix, ‘이. ‘
-The subject particle 가must be changed to ‘께서,’ an honorific particle for a doctor.
-The verb is a transitive verb which requires two objects (direct and indirect) and should be ordered with the direct object first and the indirect object second.
- To denote the passive relationship between the doctor and the baby, the verb ‘먹는다’ should be a passive verb.

16.*부모님께서 오늘 밥을 안 먹는다. (My parents do not eat boiled rice today)
-The verb ‘먹는다’ should have the honorific form with the correct word for the subject.

-The topic subject marker should be added to ‘께서,’ resulting in ‘께서는.’ -The negative marker ‘못’ should be used instead of ‘안’ to describe a situation that does not allow them to eat rice. -This statement should be in deferential style due to the subject. Therefore, ‘먹으십니다’ is correct.
17.*<u>이번 사고로</u> 많은 아이들이 <u>겁을 삼켰다</u>. (Children got scared because of this accident) -The expression is a Korean collocation and ‘겁을’ should be followed by ’먹었다.’ -To denote the cause-effect relationship, ‘사고,’ accident, is described better using ‘때문에,’ than ‘로.’ -The subject of the whole sentence is accident, ‘사고.’ Therefore the particle ‘로’ should be either a topical subject marker ‘는’ or a regular subject marker, ‘가.’ -‘삼켰다’ is the past tense. Therefore 이번 should be 저번 to denote the past. (Children were scared of this accident)

Section 2.

In the text, find ONE example for each item (on the next page).
Underline the word(s) and *put the number of the item below the line*.
Example: 0. Noun

나는 한국 사람이다.
0

Text
나는 중국 사람이에요. 하지만 지금 한국에 살아요. 한국은 "고요한 아침의 나라"라고 말해져요. 나는 보통 아침 8시에 일어나서 세수를 하고 아침을 먹어요. 9시쯤 한국어를 배우러 학교에 가요. 나는 3년 전부터 한국어를 배웠어요. 한국어는 재미있지만 결코 쉽지 않아요. 한국어 수업이 끝나면 오후 5시까지 도서관에서 공부해요. 지금도 도서관에서 한국어 숙제를 하고 있어요. 한국어 선생님이 나에게 이 숙제를 시키셨어요. 도서관은 쥐 죽은 듯 조용해요. 오늘은 금요일이라서 오후에 수업이 없어요. 금요일 저녁에는 한국 친구들을 만나서 같이 식사하고 한국 영화를 봐요. 나는 한국 영화가 재미있다는 것을 잘 알아요. 내 친구들은 영어를 잘 못하니까, 한국말로 이야기하면서 재미있게 시간을 보내요. 요즘 한국말을 잘 하는 친구들 때문에 한국어와 한국 문화에 대하여 많이 배워요. 내가 지금은 한국말을 잘 못 하지만, 빨리 잘 하고 싶어요. 그래서 한국 영화를 자막 없이 볼 거예요.

1. Topic particle (=topic marker)
2. Object particle
3. Genitive particle (=possessive particle)
4. Locative particle
5. Sino number
6. Noun classifier
7. Noun as adverb
8. Adverbial suffix
9. Conjunctive, conjunction
10. Transitive verb
11. Nominalization
12. Relativization
13. Complementation
14. Passives
15. Causatives
16. Honorific expression
17. Collocation

B-4. Oral Narrative Test

Oral Narrative Test

Read the following text twice very carefully. When you are ready recall the story in Korean orally in three minutes. Try to recall as much as possible.

민수씨는 회사(company)에서 일합니다. 아침에 민수씨는 7시에 일어납니다. 아침으로 커피 한 잔과 빵을 먹습니다. 그리고 걸어서 회사로 갑니다. 집에서 회사까지는 30분 걸립니다. 민수씨는 오전 9시에 회사에 가서 오후 5시까지 일합니다. 손님(customer)을 만날 때도 있고, 책상에서 일하기도 합니다. 민수씨는 일하기가 싫으면, 조용히 혼자(alone) 이렇게 말합니다. "5억 원(five hundred million won)이 생기면 회사에 안 갈 것이다."

그런데 어제 민수씨에게 놀라운(surprising) 일이 생겼습니다.

어제 아침 민수씨가 회사로 가는 길에 떨어진 지갑(wallet)을 1개 보았습니다. 지갑 안에는 돈 5만 원과 복권(lottery ticket) 1장이 있었습니다. 회사에서 컴퓨터로 복권(lottery ticket)의 번호(number)를 찾아 보았습니다. 민수씨는 자기 눈을 결코 믿을 수가 없었습니다. 그 복권은 1등이었습니다.

민수씨는 그 복권을 가지는 것을 생각했습니다. 그리고 그 복권을 주인(owner)인 김선생에게 돌려주는 것도 생각했습니다. 잠시 후에 민수씨는 지갑과 복권을 김선생에게 돌려주기로 했습니다. 그리고 택시로 김선생의 집에 갔습니다.

그 집에 갔을 때 할머니께서 천천히 문을 열어 주셨습니다. "김 선생님 계십니까?" 민수씨는 할머니께 여쭈어 보았습니다. 할머니께서 대답하셨습니다. "김 선생은 내 아들입니다." 민수씨는 김선생에게 지갑과 복권을 돌려주었습니다. 그리고 복권이 1등이라고 말했습니다.

"내가 산 복권이 1등인 것을 몰랐어요." 김선생은 복권이 1등인 것을 결코 믿을 수가 없었습니다. "지갑을 찾아 주셔서 감사합니다. 선물(present)로 5억을 드리겠습니다." 민수씨에게 5억이 생겼습니다. 그런데 놀라운 일이 생겼습니다. 민수씨는 회사에 안 가도 되지만, 회사에 더 가고 싶어졌습니다. 민수씨가 회사를 좋아하게 된 것입니다.

Min-su is an office worker. Every morning, he gets up at 7:00 am. For breakfast, he has a cup of coffee with milk in it and bread. And he goes to his company on foot. It takes twenty minutes from his house to the company. He arrives at his company at 8:00 am and works till 6:00 pm. He sometimes meet his customers or works at his desk. When he gets tried, he quietly says to himself, "If I have 1 million dollars, I will quit and take a rest at home."

Yesterday, something surprising happened to Min-su.

Yesterday morning, Min-su found a wallet that was dropped on his way to the company. There were 30000 won in cash and one lottery ticket. He brought the wallet with the ticket and checked the ticket numbers on the computer. He could not believe his eyes. Surprisingly, that was the winning ticket last week.

Min-su thought about having the ticket. He also thought about returning the ticket to the owner. After a while, he decided to return the wallet and the ticket to the owner. He caught a taxi and went to the owner's house.

He pressed the bell on the door of the house and an old lady answered the door slowly. "Is Mr. Kim here?" Min-su asked the old lady. She answered, "Mr. Kim is my son…" After a while, the owner appeared. Min-su returned the wallet and the ticket. After that, he also told the owner the good news about the winning ticket.

"I did not know that I won a lottery." Mr. Kim could never believe that he won the lottery. "I thank you for being honest and returning my wallet. As a reward, I'd like to give you 5 hundred million won." Now Min-su has 5 hundred million won. However something surprising happened. Even though he does not have to go to the company, he feels like he'd love to now. It is not surprising that Min-su has 5 hundred million dollars. What is really surprising is that he comes to like his company.

B-5. Background Questionnaire

Linguistic Background Questionnaire

1. Basic bio-data questions

-Age: _____ (year of birth: _____) Gender _____

-Are you a student now? Yes ____(University:) No ____(Graduated school_____)

- Class standing: Major _____ Minor _____

-Specify any Chinese or Japanese courses you have taken so far _____

-Place of birth _____

-If you were not born in the US, at what age did you come to the US: _____ years old

-Check all the family members who you have lived with for over 6 months of your life **that are native speakers of Korean.**

-Grandmother, grandfather, mother, father, brother(s), sister(s), relatives, spouse (significant other)

-Biological Father's ethnic background _____, Biological Mother's ethnic background _____

-Specify if applicable.

-Foster Father's ethnic background _____, Foster Mother's ethnic background _____

-The age when they adopted you from Korean to the US _____

-When you were a child, what was your first language (First language is the language your parents communicate with you before your age of 5?

-English_____, Korean_____, English & Korean_____,

-Any other languages _____

2. Input-interaction-output experience

Generally speaking, when growing up I have received exposure of Korean _____

0%	10	20	30	40	50	60	70	80	90	100%
never	hardly	seldom	rarely	occasionally	sometimes	often	frequently	normally	usually	always

1. Age-based self-report (Use the following scale)

0%	10	20	30	40	50	60	70	80	90	100%
never	hardly	seldom	rarely	occasionally	sometimes	often	frequently	normally	usually	always

- "100% Always" means that you ALWAYS received input of Korean from the source during the age period.
- "50% Sometimes" means that you received input of Korean and another dominant language, 50%-50%, from the source during the age period.

INPUT		
Ages (references)	Sources	Put the percentage of the scale above
0-5 (birth-before	Parents Siblings and grandparents	F_____/M_____ S_____/G_____

elementary school)	Cousins and relatives	C _____/R_____
	Entertainment materials, e.g., CDs/tapes for kids	_____
	Korean books, magazines, newspapers	_____
	Korean comic books	_____
	Korean dramas	_____
	Korean movies	_____
	Korean songs	_____
	Korean friends in community	_____
	Korean friends on the web	_____
	Korean friends at school	_____
	Saturday or Sunday school	_____
	School extra curriculum activity	_____
	Any other source (e.g. caretaker) _____	_____
6-8 (elementary school-lower grades)	Parents	F_____/M_____
	Siblings and grandparents	S_____/G_____
	Cousins and relatives	C _____/R_____
	Entertainment materials, e.g., CDs/tapes for kids	_____
	Korean books, magazines, newspapers	_____
	Korean comic books	_____
	Korean dramas	_____
	Korean movies	_____
	Korean songs	_____
	Korean friends in community	_____
	Korean friends on the web	_____
	Korean friends at school	_____
	Saturday or Sunday school	_____
	School extra curriculum activity	_____
	Any other source (e.g. caretaker) _____	_____
9-10 (elementary school-higher grades)	Parents	F_____/M_____
	Siblings and grandparents	S_____/G_____
	Cousins and relatives	C _____/R_____
	Entertainment materials, e.g., CDs/tapes for kids	_____
	Korean books, magazines, newspapers	_____
	Korean comic books	_____
	Korean dramas	_____
	Korean movies	_____
	Korean songs	_____
	Korean friends in community	_____
	Korean friends on the web	_____
	Korean friends at school	_____
	Saturday or Sunday school	_____
	School extra curriculum activity	_____
	Any other source (e.g. caretaker) _____	_____
11-13 (junior high school)	Parents	F_____/M_____
	Siblings and grandparents	S_____/G_____
	Cousins and relatives	C _____/R_____
	Entertainment materials, e.g., CDs/tapes for kids	_____
	Korean books, magazines, newspapers	_____
	Korean comic books	_____

	Korean dramas	_____
	Korean movies	_____
	Korean songs	_____
	Korean friends in community	_____
	Korean friends on the web	_____
	Korean friends at school	_____
	Saturday or Sunday school	_____
	School extra curriculum activity	_____
	Any other source (e.g. caretaker) _____	_____
14-17 (high school)	Parents	F_____/M_____
	Siblings and grandparents	S_____/G_____
	Cousins and relatives	C _____/R_____
	Entertainment materials, e.g., CDs/tapes for kids	_____
	Korean books, magazines, newspapers	_____
	Korean comic books	_____
	Korean dramas	_____
	Korean movies	_____
	Korean songs	_____
	Korean friends in community	_____
	Korean friends on the web	_____
	Korean friends at school	_____
	Saturday or Sunday school	_____
	School extra curriculum activity	_____
	Any other source (e.g. caretaker) _____	_____
18-22 (College)	Parents	F_____/M_____
	Siblings and grandparents	S_____/G_____
	Cousins and relatives	C _____/R_____
	Entertainment materials, e.g., CDs/tapes for kids	_____
	Korean books, magazines, newspapers	_____
	Korean comic books	_____
	Korean dramas	_____
	Korean movies	_____
	Korean songs	_____
	Korean friends in community	_____
	Korean friends on the web	_____
	Korean friends at school	_____
	Saturday or Sunday school	_____
	School extra curriculum activity	_____
	Regular class	_____
	Any other source (significant other) ____	_____
23-30 (After graduation, workplace)	Parents	F_____/M_____
	Siblings and grandparents	S_____/G_____
	Cousins and relatives	C _____/R_____
	Entertainment materials, e.g., CDs/tapes for kids	_____
	Korean books, magazines, newspapers	_____
	Korean comic books	_____
	Korean dramas	_____
	Korean movies	_____
	Korean songs	_____

	Korean friends in community Korean friends on the web Korean friends at school Saturday or Sunday school School extra curriculum activity Regular class in college or culture center Any other source (significant other) ____	_____ _____ _____ _____ _____ _____ _____

OUTPUT		
Ages (references)	Sources	Put the percentage of the scale above
0-5 (birth-before elementary school)	Parents Siblings and/or grandparents Cousins and relatives Korean entertainment songs for kids Korean songs Korean friends in the community Korean friends on the web Korean friends at school Saturday school or Sunday school School extra curriculum activity Writing Korean alphabet, email, journal, Any other source (e.g. caretaker) _____	F_____/M_____ S_____/G_____ C _____/R_____ _____ _____ _____ _____ _____ _____ _____ _____ _____
6-8 (elementary school-lower grades)	Parents Siblings and/or grandparents Cousins and relatives Korean entertainment songs for kids Korean songs Korean friends in the community Korean friends on the web Korean friends at school Saturday school or Sunday school School extra curriculum activity Writing Korean alphabet, email, journal, Any other source (e.g. caretaker) _____	F_____/M_____ S_____/G_____ C _____/R_____ _____ _____ _____ _____ _____ _____ _____ _____ _____
9-10 (elementary school-higher grades)	Parents Siblings and/or grandparents Cousins and relatives Korean entertainment songs for kids Korean songs Korean friends in the community Korean friends on the web Korean friends at school Saturday school or Sunday school School extra curriculum activity Writing Korean alphabet, email, journal, Any other source (e.g. caretaker) _____	F_____/M_____ S_____/G_____ C _____/R_____ _____ _____ _____ _____ _____ _____ _____ _____ _____
11-13 (junior high school)	Parents Siblings and/or grandparents	F_____/M_____ S_____/G_____

	Cousins and relatives Korean entertainment songs for kids Korean songs Korean friends in the community Korean friends on the web Korean friends at school Saturday school or Sunday school School extra curriculum activity Writing Korean alphabet, email, journal, Any other source (e.g. caretaker) _____	C _____/R_____ _____ _____ _____ _____ _____ _____ _____ _____ _____
14-17 (high school)	Parents Siblings and/or grandparents Cousins and relatives Korean entertainment songs for kids Korean songs Korean friends in the community Korean friends on the web Korean friends at school Saturday school or Sunday school School extra curriculum activity Writing Korean alphabet, email, journal, Any other source (e.g. caretaker) _____	F_____/M_____ S_____/G_____ C _____/R_____ _____ _____ _____ _____ _____ _____ _____ _____ _____
18-22 (College)	Parents Siblings and/or grandparents Cousins and relatives Korean entertainment songs for kids Korean songs Korean friends in the community Korean friends on the web Korean friends at school Saturday school or Sunday school School extra curriculum activity Writing Korean alphabet, email, journal, Regular class at college Any other source (significant other) _____	F_____/M_____ S_____/G_____ C _____/R_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____
23-30 (and after) (After college graduation, workplace)	Parents Siblings and/or grandparents Cousins and relatives Korean entertainment songs for kids Korean songs Korean friends in the community Korean friends on the web Korean friends at school Saturday school or Sunday school School extra curriculum activity Writing Korean alphabet, email, journal, Regular class at college or culture center Any other source (significant other) _____	F_____/M_____ S_____/G_____ C _____/R_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

3. Korean instruction

3-1. Korean class level or course name you have taken at the latest:
_____
(For example, KR 101, KR 102, KR 201….KR 402, Business Korean)

-I have studied Korean as heritage language / foreign language
For _____ years ___ months since the age of _____ (the year of: _____)
-List all institutes (For example, Michigan State University)
_____
_____
_____

-List all courses you took previously (For example: Korean 101)
_____
_____
_____

-List all books you learn with (For example: Integrated Korean Beginning 1)
_____
_____
_____

3-2. How have you studied Korean grammar? (Tick as many as appropriate)
___ I ask for help from parents, ____ help from teachers, _____ help from friends, ____ study with grammar books, ____ from natural communication in speaking, ____from natural communication in listening, ____ from natural communication in writing, ____ from natural communication in reading, _____ from text books in class, _____ from lectures,
Specify if there is any other way _____

3-3. How have your teachers of Korean taught Korean grammar? (Tick as many as appropriate)
_____ lecture or explicit explanation, ____ class activities, _____ authentic materials such as newspapers and movies, _____ homework, _____ grammar-focused test, quizzes, and examinations,
Specify if there is any other way _____
_____

3-4. How would you describe your Korean teachers' teaching style in your Korean class? (Tick every style that is relevant)
_____Meaning-oriented, _____communicative-activity oriented, _____grammar-oriented, _____teacher-centered instruction, _____student-centered instruction, _____textbook-oriented instruction, _____listening-speaking focused class, _____writing-reading focused class,
Any other styles you want to specify _____

3-5. How are the tests, quizzes, and examinations for evaluating Korean grammar in class?
____ written tests, quizzes, and examinations have items or sections for grammar, ____

grammar is tested through oral tests, ____ grammar is tested through written tests, ____ grammar is not tested explicitly, _____ grammar is usually emphasized in evaluations, Specify if there is any other point _____
_____
_____

3-6. Have you acquired Korean at other formal non-college institution in the US? (For example, Saturday school, Sunday school, extra curriculum activities in elementary, junior high, or high schools)
-Yes____, No____
-If yes, list institutions _____
-At what age _____ for how long? _____ year(s) _____ month(s)
-What book(s) did you learn with? _____
-Was the instruction style different from the instruction in college? _____
If yes, how would you describe the difference? _____

3-7. Reading and Writing
Reading
- When did you learn how to read Korean? At the age of _____ in the year of _____
- How did you learn how to read Korean? Who taught you to read Korean?
_____
Writing
- When did you learn how to write Korean? At the age of _____ in the year of _____
- How did you learn how to write Korean? Who taught you to write Korean?
_____

4. Studying abroad in Korea & Living in Korea
4-1. Have you ever visited Korea?
-Yes____, No____
-If yes, at what age(s) _____ for how long? _____ year(s) _____ month(s) _____ week(s) _____day(s)
-Reason(s) for being in Korea _____

If you visited Korean multiple times, please keep answering.
-2nd visit
At what age(s) _____ for how long? _____ year(s) _____ month(s) _____ week(s) _____day(s)
Reason(s) for being in Korea _____

-3rd visit
At what age(s) _____ for how long? _____ year(s) _____ month(s) _____ week(s) _____day(s)
Reason(s) for being in Korea _____

-4th visit
At what age(s) _____ for how long? _____ year(s) _____ month(s) _____ week(s) _____day(s)
Reason(s) for being in Korea _____

4-2. Have you ever studied Korean in Korea?
-Yes____, No____
-If yes, at what age(s) _____ for how long? _____ year(s) _____ month(s) _____ week(s) _____day(s)

-If yes, list the school level or program (for example, K-12, college, summer school, study abroad, etc)
_____
_____
_____

5. Tasks in this study
Complete the following based on the difficulties you felt during this study.

Names of the tasks: Imitation, Narrative, Aural task, Written task, Multiple Meta, Example Meta,

(Most difficult)_____>_____>_____>_____>_____>_____(Easiest)

If you have any ideas, please contact me heoyeon7@gmail.com! I wish you the best!

B-6. Proficiency Test (Reprinted and adapted from Lee-Ellis, 2009)

Korean Proficiency Test

This is a test of how well you comprehend and produce Korean. You will read four short passages. In each, parts of some words are missing.
Study each passage and write in the missing letters. Each line represents one syllable.

-No negative point will be deducted for a wrong answer.
-Spelling will not be assessed as long as the words are identifiable.

Example: 안녕___ ___ ___. 제 이___ ___ 김 철수입니다.

Your job is to complete the test as:

안녕<u>하 세 요</u>. 제 이<u>름 은</u> 김 철수입니다.

-Notice that partial points are available. If you know only part of the missing parts, fill in the part that you know instead of skipping the entire words/phrases. (e.g., "제 이 __ <u>은</u> 김 철수입니다." will receive partial credit.)

You will have 20 minutes. This test is designed for all ranges of proficiency (i.e., from beginning to near-native), so it will seem challenging to many of you. However, please do your best until the end, and try to work on all four passages if you have time.

Passage 1

안녕하세요. 제 이름은 김 철수입니다. 저는 대학___ ___ 다닙니다. 아침에 일어___ ___ 학교 체육___ ___ 갑니다. 체육___ ___ ___ 운동을 합___ ___. 운동을 한 다___ ___ 아침을 먹습니다. 아침은 기숙___ 식당에서 먹습니다. 저는 대학___ ___ ___ 한국어를 배___ ___ ___. 한국어 수___ ___ 매일 오___ 10시에 시작___ ___ ___. 한국어는 쓰___ ___ 말하기가 어___ ___ ___ ___. 그렇지만 듣___ ___ 읽기는 쉽___ ___ ___. 한국어 배___ ___ 것이 참 재미___ ___ ___ ___. 주말에는 친___ ___ ___ 같이 극___ ___ ___ 영화를 봅니다. 영화를 ___ 후에 한국 식당에서 저___ ___ 먹습니다. 한국 식___ ___ 극장 바___ 옆에 있습니다. 불고___ ___ 맛있습니다. 김치찌개는 맵습니다.

Passage 2

올 여름에는 가족들과 함께 제주도에 여행을 가려고 해요. 제주도는 한반___ ___ 남쪽에 있___ 섬이에요. 한국의 하와이라 불___ ___. 제주도는 자___ ___ 아름다워서 신혼___ ___ 장소로 인___ ___ 굉장히 많___ ___. 오늘은 여행___ ___ 전화를 걸___ 서울에서 제주도 ___ ___ 왕복 비행___ ___ ___ 네 장 예___ ___ ___ ___. 여행___ ___ ___ 호텔도 소개___ 주었지만 호텔은 아직 안 정___ ___ ___. 인터넷으로 정___ ___ 더 찾아 보___ 어느 호텔이 좋___지 알아 보___ ___ 해요. 요___ ___ 인터넷이 있___ ___ 호텔 뿐 아___ ___ 유명한 관___ 명소와 맛___ ___ 식당도 찾아 볼 ___ 있어서 참 편리해요.

Passage 3

안녕하세요. 서울역 앞에 위치한 서울 백화점입니다. 저희 백화점___ ___ ___ 겨울철을 맞___ 겨울옷과 난___ 제품을 세일___ ___ 있습니다. 직장 여___ ___ 위한 여성복 코너___ ___ 여성 정___과 겨울 속___ ___ 50 프로 세일하고 있___, 삼 층 아동___ 코너에서도 코___, 목도리, 장___ 등의 겨___ 상품이 각 30프로 씩 할___ ___ 가격에 판___ ___ ___ 있습니다. 칠 ___ 에서는 집 안을 따___ ___ ___ 해 줄 전___ 히터와 가스 난___ 등 다양___ 난방용 가___ 제품을 특가판___ ___ ___ 있습니다. 저___ 서울 백화점과 함 ___ 겨울 나기 준___ ___ 시작하세요. 고객 여러분의 많은 성원 부탁드립니다. 감사합니다.

Passage 4

도시의 가장 큰 문제점이라면 뭐니뭐니해도 교통 문제가 제일 크다. 도로에서는 교___ 체증으로 인___ ___ 에너지와 시___ ___ 낭비된다. 특히 출___ ___ 시간에는 한꺼___ ___ 차량이 일제___ 몰려서 도___ ___ 아주 복___ ___ ___. 게다가 뉴욕 같은 대도___ ___ 주차난은 매___ 심각한 수준___ ___. 자동___ ___ 점점 많아___ ___ 반면 주___ 공간은 제___ ___ ___ 있기 때___ ___ 주차난이 생___ ___. 주차장이 부족하면 사람___ ___ 주택가 골 ___이나 도로에까지 주차를 하___ 경우가 많다. 이렇게 불___으로 주___ ___ 차량은 또 다시 교통 혼___ ___ 원인이 되___ 더 심___ ___ 교통 체증을 일으킨다. 따라서 교통 문제를 해결하기 위해서는 자가용보다는 버스나 지하철을 많이 이용해야 할 것이다.

Passage 1

Hello, my name is Cheol-soo Kim. I go to college. After I get up in the morning, I go to the gym for exercise. After that, I have breakfast at a dormitory cafeteria. I

learn Korean at school. The class starts at 10 am. Writing and speaking in Korean are difficult, but listening and reading are easy. It is fun to learn Korean. During the weekends, I watch movies with my friends. After that, I have dinner in a Korean restaurant, which is next to the movie theater. Bulgogi is delicious. Kimchi stew is hot.

Passage 2

I will go to Je-joo Island with my family this summer. Je-joo Island is located in the south of Korea. It is called Hawaii of Korea. It is very popular as a spot for newlyweds due to its beautiful landscapes. Today I will call the tour agency to get four round tickets from Seoul to Jejoo Island. The agency also recommenended a hotel, but I have not decided yet. I will get more information on the web. The internet makes it very easy to find tourist attractions and restaurants as well as hotels.

Passage 3

Hello. This announcement is from Seoul Department Store located in front of Seoul Station. Approaching winter, we have winter clothes and heating appliances on sale. In the section for career women, suits and underwears are 50% off. In the section for children on the third floor, winter merchandise such as coats, scarfs, and gloves are 30% off. On the seventh floor, heating appliances and gas stoves for homes are on special sale. Please prepare for this winter with us, Seoul Department Store. Thank you for your attention.

Passage 4

The most serious problem in a city is traffic, most of all. People waste energy and time on the roads due to traffic jams. The roads become crowded during rush hours due to loads of vehicles. In addition, parking issues in a metropolitan city like New York are very serious. They are from increasing numbers of cars while the parking spaces are limited. In this case, people park their cars on the alleys in residential areas and even on the roads. These illegally parked cars aggravate the confusion from traffic jams, which causes more severe traffic issues. Therefore, people should use buses and the subway more in order to solve these problems.

APPENDIX C. Item total statistics (Pilot study I)

Table 29.

Item total statistics for each test focusing on cronbach's alphas if item deleted (Pilot study I)

	Cronbach's Alpha if Item Deleted			
	Elicited Imitation Test	Timed GJT	Untimed GJT	Metalinguistic Test
Item 1	.987	.963	.952	.841
Item 2	.987	.963	.952	.843
Item 3	.987	.963	.952	.841
Item 4	.987	.964	.952	.821
Item 5	.987	.963	.951	.830
Item 6	.988	.963	.951	.820
Item 7	.987	.965	.954	.842
Item 8	.987	.964	.952	.841
Item 9	.987	.964	.952	.852
Item 10	.987	.963	.952	.832
Item 11	.988	.963	.951	.831
Item 12	.988	.963	.951	.850
Item 13	.987	.964	.952	.833
Item 14	.987	.964	.952	.827
Item 15	.987	.964	.951	.837
Item 16	.987	.963	.951	.815
Item 17	.987	.963	.952	.835
Item 18	.987	.965	.952	
Item 19	.987	.964	.951	
Item 20	.987	.963	.951	
Item 21	.987	.963	.952	
Item 22	.987	.964	.952	
Item 23	.988	.963	.952	
Item 24	.987	.963	.952	
Item 25	.987	.963	.952	
Item 26	.987	.964	.951	
Item 27	.987	.963	.951	
Item 28	.987	.964	.952	
Item 29	.987	.964	.952	
Item 30	.987	.964	.952	
Item 31	.987	.963	.952	
Item 32	.987	.964	.951	
Item 33	.987	.963	.952	
Item 34	.987	.963	.952	
Item 35		.964	.951	

Table 29. (cont'd)

Item 36	.963	.950
Item 37	.964	.951
Item 38	.964	.952
Item 39	.963	.952
Item 40	.963	.951
Item 41	.964	.953
Item 42	.964	.952
Item 43	.965	.954
Item 44	.963	.951
Item 45	.963	.951
Item 46	.964	.951
Item 47	.963	.951
Item 48	.963	.951
Item 49	.963	.952
Item 50	.964	.952
Item 51	.963	.951
Item 52	.964	.951
Item 53	.963	.951
Item 54	.963	.951
Item 55	.963	.951
Item 56	.963	.952
Item 57	.963	.951
Item 58	.963	.952
Item 59	.963	.952
Item 60	.964	.952
Item 61	.964	.952
Item 62	.964	.951
Item 63	.964	.952
Item 64	.963	.951
Item 65	.963	.951
Item 66	.964	.951
Item 67	.964	.952
Item 68	.965	.952

Appendix D. Item total statistics (Pilot study II)

Table 30.

Item total statistics for each test focusing on cronbach's alphas if item deleted (Pilot study II)

	Cronbach's Alpha if Item Deleted				
	Elicited Imitation Test	Aural GJT	Written GJT	Metalinguistic Test1	Metalinguistic Test2
Item 1	.877	-	-	.710	.864
Item 2	.875	.869	.853	.710	.872
Item 3	.883	-	.847	.672	.858
Item 4	.877	.872	.841	.664	.910
Item 5	.880	.867	.838	.672	.858
Item 6	.880	.873	.844	.671	-
Item 7	.879	-	-	.690	-
Item 8	.885	-	.842	.738	-
Item 9	.881	.868	.844	-	.858
Item 10	.882	.867	.835	.697	.864
Item 11	.884	-	-	.668	-
Item 12	.885	.870	.847	.674	-
Item 13	.884	.866	.836	.802	-
Item 14	-	.877	.840	.697	-
Item 15	.875	-	-	.674	-
Item 16	.879	.873	.851	.643	.878
Item 17	.883	.865	.853	.703	-
Item 18	.883	.867	.840		
Item 19	.876	.875	.847		
Item 20	.887	-	.845		
Item 21	.874	.869	.838		
Item 22	.879	.868	.847		
Item 23	.882	.872	.844		
Item 24	-	-	-		
Item 25	.888	.865	.843		
Item 26	.879	.870	.850		
Item 27	.880	.873	.843		
Item 28	.883	.873	.851		
Item 29	.873	.867	.839		
Item 30	.878	.865	.845		
Item 31	.870	.869	.848		
Item 32	-	.872	.840		
Item 33	.880	.870	.849		
Item 34	.885	.873	.854		
Item 35		.874	-		

Table 30. (cont'd)

Item 36	-	.847
Item 37	.866	.836
Item 38	.876	.850
Item 39	-	-
Item 40	.872	-
Item 41	.869	.843
Item 42	.869	.844
Item 43	.870	.846
Item 44	-	.847
Item 45	.865	.847
Item 46	.869	.848
Item 47	.879	-
Item 48	.869	-
Item 49	.865	.847
Item 50	.865	.851
Item 51	-	.847
Item 52	-	-
Item 53	.865	.841
Item 54	.869	.855
Item 55	.870	.847
Item 56	.873	.856
Item 57	.872	.849
Item 58	.864	.843
Item 59	.880	.860
Item 60	.873	.845
Item 61	.872	.840
Item 62	.867	.837
Item 63	.878	.840
Item 64	.871	.848
Item 65	.864	.846
Item 66	.869	.840
Item 67	.868	.843
Item 68	.869	.843

Note. "-" means that the variable has zero variance, which means that the 10 participants answered correctly or incorrectly. However, this does not guarantee the same results when this study includes L2 learners.

APPENDIX E. Summary of all CFAs

Table 31.

Summary of the important indices from all CFAs

Observable variable (O.V.)	Factor	Models	INDEX					
			NFI (≥ .90)	RMSEA (.00≤RMSEA≤ .05)	χ^2 ($p \geq .05$)	*df*	CMIN/DF (0≤CMIN/DF≤2)	AIC (smaller than comparison model)
4 OVs	2	**Figure 1**. 2F-4-Default. 4 OVs Default Implicit vs. explicit	.998	.000	0.410 (*p*=.522)	1	.410 Heywood case	26.410
EIT,		**Figure 2**. 2F-4-Rival 1. 4 OVs Ungrammatical items in written GJT	.998	.000	0.483 (*p*=.487)	1	.483	26.483
AuralGJT,		2F-4-Rival-2. Grammatical vs. ungrammatical items		Unidentifiable	-			
WrittenGJT,	1	1F-4-Default. 4 OVs Default Explicit	.914	.302	20.573 (*p*=.000)	2	10.286	44.573
Metalinguistic		**Figure 3.** 1F-4-Rival-1. 1 Covaried error terms btw imitation and auralGJT	.998	.000	0.410 (*p*=.522)	1	.410 Heywood case	26.410
		Figure 4. 1F-4-Rival-2. 1 Covaried error terms btw writtenGJT and metalinguistic test	.998	.000	0.410 (*p*=.522)	1	.410	26.410
5 OVs	2	2F-5-Narrative-Default. Implicit vs. explicit	.840	.400	51.983 (*p*=.000)	3	17.328 Heywood case	85.983
EIT,		2F-5-Narrative-Rival-1. Ungrammatical items in writtenGJT	.870	.309	32.302 (*p*=.000)	3	16.767	66.302
AuralGJT		2F-5-Narrative-Rival-2 2 Covaried error terms btw auralGJT and narrative, imitation and narrative	.985	.095	3.846 (*p*=.146)	2	1.923	39.846
Narrative test		2F-5-Narrative-Rival-3 Grammatical vs. ungrammatical items		Unidentifiable				
WrittenGJT	1	1F-5-Narrative-Default. 5 OVs Default Explicit	.756	.381	78.914 (*p*=.000)	5	15.783	
Metalinguistic		1F-5-Narrative-Rival-1. 2 Covaried error terms btw metalinguistic test and writtenGJT, imitation test and narrative	.969	.152	10.095 (*p*=.018)	3	3.365	
		1F-5-Narrative-Rival-2. 3 Covaried error terms btw metalinguistic test and writtenGJT, imitation test and narrative, auralGJT and narrative	.991	.065	2.849 (*p*=241)	2	1.414	39.630

Table 31. (cont'd)

5 OVs EIT AuralGJT **WrittenGJT** Metalinguistic **C-test**	2	2F-5-C-test-Default 5 CVs Default: Implicit vs. explicit	.927	.269	25.201 (*p*=.000)	3	8.400	59.201
		Figure 5. 2F-5-C-test-Rival-1. 2 Covaried error terms btw writtenGJT and metalinguistic test, metalinguistic test and C-test	.998	.000	0.656 (*p*=.418)	1	.656	38.656
		Figure 6. 2F-5-C-test-Rival-2. Ungrammatical items in writtenGJT	.972	.096	7.749 (*p*=.101)	4	1.937	41.749
		Figure 7. 2F-5-C-test-Rival-3. 2 Covaried error terms btw writtenGJT_ungra and metalinguistic test, metalinguistic test and C-test	.998	.000	0.677 (*p*=.411)	1	.677	38.677
		2F-5-C-test-Rival-4 Grammatical vs. ungrammatical items	Unidentifiable					
		2F-5-C-test-Rival-5 Orality+grammatical vs. literacy+ungrammatical	.964	.109	6.645 (*p*=.084)	3	2.215	40.645
	1	1F-5-C-test-Default	.885	.261	39.761 (*p*=.000)	5	7.952	69.761
		1F-5-C-test-Rival-1. 1 Covaried error term btw Metalinguistic test and C-test	.940	.202	20.640 (*p*=.000)	4	5.160	52.640
		1F-5-C-test-Rival-2. 2 Covaried error terms btw Metalinguistic test and C-test, imitation and auralGJT	.981	.106	6.451 (*p*=.092)	3	2.150	40.451
6 OVs EIT Narrative test AuralGJT **WrittenGJT** Metalinguistic C-test	2	2F-6-Default. 6 OVs Default: Implicit vs. explicit	.817	.295	79.080 (*p*=.000)	8	9.885	117.080
		2F-6-Rival-1. 3 Covaried error terms btw auralGJT and narrative, narrative and imitation, metalinguistic test and C-test	.980	.084	8.619 (*p*=.125)	5	1.724	52.619
		2F-6-Rival-2. Ungrammatical items in writtenGJT	.873	.217	46.283 (*p*=.000)	8	5.783	84.283
		Figure 8. 2F-6-Rival-3. Ungrammatical items in writtenGJT. 3 Covaried error terms btw auraGJT and narrative, narrative and imitation, metalinguistic and C-test	.986	.019	5.191 (*p*=.393)	5	1.038	49.191
		2F-6-Rival-4. Grammatical vs. ungrammatical items	Unidentifiable					
		Figure 9. 2F-6-Rival-5. Orality+grammatical vs. Literacy+ungrammatical	.953	.064	11.339 (*p*=.183)	8	1.417	49.339

Table 31. (cont'd)

	Figure 10. 2F-6-Rival-6. Orality+grammatical vs. Literacy+ungrammatical. 1 covaried error terms btw metalinguistic test and C-test	.966	.043	8.323 (*p*=.305)	7	1.189	48.323
1	F-6-Default. 6 OVs Default	.752	.328	107.478 (*p*=.000)	9	11.942	143.478
	1F-6-Rival 1. 6 OVs 2 Covaried error terms btw metalinguistic test and C-test, imitation test and narrative	.934	.174	28.546 (*p*=.000)	7	4.078	68.546
	1F-6-Rival 2. 6 OVs 4 Covaried error terms btw metalinguistic test and C-test, metalinguistic test and writtenGJT, imitation test and narrative, auralGJT and narrative	.972	.119	12.228 (*p*=.032)	5	2.446	56.228

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