

Sensitivity to ungrammatical object drop in English by Korean young and adult L2 learners*

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Kim, Kitaek. 2015. Sensitivity to ungrammatical object drop in English by Korean young and adult L2 learners. *Linguistic Research* 32 (Special Edition), 57-81. This study looks at age effects in second language acquisition by exploring whether child L2 learners have an advantage over adult L2 learners in learning target language knowledge. The study focuses on ungrammatical object drop in English (e.g., **Kim is beating*), which is a type of error that Korean learners of English often make. Korean adult ($n = 49$) and child ($n = 30$) L2 learners' knowledge of the ungrammaticality of incorrect English null object sentences was assessed via an acceptability judgment task manipulating (i) verb type (obligatorily transitive verbs vs. intransitively-biased, optionally transitive verbs) and (ii) sentence type (transitive vs. intransitive). A high proficiency adult L2 group—but no child L2 group—showed a native-like pattern, rejecting the ungrammatical intransitive sentences with obligatorily transitive verbs. These results raise doubts about the claim that children have an advantage over adults in language acquisition, which is the basis of the Fundamental Difference Hypothesis. (Gyeongin National University of Education)

Keywords second language acquisition, age effects, Fundamental Difference Hypothesis, null objects, subcategorization

1. Introduction

In the field of second or foreign language (L2) acquisition, the important question of whether children and adults utilize the same acquisition process has remained unresolved (Haznedar 2013; Slabakova 2013). A well-known theory regarding this issue is the Fundamental Difference Hypothesis (FDH; Bley-Vroman 1990, 2009), which claims that native language-learning children and second

* This paper is a significantly revised and further developed version of part of my dissertation. I am very grateful to anonymous reviewers for their invaluable comments, questions and suggestions. Any remaining errors are mine.

language-learning adults acquire languages in different ways. The FDH emerged from the observation that in contrast to child first language (L1) development, adult L2 learning results in “lack of success” and “general failure” (Bley-Vroman 1990: 6). The hypothesis attempts to account for the adult-child asymmetry observed in, for example, subtle grammaticality judgments.¹ To account for such differences, the FDH claims that domain-specific learning mechanisms and Universal Grammar are responsible for child language development, while a general problem-solving system and established L1 knowledge are the basis for adult L2 learning (Bley-Vroman 1990). In this view, the general problem-solving system that adult L2 learners (henceforth, L2ers) utilize is not particularly well equipped to deal with the acquisition of a language—a complicated, abstract, formal system.

In fact, L2 proposals claiming a permanent deficit in knowledge for adult L2ers (Hawkins & Chan 1997; Hawkins & Hattori 2006; Hawkins & Liszka 2003; Tsimpli 2003; Tsimpli & Dimitrakopoulou 2007) are frequently based on the assumption that children and adults utilize different acquisition processes. Notably, these proposals often link knowledge deficits with learners’ maturational changes: For instance, Beck (1999: 316) claimed that “the morphosyntactic features that require or prohibit thematic verb raising become impaired during the course of maturation.”²

Recent psycholinguistic research has reported differences between child and adult L2ers in language processing (Clahsen & Felser 2006; Hopp 2007; Witzel et al. 2012). When children parse temporarily ambiguous sentences, they rely primarily on syntactic information while often ignoring lexical-semantic and contextual cues (among others, Trueswell et al. 1999). In sharp contrast, adult L2ers rely heavily on lexical-semantic and contextual cues in parsing ambiguous sentences (among others, Felser et al. 2003). This difference is the basis of the Shallow Structure Hypothesis (SSH; Clahsen & Felser 2006: 32), which posits that “the syntactic representations

¹ Bley-Vroman did not cite specific literature to support this observation. One famous example, however, is Johnson and Newport’s (1989, 1991) report of adult L2ers’ low accuracy and inconsistency in grammaticality judgment tasks versus child L2ers’ high accuracy and consistency in the same tasks. Other authors have argued that this asymmetry is not exclusively due to the age factor. For example, Birdsong and Molis (2001: 247) replicated Johnson and Newport’s (1989) study and reported that the “amount of current English use” plays a “nontrivial role...in determining the L2 acquisition end state.”

² This claim is in line with the Critical Period Hypothesis (Lenneberg 1967). For discussion about this critical period issue in L2 acquisition, see Slabakova (2013). For one empirical L2 study, see Abrahamsson and Hyltenstam (2009).

adult L2 learners compute for comprehension are shallower and less detailed than those of native speakers.” This claim suggests that the SSH maintains the position that adult L2ers face a knowledge problem (for discussion, see Dekydtspotter et al. 2006), which is consistent with the FDH and proposals that claim a permanent deficit in knowledge for adult L2ers.

However, it is noteworthy that both the FDH and the SSH are based on the comparison of native-speaker children (henceforth, child L1ers) and adult L2ers. Child L1ers and adult L2ers are not a minimal pair in which the only crucial difference is age, because the former learns an L1, while the latter learns an L2 with the L1 system already built in. For this reason, Schwartz (1992, 2004) proposed developmental comparison between adult L2ers and child L2ers with the same L1.

Despite the theoretical importance of this observation, however, only a few studies have compared child L2ers and adult L2ers (Unsworth 2005; Unsworth & Blom 2010). DeKeyser’s (2012: 456) meta-analysis of age effects in L2 acquisition also concluded that “research on age effects has only begun,” pointing out that much more documentation should be accumulated. The current study aims to serve as a piece of documentation about age effects in L2 acquisition by exploring whether child L2ers have an advantage over proficiency-matching adult L2ers in learning target language (TL) knowledge. The study focuses on object drop in English, which is a domain in which Korean learners of English often make errors (Hwang 2014; Park 2004).

2. Literature review

2.1 Child L2 acquisition and child-adult L2er comparison

The FDH claims that the contrast between successful child L1ers and unsuccessful adult L2ers in TL acquisition is due to differences in their acquisition processes: Domain-specific learning mechanisms and Universal Grammar are responsible for the success of child L1ers, while a general problem-solving system and established L1 knowledge are the cause of adult L2ers’ lack of success. To compare child L2ers with adult L2ers to test this claim of the FDH, we need to find child L2ers who meet the following conditions: First, the child L2ers should be like

child L1ers in being able, we assume, to use domain-specific learning mechanisms and Universal Grammar, leading to successful TL acquisition. Second, at the same time, the child L2ers for this comparison should be like the adult L2ers in having (bulk of) L1 knowledge that is already established. If these conditions are met, the two groups are a minimal pair where the only difference is the age factor, which is the basis of the FDH's claim of different acquisition processes between children and adults. A question arises: Who are the particular child L2ers that can meet these conditions?

This paper follows Schwartz (2004) in considering child L2ers (i.e., who meet the two conditions) to be those whose first non-native TL exposure occurs between age 4 and age 7.³ This range was chosen because (i) children at age 4 know the bulk of their L1 grammar (Guasti 2002), and (ii) children whose L2 acquisition begin before age 8 have shown native-like performance on tasks assessing various morphosyntactic phenomena (Johnson & Newport 1989, 1991). According to Schwartz (2004: 48), the native-like performance of these L2 children suggests that they are “utilizing the same acquisition processes as children use in L1 acquisition.”

The boundary between child and adult L2ers is not clear-cut. For Haznedar (2013), the boundary is 7–10 years, based on the debates on the Critical Period Hypothesis (Lenneberg 1967). That is, Haznedar defined adult L2ers as those who start to learn the TL after they reach 7–10 years of age, the period during which the alleged critical period for language acquisition ends.

In Korea, although some children begin to learn English when they are very young (e.g., if they attend an English-medium kindergarten or live in an English-speaking country), most do not start to study English regularly until about age 9, when they begin a regular English class in elementary school.⁴ These children, the majority, would not be considered child L2ers who can be compared with adult L2ers, according to Schwartz (2004) and Haznedar (2013). To test the FDH by comparing L1 Korean child L2ers of English with L1 Korean adult L2ers

³ There are other definitions of child L2ers: For example, Johnson and Newport (1989) defined child L2ers as those whose first non-native TL exposure occurs between age 0 and age 7. However, this definition does not distinguish child L2ers from simultaneous bilingual speakers.

⁴ It is worth noting that the amount of instruction time given to English in Korean elementary schools is not large: According to Lee (2003), 3rd graders (age 9) and 4th graders (age 10) have one hour a week of English, and 5th graders (age 11) and 6th graders (age 12) have two hours a week.

of English, we need child participants who started being exposed to regular L2 English input before they entered elementary school.

In addition, to compare child L2ers with adult L2ers, it is important to group the learners by TL proficiency and compare the two populations within each proficiency group (Unsworth 2005). This study adopts a picture-narration task for proficiency measurement (Song & Schwartz 2009; Unsworth 2005; Whong-Barr & Schwartz 2002), which is appropriate for children (Whong-Barr & Schwartz 2002).

2.2 Ungrammatical object drop in English

East Asian languages (e.g., Korean, Chinese, and Japanese) allow null objects (Hoji 1998; Huang 1984; Moon 2010). When a transitive verb is used, null objects are licensed by the topic prominent feature of these languages (Huang 1984). See the Mandarin sentence in (1) for an example.

- (1) Zhangsan shuo [Lisi buren shi e].
 Zhangsan say Lisi not know
 ‘Zhangsan said that Lisi does not know [him].’
 (Huang 1984: 537)

Huang noted that the null object in (1) refers to someone outside the sentence. To account for this phenomenon, he proposed a rule of Topic NP Deletion: The topic of a sentence can be deleted under identity with a topic in a discourse. That is, speakers of East Asian languages drop an object when a discourse context provides information about it. At the same time, when they encounter a null object sentence, they will assume that the object information is present somewhere in the discourse context.

While East Asian languages are “discourse-oriented,” English is “sentence-oriented” (Tsao 1977). Thus, while East Asian languages are subject to the Topic NP Deletion rule, English is not. Huang (1984) proposed a topic-drop parameter, which deals with the availability of null objects: While East Asian languages are [+topic-drop], English is a [-topic-drop] language.

Notably, however, there is object drop in English; but this is a lexical phenomenon (Cote 1996). See (2) and (3) for examples.

(2) a. Kim is beating Lee.

b. *Kim is beating.

(3) a. Kim is fighting Lee.

b. Kim is fighting.

Both *beat* and *fight* can be used as transitive verbs as in (2a) and (3a), where they select an NP as a complement. However, *beat* cannot be used as an intransitive verb (2b), while *fight* can be (3b). This asymmetry comes from a syntactic requirement—not a semantic requirement—of a particular verb. The words *beat* and *fight* have the same argument structure (i.e., the number of arguments that a predicate requires) in that they select two thematic roles, agent and theme, as in (2a) and (3a). In (3b), the theme argument is not expressed, and thus it is an “implicit argument” (Jackendoff 1990: 45). In (2b), however, the theme argument cannot be unexpressed, because of a syntactic requirement of *beat*: *beat* requires an NP complement obligatorily. Therefore, verbs like *beat* are called obligatorily transitive verbs, while verbs like *fight* are called optionally transitive verbs.

The complement information in such transitive verbs is used in syntactic derivation. In recent theories of syntax (e.g., the Minimalist Program; Chomsky 1995), a syntactic derivation requires (i) subcategorization information for lexical items and (ii) combinatorial operations (i.e., Merge and Move). Two lexical items are merged to satisfy, for instance, the subcategorization requirements of a lexical item. For example, the transitive verb *beat* has an uninterpretable feature [*u*N], so that only an NP can be merged with the verb as its complement because the NP can check off the [*u*N] feature in *beat*. This uninterpretable feature comes from the subcategorization information of the verb *beat*.

2.3 L2 acquisition studies on ungrammatical object drop

In the field of L2 acquisition, there is little research that explores object drop by English L2ers with East Asian first languages (Hwang, 2014). What the existing studies show in common is that these learner populations are insensitive to (and often produce) incorrect null object sentences when learning English (Hwang 2014; Park 2004; Yuan 1997; Zobl 1994). Zobl’s (1994) grammaticality judgment task

with Chinese-speaking learners of English showed that their rejection rate of incorrect null object sentences was only 43.8%. Yuan (1997) also conducted a grammaticality judgment task, with 159 L1 Chinese adult L2ers of English. Strikingly, he reported that even the highest proficiency learners were not able to reject the ungrammatical English sentences with null objects. Yuan attributed their failure to reject null objects to the absence of informative L2 input to unset their L1 [+topic-drop] setting.

Park (2004) looked at corpus data of L1-Korean children learning L2 English and reported that they produced null object sentences. She provided a syntactic account for this phenomenon. Based on work by Lasnik (1999) and Bošković and Takahashi (1998), she discussed how theta-role assignment is the checking of formal theta-features; in English, the theta-feature is strong and must be checked before Spell-out, while in Korean, the theta-feature is weak and thus the feature checking can be postponed until after Spell-out, which allows the null object sentences. She further claimed that one reason that L1 Korean speakers produce incorrect null object sentences in English is that they have difficulty learning the strong theta feature in English. However, the data are not very informative, as the study only deals with less proficient learners: The Mean Length of Utterance (MLU) information of the six children ranged between 1.6 and 3.2, which suggests that none of the children were proficient in English.

More recently, Hwang (2014) looked at L2 English productions of L1 Korean adult learners of English. She reported that the high proficiency adults did not show object drop, and she therefore claimed that high proficiency L2ers can unlearn the topic-prominent properties responsible for object drop. However, production data have a limitation in that they often fail to reveal L2 knowledge. In particular, knowledge of ungrammaticality cannot be tested through production. For example, we do not know whether the high proficiency learners in Hwang's study were able to reject transitive sentences without an expressed object.

Based on the previous literature that we discussed, this study asks the following two questions:

1. Can L1 Korean adult/child L2ers of English come to know that English obligatorily transitive verbs do not allow object drop, rejecting incorrect null object sentences?

2. Do L1 Korean child L2ers show higher sensitivity to incorrect null object sentences than proficiency-matching adults?

3. Methods

3.1 Participants

Forty-nine adult native speakers of Korean (ages = 19–26) and 30 child native speakers of Korean (ages = 9–12; mean 11) who were learning L2 English in Korea participated. At the time of testing, all the adult L2ers were college students in Korea, none majoring in English or linguistics. All the adult L2ers had learned English in the classroom from age 9 in Korea. All the 30 L2 children had started learning English from the ages of 4 or 5 (mean = 5.2). The mean exposure to English for the child L2ers was about 5.7 years. The child L2ers learned English from private English-immersion institutes in Korea in which most of the teachers were English native speakers. At the time of testing, all these children were enrolled in the highest proficiency class. In the institutes, children aged 4–6 learned English for five hours a day from Monday to Friday. Children over 7 went to the institutes after their classes at elementary school for about two or three hours a day from Monday to Friday. Five of the children had lived in the United States: three children for two years at ages 5 and 6; one child for two years at ages 7 and 8; and one child for one year at age 5.

A picture-narration task (Song & Schwartz 2009; Unsworth 2005; Whong-Barr & Schwartz 2002), as a task appropriate for children, was employed to measure the participants' English proficiency.⁵ Following Unsworth (2005), both adult L2er and child L2er groups were divided into three subgroups based on their proficiency scores: Low (z-score below 0.5), Medium (z-score between 0.5 and 0.5), and High

⁵ The children were presented with three sets of four pictures depicting a series of events, and were asked to tell stories based on the pictures (Song & Schwartz 2009). During the task, the children were encouraged to speak as much as possible. For instance, the researcher provided prompts and asked questions such as: "And what happened next?" (Unsworth 2008: 311). The production data from the picture-narration task were used to measure proficiency by calculating the participants' scores of complexity (total number of words divided by the total number of T-units) and accuracy (the number of error-free T-units divided by the total number of T-units).

(z-score higher than 0.5).⁶ Table 1 shows the information for each proficiency group.

Table 1. Participant grouping by proficiency

		Low (zscore < 0.5)	Medium (0.5 < zscore < 0.5)	High (0.5 < zscore)
Adult	Number	13	18	18
L2ers (n = 49)	zscore mean (SD)	1.21 (0.51)	0.06 (0.32)	1.15 (0.58)
Child	Number	11	10	9
L2ers (n = 30)	zscore mean (SD)	1.08 (0.44)	0.04 (0.30)	0.94 (0.29)

Recall that the children came from the highest proficiency classes in their institutes and the adults were all college students with about 10 years of experience learning English. That is to say, the Low group learners were not beginners; their placement in this group means only that their proficiency was relatively lower than that of the other groups.

3.2 Materials

To test whether the participants would reject the incorrect null object sentences (e.g., **Kim is beating*), this study employed an acceptability judgment task (AJT), with items as in (4).⁷

(4) Test sentence: *Kim is touching Lee.*

Acceptability rating: Very unnatural 1–2–3–4–5–6 Very natural

Although the reliability and validity of AJTs have been criticized (see Sorace 1996, for an overview), AJT studies can provide “valuable insights about learner

⁶ These z-scores were calculated based on the proficiency scores of all 79 participants.

⁷ The AJT is commonly referred to as a grammaticality judgment task, but the current study instead uses the term “acceptability judgment task,” or AJT, throughout, based on the consideration that judgment data reflect various variables (e.g., grammatical knowledge, pragmatic appropriateness, etc.). Sorace (1996) discussed the fact that while sentences can be grammatical or not from the linguist’s perspective, to informants, sentences are only acceptable with respect to the various variables.

grammar” if carefully designed (Lardiere 2012: 115). The AJT in this study was a 2x2 design, varying sentence type (transitive vs. intransitive) and verb type (obligatorily transitive vs. intransitively-biased optionally transitive). It used four obligatorily transitive verbs (*beat*, *catch*, *find*, *touch*) and four intransitively-biased optionally transitive verbs (*fight*, *hunt*, *move*, *race*). The transitivity bias of the intransitively-biased optionally transitive verbs was less than 50%: *fight* (23.5%, 32/136), *hunt* (45.2%, 71/157), *move* (34.0%, 32/94), and *race* (36.3%, 56/154) (Gahl et al. 2004). In the English AJT, the participants read eight sentences missing a direct object NP (e.g., **Kim is beating*; *Kim is fighting*) and eight sentences including a direct object NP (e.g., *Kim is beating Lee*; *Kim is fighting Lee*), and rated the sentences’ acceptability on a scale of 1 to 6 (1 = sounds completely unnatural; 2 = sounds unnatural; 3 = sounds somewhat unnatural; 4 = sounds somewhat natural; 5 = sounds natural; 6 = sounds completely natural).

The Korean AJT, which used the translation equivalents of the English AJT items, was administered right after the English AJT. The Korean AJT aimed to check whether the participants’ overall responses were reliable. As mentioned, the Korean language allows null objects, and thus obligatorily transitive verbs do not exist in Korean. Therefore, participants were not expected to give low ratings to the Korean intransitive sentences using the translation equivalents of the obligatorily transitive verbs. That is, different rating patterns in the Korean AJT and the English AJT would suggest greater reliability in the results of the English AJT.⁸

However, the participants’ ratings on the English AJT might affect their ratings on the subsequent Korean AJT. Therefore, as a control group, 10 adult native speakers of Korean completed the Korean AJT only, in order to provide results unaffected by the English AJT. An additional control group of 10 native English-speaking adults, recruited from the University of Hawai‘i community, completed the English AJT only.

3.3 Data Analysis

The participants’ performance was assessed by their responses on the 6-point

⁸ The Korean transitive verbs were carefully selected from those that can allow the accusative -ul/-lul marked object NP: *ttaylita* ‘beat’, *capta* ‘catch’, *chacta* ‘find’, *mancita* ‘touch’, *macsessawuta* ‘fight’, *sanyanghata* ‘hunt’, *itongsikhita* ‘move’, and *macsekyengcwuhata* ‘race’.

Likert scale. For within-group comparisons, separate repeated-measure ANOVAs were applied to analyze main effects of *sentence type* (transitive vs. intransitive) and *verb type* (obligatorily transitive vs. intransitively-biased optionally transitive) and their interactions. Paired-samples *t*-tests were subsequently conducted for pairwise comparisons. These comparisons were planned: The analysis looks at whether, in intransitive sentences, the acceptability ratings on the obligatorily transitive verbs (e.g., **Kim is beating*) are significantly lower than the ratings on the intransitively-biased optionally transitive verbs (e.g., *Kim is fighting*), and, in contrast, whether in transitive sentences the ratings on the obligatorily transitive verbs (e.g., *Kim is beating Lee*) are not statistically different from the ratings on the intransitively-biased optionally transitive verbs (e.g., *Kim is fighting Lee*).

4. Results

4.1 Native-speaker control groups

This section deals with the data from the native-speaker control groups. Figure 1 shows the acceptability ratings of the native Korean-speaking control group ($n = 10$) and the native English-speaking control group ($n = 10$), on the Korean AJT and the English AJT, respectively.

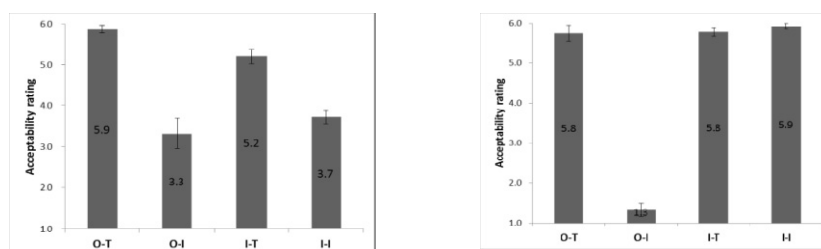


Figure 1. Acceptability ratings for verbs in transitive vs. intransitive sentences: Korean native controls and English native controls

Notes. O-T = Obligatorily transitive verbs used in transitive sentences; O-I = Obligatorily transitive verbs used in intransitive sentences; I-T =

Intransitively-biased, optionally transitive verbs used in transitive sentences; I-I = Intransitively-biased, optionally transitive verbs used in intransitive sentences; error bars represent standard errors.

Figure 1 shows that the Korean native speakers tended to allow the translation equivalents of the obligatorily transitive English verbs in intransitive sentences, with an average rating of 3.3, which is between “somewhat unnatural” (3) and “somewhat natural” (4). However, the English native speakers knew that the obligatorily transitive English verbs cannot be used in intransitive sentences. Their average acceptability rating for the intransitive sentences including obligatorily transitive verbs is only 1.3, which is between “completely unnatural” (1) and “unnatural” (2). An independent sample *t*-test showed that these two numbers are significantly different from each other ($t(18) = 4.84$; $p < .0001$).

In the English AJT, a repeated measures ANOVA showed main effects of verb type [$F_1(1, 9) = 449.67$, $p < .001$; $F_2(1, 6) = 892.83$, $p < .001$] and sentence type [$F_1(1, 9) = 174.40$, $p < .001$; $F_2(1, 6) = 525.29$, $p < .001$], as well as an interaction effect [$F_1(1,9) = 231.67$, $p < .001$; $F_2(1, 6) = 601.60$, $p < .001$]. The main effects of verb type and sentence type come from the fact that the English native speakers gave significantly lower ratings to the ungrammatical sentences (i.e., intransitive sentences with obligatorily transitive verbs) than to the grammatical sentences. The interaction effect indicates that the participants distinguished between the two verb types: A planned comparison revealed that in transitive sentences, the participants' ratings reflect no difference in acceptability between the two verb types [$t_1(9) = .124$, $p = .90$; $t_2(3) = .129$, $p = .91$], while in intransitive sentences, the participants considered the obligatorily transitive English verbs to sound less natural than the intransitively-biased optionally transitive verbs [$t_1(9) = 27.463$, $p < .001$; $t_2(3) = 65.054$, $p < .001$].

4.2 L2 groups

This section describes the results from the target L2 adult and L2 child groups, looking first at the Korean AJT results. Figure 2 shows the ratings of the Korean AJT by the adult L2ers and the child L2ers.

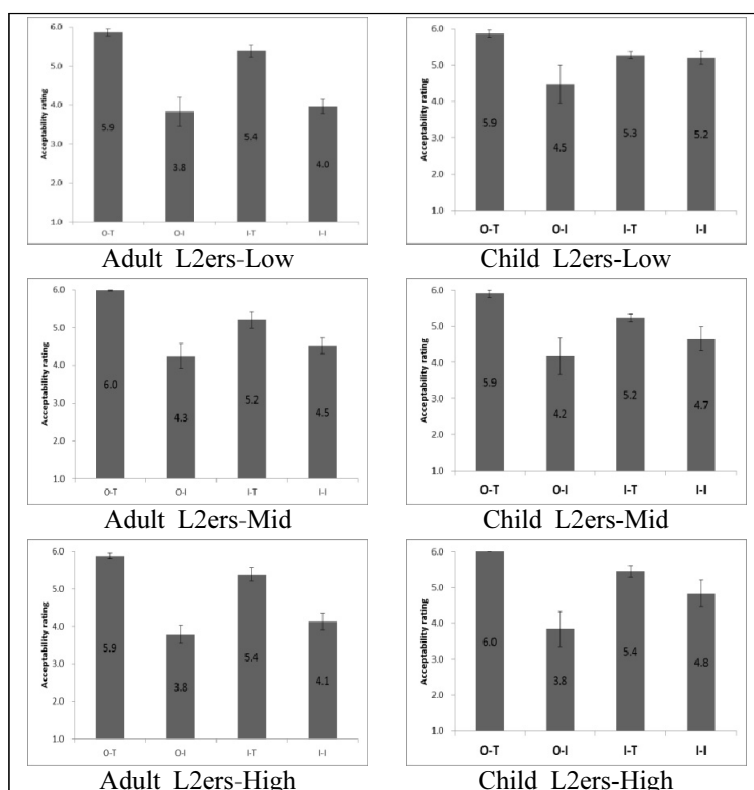


Figure 2. Korean AJT: Acceptability ratings for verbs in transitive vs. intransitive sentences

Figure 2 shows that all six L2er groups tended to allow the translation equivalents of the obligatorily transitive English verbs to be used in intransitive sentences, with an average between 3.8 and 4.5.

To examine whether the six groups show any differences in their patterns of ratings, a 2 (verb type; obligatorily transitive vs. intransitively-biased optionally transitive) $\times$ 2 (sentence type; transitive vs. intransitive) $\times$ 3 (proficiency group; high vs. mid vs. low) $\times$ 2 (learner group; adult vs. child) ANOVA was conducted (within group factors: verb type and sentence type; between group factors: proficiency group and learner group). This analysis yielded a main effect of sentence type [$F_1(1, 73) = 98.77, p < .001$; $F_2(1, 36) = 643.77, p < .001$], as well as an interaction effect between verb type and sentence type [$F_1(1, 73) = 92.27, p < .001$; $F_2(1, 36) =$

110.02, $p < .001$]. Notably, there were no main effects of proficiency group and learner group (all $p > .10$), which suggests that the rating patterns in the Korean AJT are not different between the adult L2ers and the child L2ers and between the high proficiency, medium-proficiency, and low-proficiency learners.

Now let us look at the acceptability ratings for the English AJT by proficiency group and learner group, to compare proficiency-matching adult L2ers and child L2ers. Figure 3 shows the acceptability ratings for the English AJT by the six groups.

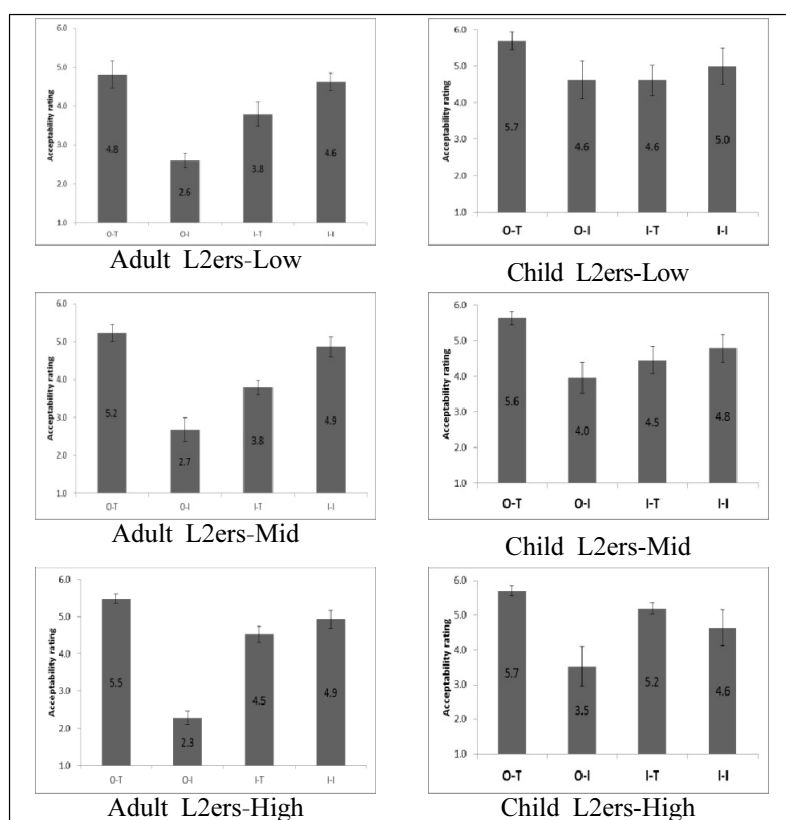


Figure 3. English AJT: Acceptability ratings for verbs in transitive vs. intransitive sentences

Figure 3 shows that the adult L2ers knew that the obligatorily transitive English verbs cannot be used in intransitive sentences; their average acceptability rating for

the intransitive sentences including obligatorily transitive verbs is around 2 to 3 (2 = unnatural; 3 = somewhat unnatural), while the proficiency-matching child groups gave these sentences higher ratings, between 3 and 5 (3 = somewhat unnatural, 4 = somewhat natural, 5 = natural).

To examine whether the six groups show any differences in their patterns of ratings, a 2 (verb type) x 2 (sentence type) x 3 (proficiency group) x 2 (learner group) ANOVA was conducted (within group factors: verb type and sentence type; between group factors: proficiency group and learner group). This analysis yielded main effects of verb type [$F_1(1, 73) = 7.90, p < .01$; $F_2(1, 36) = 4.06, p = .051$], sentence type [$F_1(1, 73) = 31.54, p < .001$; $F_2(1, 36) = 36.59, p < .001$], and notably, learner group [$F_1(1, 73) = 19.75, p < .001$; $F_2(1, 36) = 30.10, p < .001$]. These results suggest that the rating patterns in the English AJT are different between the adult L2ers and the child L2ers.

To examine which group shows the more native-speaker-like pattern, repeated measures ANOVAs were performed for each learner group. Recall that the native English-speaking adults' results show main effects of verb type and sentence type, as well as an interaction effect. According to the ANOVA analysis, only the adult L2ers-High group shows the native-speaker pattern, with main effects of verb type [$F_1(1, 17) = 33.86, p < .001$; $F_2(1, 6) = 6.41, p = .045$] and sentence type [$F_1(1, 17) = 59.42, p < .001$; $F_2(1, 6) = 17.28, p < .01$], as well as an interaction effect [$F_1(1, 17) = 61.48, p < .001$; $F_2(1, 6) = 29.21, p < .01$]. The main effect of verb type shows that the intransitively-biased optionally transitive verbs sounded more natural than the obligatorily transitive verbs. In fact, this result is due to the presence of the obligatorily transitive verbs in the (ungrammatical) intransitive sentences. The main effect of sentence type shows that the transitive sentences sounded more natural than the intransitive sentences. The interaction effect indicates that the participants distinguished between the two verb types: A planned comparison revealed that in transitive sentences, obligatorily transitive verbs sounded more natural than intransitively-biased optionally transitive verbs [$t_1(17) = 3.881, p < .01$; $t_2(3) = 1.984, p = .14$], while in intransitive sentences, the intransitively-biased optionally transitive verbs sounded significantly better than the obligatorily transitive verbs [$t_1(17) = 8.969, p < .001$; $t_2(3) = 9.475, p < .01$].

However, all the other five groups' results showed interaction effects [for adult L2ers-Low, $F_1(1, 12) = 27.18, p < .001$; $F_2(1, 6) = 11.93, p = .014$; for adult

L2ers-Mid, $F_1(1, 17) = 113.97, p < .001$; $F_2(1, 6) = 18.11, p < .01$; for child L2ers-Low: $F_1(1, 10) = 20.73, p < .01$; $F_2(1, 6) = 4.43, p = .08$; for child L2ers-Mid, $F_1(1, 9) = 26.42, p < .01$; $F_2(1, 6) = 8.83, p = .03$; for child L2ers-High: $F_1(1, 8) = 27.63, p < .01$; $F_2(1, 6) = 31.94, p < .01$], which suggests that all these learners knew that the two verb types are different from each other. However, these five groups were not yet convinced enough to reject the ungrammatical intransitive sentences with obligatorily transitive verbs. Table 2 summarizes the results, and Tables 3 through 7 display all the statistical results.

Table 2. English AJT: Summary of the results

	Knowledge of ungrammaticality		Distinguishing of the verb types	
	Main effects of both verb type and sentence type		Interaction effect	
	Adult	Child	Adult	Child
L2ers-Low	NO	NO	YES	YES
L2ers-Mid	NO	NO	YES	YES
L2ers-High	YES	NO	YES	YES
English natives	YES		YES	

Table 3. Statistical results of the English AJT: Main effects of verb type

	Adult	Child
L2ers-Low	$F_1(1, 12) = 2.93, p = .11$; $F_2(1, 6) = 6.35, p = .06$	$F_1(1, 10) = 2.03, p = .18$; $F_2(1, 6) = 1.14, p = .33$
L2ers-Mid	$F_1(1, 17) = 3.68, p = .07$; $F_2(1, 6) = .75, p = .42$	$F_1(1, 9) = .79, p = .40$; $F_2(1, 6) = .51, p = .50$
L2ers-High	$F_1(1, 17) = 33.86, *p < .001$; $F_2(1, 6) = 6.41, *p = .045$	$F_1(1, 8) = 3.58, p = .095$; $F_2(1, 6) = 1.45, p = .27$
English natives	$F_1(1, 9) = 449.67, *p < .001$; $F_2(1, 6) = 892.83, *p < .001$	

Table 4. Statistical results of the English AJT: Main effects of sentence type

	Adult	Child
L2ers-Low	$F_1(1, 12) = 9.40, *p = .01$; $F_2(1, 6) = 2.48, p = .17$	$F_1(1, 10) = .31, p = .59$; $F_2(1, 6) = .97, p = .36$
L2ers-Mid	$F_1(1, 17) = 7.97, *p = .012$; $F_2(1, 6) = 3.04, p = .13$	$F_1(1, 9) = 1.68, p = .23$; $F_2(1, 6) = 4.02, p = .092$
L2ers-High	$F_1(1, 17) = 59.42, *p < .001$; $F_2(1, 6) = 17.28, *p < .01$	$F_1(1, 8) = 5.55, *p = .046$; $F_2(1, 6) = 91.18, *p < .001$
English natives	$F_1(1, 9) = 174.4, *p < .001$; $F_2(1, 6) = 525.29, *p < .001$	

Table 5. Statistical results of the English AJT: Interaction effects

	Adult	Child
L2ers-Low	$F_1(1, 12) = 27.18, *p < .001$; $F_2(1, 6) = 11.93, *p = .014$	$F_1(1, 10) = 20.73, *p < .01$; $F_2(1, 6) = 4.43, p = .08$
L2ers-Mid	$F_1(1, 17) = 113.97, *p < .001$; $F_2(1, 6) = 18.11, *p < .01$	$F_1(1, 9) = 26.42, *p < .01$; $F_2(1, 6) = 8.83, *p = .025$
L2ers-High	$F_1(1, 17) = 61.48, *p < .001$; $F_2(1, 6) = 29.21, *p < .01$	$F_1(1, 8) = 27.63, *p < .01$; $F_2(1, 6) = 31.94, *p < .01$
English natives	$F_1(1, 9) = 231.67, *p < .001$; $F_2(1, 6) = 601.60, *p < .001$	

Table 6. Statistical results of the English AJT: Planned comparison in transitive sentences

	Adult	Child
L2ers-Low	$t_1(12) = 1.972, p = .072$; $t_2(3) = 2.000, p = .14$	$t_1(10) = 3.048, *p = .012$; $t_2(3) = 2.061, p = .13$
L2ers-Mid	$t_1(17) = 7.092, *p < .001$; $t_2(3) = 1.950, p = .15$	$t_1(9) = 3.689, *p < .01$; $t_2(3) = 2.602, p = .08$
L2ers-High	$t_1(17) = 3.881, *p < .01$; $t_2(3) = 1.984, p = .14$	$t_1(8) = 3.207, *p = .012$; $t_2(3) = 1.877, p = .16$
English natives	$t_1(9) = .124, p = .90$; $t_2(3) = .129, p = .91$	

Table 7. Statistical results of the English AJT: Planned comparison in intransitive sentences

	Adult	Child
L2ers-Low	$t_1(12) = 7.459, *p < .001;$ $t_2(3) = 8.720, *p < .01$	$t_1(10) = 1.875, p = .09;$ $t_2(3) = 1.681, p = .19$
L2ers-Mid	$t_1(17) = 7.277, *p < .001;$ $t_2(3) = 8.001, *p < .01$	$t_1(9) = 3.637, *p < .01;$ $t_2(3) = 3.306, *p = .046$
L2ers-High	$t_1(17) = 8.969, *p < .001;$ $t_2(3) = 9.475, *p < .01$	$t_1(8) = 4.061, *p < .01;$ $t_2(3) = 5.108, *p = .015$
English natives	$t_1(9) = 27.463, *p < .001;$ $t_2(3) = 65.054, *p < .001$	

All in all, the English AJT results show that the six participant groups distinguished the two English verb types in terms of their tendency to occur in the two sentence types, as seen in the significant interaction effects. However, only the adult L2ers-High group's results showed robust main effects of verb type and sentence type; that is, this group's pattern was native-speaker-like. In addition, the adult L2ers showed higher sensitivity than the child L2ers to the ungrammaticality of intransitive sentences with obligatorily transitive verbs, giving lower ratings to those sentences. Note that a main effect of learner group appeared in the English AJT; however, no such effect appeared in the Korean AJT.

5. Discussion

The first question that this paper asks is: Can L1-Korean adult/child L2ers of English come to know that English obligatorily transitive verbs do not allow object drop, and thus reject incorrect null object sentences? The AJT results showed that high proficiency L1-Korean adult L2ers are able to know the subcategorization requirements of English obligatorily transitive verbs, showing a native-speaker-like pattern (i.e., acceptability ratings indicating “unnatural” for the ungrammatical sentences; main effects of verb and sentence type). Conversely, no child L2er groups showed native-speaker-like patterns.

These results suggest that there is no ground for the view that adult L2ers have less of an advantage in language learning than children do (FDH; Bley-Vroman

1990, 2009), when adult L2ers are compared with child L2ers. In fact, the FDH, which claims fundamental differences between what drives child language development and what drives adult foreign language learning, was a response to the observation of the generally poor performance of adult L2ers. However, as discussed, child L1ers and adult L2ers are not a minimal pair in which the only crucial difference is age; to be valid, the comparison must be between child L2ers and adult L2ers. Notably, the current study did not find an advantage of child L2ers over adult L2ers in L2 learning.

According to the FDH, when individual adult L2ers exhibit convergence on TL grammar, such native-like performance can be attributed to (i) application of the corresponding L1 knowledge, or (ii) analogy from TL input, or (iii) an instruction effect. However, this account does not hold for the native-like performance of the high adult group in the present study. First, the Korean language allows object drop, as the Korean AJT data suggest. Second, the TL input can indicate that object drop is possible for the intransitively-biased optionally transitive verbs, but not that object drop is impossible for obligatorily transitive verbs in English sentences. What grammar tells us is what is possible or not possible, rather than what is more preferable or less preferable. It is a mystery in language acquisition that without negative evidence, L2ers come to know what is *not* possible from TL input (Schwartz & Sprouse 2000, 2013). Third, it is highly unlikely that the study's results reflect an instruction effect. It seems implausible that, when teaching English vocabulary, English teachers in Korea explicitly teach the syntactic requirement of each verb; at the same time, it seems implausible that, when learning English vocabulary, these Korean learners memorized not only the semantic meaning but the syntactic requirement of each verb.

The second question this paper asks is: Do Korean child L2ers show higher sensitivity to incorrect null object sentences than proficiency-matching adults do? The AJT results showed that the opposite is true: The adult L2ers were more sensitive to ungrammaticality in the test sentences than were the proficiency-matching child L2ers. This is a striking result. The adult L2ers rejected, for example, a sentence with *beat* missing an object, but allowed, for example, a sentence with *fight* missing an object, although both *beat* and *fight* have the same thematic roles (i.e., agent and theme). That is, they used the syntactic requirement of the verbs when processing the sentences. The results thus suggest that there is no

ground for the view that child L2ers show higher sensitivity to syntactic information than proficiency-matching adults do.

It might be tempting to attribute the child L2ers' higher ratings on the ungrammatical intransitive sentences with obligatorily transitive verbs to mere generosity, on the part of the children, in giving ratings. However, this claim does not hold when we consider the Korean AJT results: The child L2ers did not give significantly higher ratings than the adult L2ers in the Korean AJT. Recall that the ANOVA analysis showed a main effect of learner group in the English AJT, but not in the Korean AJT. If the children were more generous than the adults, we would expect to see (i) higher ratings for the Korean AJT as well as the English AJT, and thus (ii) main effects of learner group in the Korean AJT as well as the English AJT.

6. Conclusion and limitations of the study

The results reported in this paper raise doubts about the basis of the theories that claim fundamental differences between children and adults in the process of language learning. These theories are based on the comparison of child L1ers' successful L1 performance with adult L2ers's unsuccessful L2 performance. However, as discussed, we also need to compare adult L2ers and child L2ers (Schwartz 1992, 2004). The current study's comparison of proficiency-matching adult L2ers and child L2ers suggests that we should be careful about concluding that children have an advantage over adults in language learning. In this study, adult L2ers showed better performance than proficiency-matching child L2ers.

This paper has several limitations. First, as one of the reviewers correctly pointed out, the study could not control for TL input quantity and quality or TL output between children and adults. Input/output can be confounding factors; recall Birdsong and Molis's (2001) claim that the amount an L2er uses the TL is "nontrivial" in its long-term effects on acquisition. Although the child L2ers in this study fit Schwartz's (2004) definition of child L2ers, it is worth noting that these children were learning English not as a second language (i.e., ESL), but as a foreign language (i.e., EFL). Although they went to institutes where most of the teachers were English native speakers, their fellow students were all Koreans; and outside the

classroom, they are surrounded with Korean input. In other words, it is likely that their teachers are their only sources of English input. In addition, it is possible that the teachers in the English kindergarten use “foreigner talk,” speaking only in structurally simplified sentences. In contrast, in an ESL context, TL input is fully available outside the classroom, and L2ers are likely to be exposed to a variety of sentence types from diverse sources (e.g., TV, radio, magazines, L1-English-speaking friends). A longitudinal study with a close examination of TL input/output is called for to address both age effects and input/output effects in L2 acquisition.

Second, just as production data alone cannot reveal the full extent of learners’ L2 knowledge (such as knowledge of ungrammaticality, as discussed in Section 2.3) (Choi 2013), this study’s AJT data alone may not fully reflect L2 knowledge. One of the reviewers correctly pointed out that an AJT is far from actual language use, where implicit linguistic knowledge is required; the AJT data come from an experimental setting, where explicit metalinguistic knowledge can be used (for this issue, see Jiang 2004). To obtain a clearer picture of L2 knowledge, future research should employ a wide variety of methods to elicit production data (e.g., from picture description and elicited production tasks), comprehension data (e.g., from picture-selection and act-out tasks), judgment data (e.g., from AJTs and truth value judgment tasks), and processing data (e.g., from self-paced reading tasks and eye-tracking).

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Received: 2015. 3. 2.

Revised: 2015. 6. 15.

Accepted: 2015. 6. 15.