http://dx.doi.org/10.20880/kler.2020.55.5.85

A Study on the Processing of the Korean Passive through a Self-Paced Reading Task (SPRT)

Kim, Hojung Seoul National University /
Department of Korean Language Education
Korean Language Education Research Institute
Professor / Researcher (1st author)

Lee, Wonki Purdue University
Education, Curriculum and Instruction, Literacy and Language
Research Assistant (co-author)

I. Introduction

The present paper aims to examine how learners and native speakers of Korean process passive sentences and judge grammaticality by using a Self-Paced Reading Task (SPRT) and a follow-up Grammaticality Judgment Task (GJT). The phenomenon and concept of the "passive voice," along with the expression mechanism of passive voice, are shared by numerous languages. However, it has been reported that passive voice language expressions differ from language to language, which poses challenges for many L2 learners (Armstrong et al., 1983; Croft, 2002; Levin & Rappaport, 1991; Straus & Brightman, 1982; Talmy, 1988). Korean is not excluded from this trend. In general, passive expressions should be learned at the intermediate stage and gradually proceduralized and internalized, but learners tend to have difficulty understanding and correctly using passive sentences, even at the advanced stage (Hwang, 2011; Author Kim & Lee, 2018a; Yoo, 2015). Therefore, based on learner proficiency and the use of SPRTs to provide the development of L2 Korean passive sentences for each stage, we will conduct a detailed examination of the types of passive sentences that make studying Korean difficult for native speakers as well as intermediate and advanced learners.

The "Grammaticality Judgment Test (GJT)" is a test type designed to measure the "latent language competence" or grammatical knowledge (Chomsky, 1965, p. 3-4; Kellerman, 1985; Schütze, 2016, p. 21) of language users, as opposed to the "behavior or actual use of the language". As a method to measure the grammatical knowledge of learners, GJTs have been developed and used in research regarding the acquisition of L2 and L1 (Mitchell et al., 2013, p. 7). In Korean language education as well, GJT have been used for evaluating the grammatical competence of learners—that is, the degree and patterns of knowledge—and for preparing measures to teach grammar effectively based on the result. However, because GJT tasks have been designed mostly to assess learners' grammatical knowledge by analyzing the accuracy of their grammatical judgment, it was challenging to learn how individual sentences were being processed (for example, how reading time and judgment result were correlated) and to understand the cognition loading experienced by learners.

On the other hand, a "Self-Paced Reading Task (SPRT)" can enable researchers to look at variables, such as reading time for each word, sentence processing time, and the time spent making the judgment, while simultaneously paying attention to the form of each word (Marsden et al., 2018). For this reason, it has been reported that SPRT have been used in more than 42 L2 acquisition studies since 2010. Juffs and Harrington (1995) applied this method for the first time (Marsden et al., 2018). Unfortunately, it is difficult to find studies on Korean language education that have used SPRT to closely analyze how learners process sentences, and thoroughly investigate educational problems based on the findings (Author Kim & Lee, 2018b). This is partly because there have been no discussions on developing and applying programs for enabling researchers to examine how learners process sentences and judge grammaticality. This lack of use of SPRT is not limited to Korean language education research. Due to the difficulty of designing tasks and developing programs, SPRT have been used less frequently in research on other L1 or L2 acquisitions.

Against this backdrop, this study aims to develop and apply SPRT and a computer-based GJT program to examine how learners process passive sentences in real-time and judge the grammaticality of passive sentences; it aims to provide significant implications for the teaching of passive sentences based on the findings.

This study aims to explore the following research questions in detail. First, among the intermediate and advanced learners and native speakers of Korean, how do the processing behaviors of passive sentences, based on type, differ in terms of accuracy and reading time? Second, how are the reading times of passive sentences, based on type, correlated with accuracy among intermediate and advanced learners and native speakers of Korean? Third, what are the implications of this research for teaching passive sentences to intermediate and advanced learners of Korean?

II. Literature Review

Self-Paced Reading (SPR), which is designed to measure real-time processing of language input, is implemented as follows: users are asked to read the word(s) on the monitor, and then click the button to move to the next word in a given task. Researchers are able to measure participants' reading time in terms of words or other units or under specific conditions. To keep the participants focused on the task and to determine reading comprehension, an SPRT is followed by true/false or comprehension questions. In SPR, an increase or decrease in reading time for words during real-time processing is considered to be caused by the degree of cognition loading during sentence processing; similarly, slow reading speed reflects the cognitive pressure felt by learners required to process unclear or uncertain word units in real time (Mackey & Marsden, 2015).

In L2 Grammatical Processing, it is thought that a cognition load influences reading time when learners are faced with grammatically

unclear words. In an experiment involving Chinese learners of English, Juffs and Harrington (1995, 1996) observed that it took participants longer than native speakers to read predicates that were out of context. They explained the phenomenon— it takes longer to read unclear or ungrammatical words and the 1 to 3 words in the phrase that follow—with the sentence processing model. According to the model, as human working memory is limited, an output with high cognition loading takes more reading time than one that does not use limited working memory. This is because readers have to analyze and complete input processing with high loading as quickly as possible to prepare cognitive space in their working memory for the next input (e.g., Gorrell, 1995; Townsend & Bever, 2001; Weinberg, 1999).

Williams (2006) compared native speakers and L2 learners in terms of grammatical knowledge, working memory, and real-time reading time to examine the patterns or L2 acquisition, and tried to identify the characteristics of acquiring grammatical knowledge for L2 learners. He conducted SPRT for learners of English whose native languages were Korean, Chinese, and German and argued that learners with high working memory showed a similar level in terms of processing results or performance. In the experiment, learners were asked to read a sample sentence, immediately following, they were required to complete sentences using words from the sentence they had just read. In a similar study, Dussias and Pinar (2010) analyzed grammaticality judgment results and reading time patterns of learners with high working memory capacity and of native speakers, while Jackson and van Hell (2011) analyzed the pattern of grammaticality judgment and reading time in SPRT among learners with high L2 proficiency.

Many researchers tried to determine whether learners could recognize and process case-makers, which provide morphological and syntactic information during real-time reading and processing in L2 processing as well. Jackson (2008) examined how German native speakers processed English “Wh-questions” through SPRTs to deter-

mine whether learners can recognize the L2 characteristics and reflect them in real-time processing to read in a language whose word order or main verb location is different. It was found that, because of mother tongue transfer, German-speaking learners of English had difficulty processing English sentences—in which the subject appears first in "Wh-questions"—because objects come first in German sentences. Thus, L2 learners are influenced by the morphological syntactic characteristics and proficiency of L1 while processing L2 sentences.

While researching whether L2 learners' grammatical knowledge was applied in the process of reading sentences in real time, Hopp (2010) demonstrated that there were significant differences in terms of reading time between grammatical and ungrammatical sentences, and that reading time increases for ungrammatical sentences or for sentences with different word orders compared to the learner's native language. Roberts and Liszka (2013) believed that English L2 learners' sensitivity to sentences with grammatical errors of tense and aspect is determined by whether the category exists in the L1 grammar; furthermore, they showed that there are differences in the application of such knowledge in real-time processing based on learners' proficiency.

III. Research Methodology

1. Participants

The present study examined 85 subjects residing in Seoul, including learners and native speakers of Korean. Based on the length of residence in Korea, learners were divided into Group 1 (N = 22) and Group 2 (N = 32), with Group 3 (N = 31) consisting of native speakers. Data with insincere responses in the experiment sentences, excluding filler sentences, were eliminated from the final analysis. Consequently, data from 2 subjects, five subjects, and three subjects

were eliminated from Group 1, Group 2, and Group 3, respectively. Ultimately, data from 75 respondents were analyzed: Group 1 (N = 20), Group 2 (N = 27), Group 3 (N = 28). This study grouped the non-native participants whose first language is not Korean based on the Korean language proficiency (Group 1 and Group 2). Also, the other group (Group 3) was consisted of Korean native speakers whose first language are Korean. Group 1 (Intermediate level Korean language learners) comprised learners who had attained Level 4 in the Test of Proficiency in Korean (TOPIK) and had studied Korean for less than three years. Group 2 (Advanced level Korean language learners) comprised those who had attained Level 5 and 6 (5+ hereafter) in TOPIK, graduate students with a Korean (Education) major, and those who had studied Korean for 5 years or more. Last, Group 3 consisted of L1 Korean speakers who were college students (or graduate students) in Korea. Relevant data on the study participants are presented in Table 1.

Table 1. Socio-demographic information of participants

		Group 1	Group 2	Group 3	Total
Age	Under 20	0	0	2	2
	20-29	17	20	26	63
	30-39	3	5	0	8
	40-49	0	2	0	2
	Total	20	27	28	75
Education	College	2	0	20	22
	Graduates	0	27	0	27
	Korean Language Institute	26	0	0	26
	Total	28	27	20	75
Level of TOPIK	4	20	0	0	20
	5+	0	27	0	27
	Native Speaker	0	0	28	28
	Total	20	27	28	75

2. Methods

1) Task design

A systematic review of prior research (Kim & Lee, 2018b, pp. 127-132) on errors or learners' acquisition of passive voice in Korean was conducted and analyzed to develop the current study's experimental tasks. Difficulties in learning passive voice in Korean were identified, based on type, for reference and used to develop the study's task items. We conducted a systematic review of the types of passive errors by searching important keywords in major academic databases in Korea, such as RISS (Research Information Sharing Service), KISS (Korean studies Information Service System), and in e-articles.

As a result, 327 error sample sentences produced by learners of Korean were collected from 25 papers, and six error types common among learners were identified. In Korean sentences, learners often make the following errors: 1) replacing passive voice with active voice, 2) replacing active voice with passive voice, 3) selecting a passive suffix out of several options, 4) selecting the post-positional particle while producing a passive sentence, 5) confusing causative affix with a passive affix, which has the same form, and 6) choosing incorrectly between passive forms with passive suffixes and those with "*-doeda*" or "*-eojida*." In this study, tasks were designed to determine whether participants could choose the correct verb in passive or active sentences, select an appropriate passive suffixes for each verb stem, select appropriate postpositional particles when producing passive sentences, distinguish between causative and passive suffixes, and differentiate between the meanings of passive forms with passive suffixes and those with "*-doeda*" or "*-eojida*." These tasks consisted of ungrammatical sentences (N = 31), grammatical sentences (N = 11), and fillers (N = 6) [Table 2].

Table 2. Test item composition

Category	Grammaticality	Type No.	Item type	Example	No. of questions
Target	Ungrammatical Sentence	1	Error of using an active verb instead of passive verb	그는 넘어져서 옷이 여기저기 찢은 채로 나타났다 ku-nun nemeci-ese os-i yekiceki ccic-un chay-lo natana-ass-da He-TOP fall-PV-because cloth-NOM here and there tear-MOD condition-MOD appear-PAST-DEC 'He fell down and showed up with his clothes torn.'	7
		2	Error of using passive verb instead of active verb	부모님들은 자식들을 위해 월급을 모두 쓰였다 pwumonimtul-un casiktul-eke welkup-ul motwu ssui-ess-ta parents-TOP children-to paycheck-ACC all spend-PAST-DEC 'Parents spent all of their paycheck on their children.'	8
		3	Error of adding the wrong passive suffix	그가 결혼한다는 소식이 믿히지 않았다 ku-ka kyelhonhanta-nun sosik-i mithi-ci an-ass-ta. He-NOM marry-MOD news-NOM believe-PV not-PAST-DEC 'The news his getting married wasn't believed.'	8
		4	Error of using the wrong postpositional particle in passive sentences	끈을 리본 모양으로 잘 안 묶인다 Kkun-ul lipon moyang-ulo cal an mwukki-n-ta. String-ACC ribbon shape-to well not tie-PRESENT-DEC 'It's hard to tie a ribbon'	2
		5	Error of confusing passive with causative forms	간밤에 늦게 잤더니 아침 늦게야 눈이 띄웠다. kanpam-ey nut-key ca-ass-teni achim nut-key-ya nun-i ttuiwu-ess-ta. Last night-at late sleep-PAST-and morning late eye-TOP open-CV-PAST-DEC 'When (I) slept late last night, (I) opened my eyes late in the morning.'	3

Target	Ungrammatical Sentence	6	Error of confusing suffix passive forms with “*-doeda*” or “*-eojida*” passive forms	나는 선생님의 미소에 마음이 놓여졌다. Na-nun sensayngnim-uy miso-ey maum-i noyeci-ess-da. I-TOP teacher-POS smile-at heart-NOM relieve-PAST-DEC ‘I was relieved with teacher’s smile.’	3
	Grammatical Sentence	7	Passive sentence using suffixes	교실에서 음악 소리가 잘 들린다 Kyosil-eyse umak soli-ka cal tuli-n-da. Classroom-at music sound-TOP well hear-PV-PRESENT-DEC	9
Filler	Ungrammatical Sentence	9	-	영수는 머리 아픈 먹는 약을 가지고 다닌다 Yengswu-nun meli aphu-n mek-nun yak-ul kaci-ko tani-n-ta. Yengswu-NOM everyday sick-PRESENT/MOD eat-MOD medicine-ACC have-MOD bring-PRESENT-DEC ‘Yengswu carries pills for a headache.’	4
	Grammatical Sentence	10	-	요즘은 날씨가 많이 덥지 않다. Yojcum-un nalssi-ka man-i tep-ci an-ta. These days-TOP weather-NOM much hot-MOD not-DEC ‘Weather is not very hot these days.’	4
			Total		48

2) Task tool development

The experiments were conducted using web-based SPRT developed by the researchers. Sentences were presented word-by-word to measure reading times in real time. After reading the sentences, the participants were required to make grammaticality judgments. Characters were presented in "Malgun Gothic" font (size: 20 points) on a white screen. The participants initiated the experiment by clicking the "START" button under the test number, and clicked "Yes" or "No" to select their grammaticality judgment. A flow chart of the experiment is shown in Figure 1.

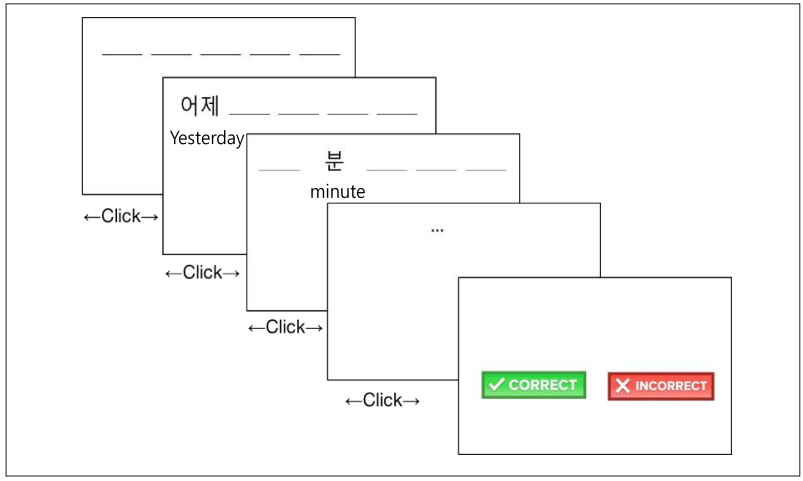

Figure 1. Word-by-word Self-Paced Grammaticality Task procedure

3. Analysis

1) Accuracy

Signal detection theory was used to calculate the accuracy of the participants' grammaticality judgments made after reading the sentences. The method for calculating the A' score using the "yes/no task" is shown in Table 3 and the equation below (Snodgrass & Cor-

win, 1988).

Table 3. Signal detection theory

Ungrammatical Sentence (UN-Grammatical)		Actual stimuli (sentence grammaticality)	
		Grammatical Sentence (Grammatical)	
Result	Detected	Hit	Correct Rejection
	Failed	Miss	False Alarm

$$\text{In this case, } A = \begin{cases} .5+\dfrac{(H\text{-}F)(1+H\text{-}F)}{4H(1\text{-}F)} & when\ H \geq F \\ .5-\dfrac{(F\text{-}H)(1+F\text{-}H)}{4H(1\text{-}H)} & when\ H < F \end{cases}$$

where hit is "H," false alarm is "F," and the distribution of scores is $0.5 \leq A' \leq 1.0$. This is advantageous because researchers can adjust a 50% probability for the yes/no task by assigning relative weight when ungrammatical sentences are accurately detected, and thus, examine in greater detail how learners make grammaticality judgments.

2) Real-time passive sentence processing

In this experiment, we recorded 1) the time it took learners to progress from reading a sentence to making a grammaticality judgment, and 2) the time it took to process each *Eojeol*.[1] We programed this period to be measured by milliseconds (ms, 1/1000 seconds). Values outside of the 3SD (standard deviation) range were eliminated as outliers (DeDe et al., 2004).

3) Statistical data processing

Two-way ANOVA, regression, and correlation analyses were

1 *Eojeol* is a unit of spacing used in Korean; it is equivalent to a "word" or "phrase" in English. An *Eojeol* can represent a single inflected lexeme, or several lexemes.

conducted to determine whether there were significant differences among learners, based on level, in terms of the accuracy of sentence grammaticality judgment, reaction time, and the correlation between time and accuracy. The analysis was conducted using SPSS ver. 25 (SPSS Inc., Chicago, IL, USA).

IV. Results

1. Accuracy

The mean A' scores for grammaticality judgment were as follows: Group 1 learners (M = 0.5464, SD = .081), Group 2 learners (M = 0.6431, SD = .11), and Group 3 Korean native-speakers (M = 0.8698, SD = .14). One-way ANOVA was performed to determine statistically significant differences in mean A' scores between the groups. As a result, the mean A' scores showed statistically significant differences between groups ($F_{(2,76)}$ = 101.223, p < .05).

The correct answer rate (no. of correct answers/no. of total questions) for each question, categorized by group, is presented in Table 2. Because each type of passive sentence was either an ungrammatical or grammatical sentence, A' scores based on type could not be obtained. This is because A' scores require the correct answer rate for both ungrammatical and grammatical sentences. Therefore, statistics for the correct answer rates are presented in Table 4. The correct answer rate for the A' score, based on type, was the highest for Group 3, followed by Group 2 and Group 1 (see Table 4).

Table 4. Accuracy of SPRT for each group based on item type

	Group 1 (N = 20)		Group 2 (N = 27)		Group 3 (N = 28)		Total (N = 75)	
	Mean (%)	SD (%)	Mean (%)	SD (%)	Mean (%)	SD (%)	Mean (%)	SD (%)
Type 1	59.51	3.58	68.62	9.86	98.31	9.54	80.34	19.91
Type 2	58.86	7.33	70.53	9.21	94.7	9.35	72.94	19.37
Type 3	65.8.4	17.95	71.61	16.01	90.51	12.76	73.93	25.93
Type 4	56.85	11.24	72.68	20.65	97.72	15.63	76.78	25.09
Type 5	60.89	11.68	65.94	14.83	95.29	18.19	71.15	24.52
Type 6	54.16	9.26	57.44	9.21	80.89	21	67.32	17.53
Type 7	73.54	12.53	78.87	2.42	97.95	10.1	83.19	6.66
Total	61.38	10.51	69.38	11.74	93.62	13.8	75.09	19.86

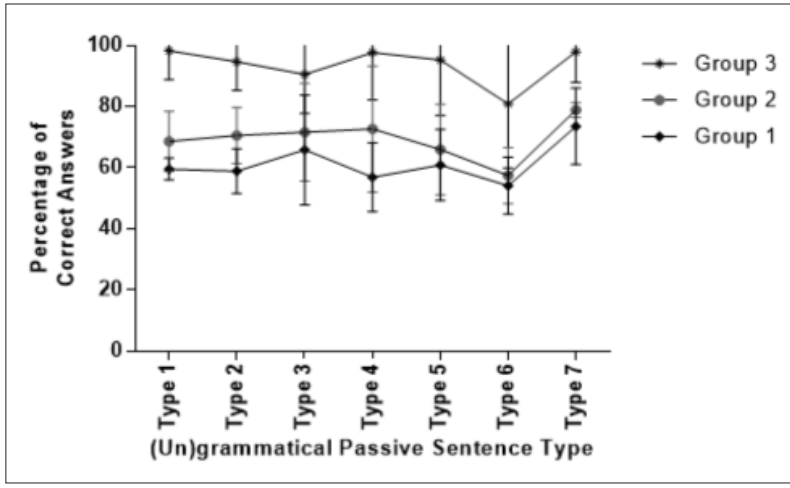

Figure 2. Percentage of correct answers of groups based on item type

With A' score as the dependent variable, a two-way ANOVA was conducted to examine statistically significant differences in the scores based on group and type, and to analyze how each variable influ-

enced the scores. The results indicate main effects based on group ($F_{(2,532)}$ = 299.7, p < .05) and based on type ($F_{(6,532)}$ = 14.50, p < .05). Furthermore, interaction was observed in the graph, indicating interaction effects based on group x item ($F_{(12,532)}$ = 2.108, p < .05).

Considering the interaction effects, the post-test was conducted through pairwise comparison. The results indicated statistically significant differences among Groups 1, 2, and 3 for Types 1, 2, and 4, while there was no significant differences between Groups 1 and 3 for Types 3, 5, and 6.

2. Real-time Processing Time of the Passive Sentences

1) Item processing

The real-time reading time for sentence processing, categorized by group (unit = ms), was as follows: Group 1, 9434.76 (SD = 838.64); Group 2, 4035.06 (SD = 437.89); and Group 3, 3749.10 (SD = 358.85). To determine whether statistically significant differences existed in sentence reading time, and based on the item between groups, a one-way ANOVA was performed. The results indicated statistically significant differences between groups in item reading time ($F_{(2,532)}$ = 104.82, p < .05) (see Table 5).

Table 5. Test item processing time based on group

	Test Item		
	Mean	**SD**	**Std. Error**
Group 1 (N = 20)	9434.76	838.64	195.80
Group 2 (N = 27)	4035.06	437.89	150.49
Group 3 (N = 28)	3749.10	358.85	138.91
Total	5360.63	618.93	161.61

Std. Error = Standard Error

Item processing time based on type is provided in Table 6.

Table 6. Test item processing time based on passive type

	Processing Time			
	Group 1	Group 2	Group 3	Total
Type 1	10317.33	3526.41	3327.1	5346.91
Type 2	8477.59	4127.2	4163.21	5351.46
Type 3	9598.04	3946.72	3994.32	5537.38
Type 4	9822.18	4263.27	4045.57	5734.16
Type 5	9152.9	4102.93	4127.28	5517.88
Type 6	9919.22	4328.41	4173.01	5830.27
Type 7	8756.09	3950.48	3788.57	5231.36
Total	9434.76	4035.06	3945.58	5507.06

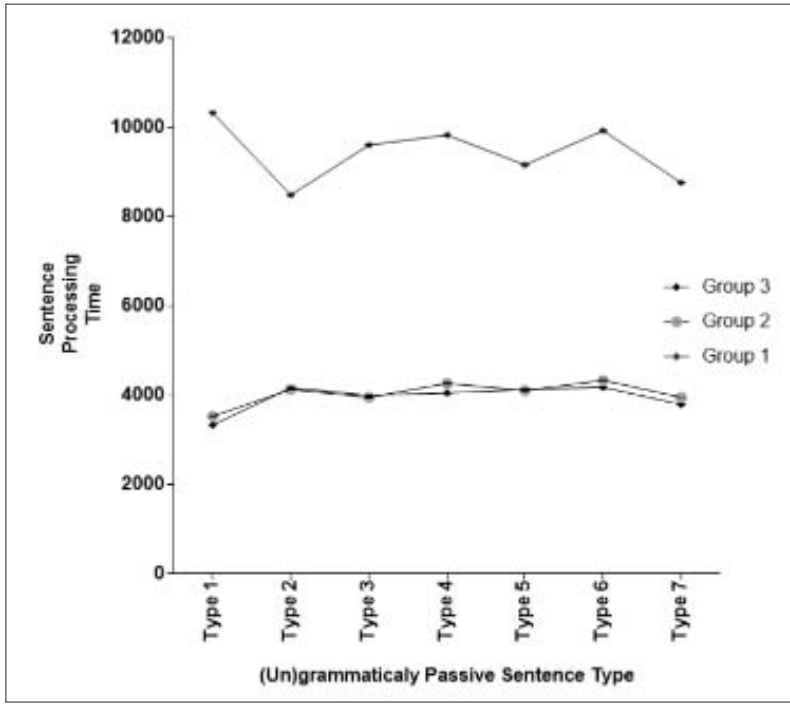

Figure 3. Sentence processing time

With reading time as the dependent variable, a two-way ANOVA was conducted to examine whether group and item type influenced reading time; the results indicated main effects based on group ($F_{(2,532)}$ = 10251.33, p < .05) and based on item type ($F_{(6,532)}$ = 25.70, p < .05). Furthermore, interaction was observed in the graph, indicating interaction effects based on group x item ($F_{(12,532)}$ = 33.02, p < .05). A post-test was conducted through a pairwise comparison, and the results showed no significant differences in the reading times between Groups 2 and 3 for (un)grammatical passive sentence types 1-7. Considering that item/sentence reading time reflects the cognition loading and working memory required for processing, the loading for processing sentences with passive expression was found to decrease as learners' proficiency level gradually increased to a degree similar to Group 3.

2) *Eojeol* reading

Among *Eojeol* reading times for learners, results outside of the ±2SD range were eliminated and analyzed. The results indicated the mean *Eojeol* reading time as shown in Table 7, and that significant differences exist in *Eojeol* reading times between groups ($F_{(2,532)}$ = 64.34, p < .01). A post-test examining the differences based on groups indicated statistically significant differences between Groups 1 and 2 (t(76) = 13.23, p < .01) and Groups 1 and 3 (t(76) = 14.96, p < .01), whereas there were no statistically significant differences between Groups 2 and 3 (see Table 7).

Table 7. *Eojeol* reading time

	Mean	SD
Group 1 (N = 20)	1350.41	433.83
Group 2 (N = 27)	645.87	226.00
Group 3 (N = 28)	547.84	124.01
Total	926.31	281.11

a. Critical *Eojeol*+1 (Spillover Effects)

Researchers disagree whether word reading time is difficult due to processing the word itself or is influenced by the previous words. Just and Carpenter (1980) based their argument on the "immediacy assumption" that each content word is interpreted as it is encountered by the learner and that the interpretations at all levels of processing are not deferred. On the other hand, Mitchell (1984) has reported a processing spillover effect, which means that the processing of words may be deferred. Smith and Levy (2013) have mentioned the importance of spillover effects in processing the word that follows the target word. Passive expressions, which were examined in this experiment, can be influenced by the sentence structure and adjacent *Eojeol* during processing. This study examined the following *Eojeol*, as well as the passive verb, thus predicting that spillover effects could be caused by a processing delay.

Group

The result of analyzing the mean reading time for the passive verb and the *Eojeol* that followed is presented in Table 8. First, the mean *Eojeol* processing time for the participants and the passive verb *Eojeol* (+1) were analyzed using a two-way ANOVA. The results showed different main effects: based on *Eojeol* type ($F_{(2,154)}$ = 190.7, p < .01), based on group ($F_{(1,154)}$ = 16.58, p < .01), and interaction effects ($F_{(2,154)}$ = 8.29, p < .01). A post-test (t(154) = 5.362, p < .01) revealed a significantly longer processing time of critical +1 *Eojeol* for Group 2.

Table 8. Comparison of *Eojeol* processing time: Critical +1 and groups

	Eojeol		Critical+1 *Eojeol*	
	Mean	SD	Mean	SD
Group 1 (N = 20)	1350.41	233.83	1332.28	222.23
Group 2 (N = 27)	645.87	226.01	942.42	231.14
Group 3 (N = 28)	547.84	124.01	662.39	138.88
Total	848.02	182.22	979.01	192.21

Item type

The results of the reading times for the passive verb and the *Eojeol* that followed, based on type, are shown in Table 9. The results were compared with the mean reading time through a two-way ANOVA, and there were main effects based on type ($F_{(6,1036)}$ = 2.416, p < .05), main effects based on *Eojeol* type ($F_{(1,1036)}$ = 302.3, p < .01), and interaction effects ($F_{(6,1036)}$ = 8.277, p < .01).

Table 9. Comparison of *Eojeol* processing time: Critical +1 and types.

	Eojeol		Critical *Eojeol* +1	
	Mean	**SD**	**Mean**	**SD**
Type 1	1020.82	374.29	1483.09	384.43
Type 2	1136.75	238.33	1314.36	343.87
Type 3	986.34	318.67	1460.89	345.29
Type 4	942.31	304.92	1544.37	436.31
Type 5	988.82	271.01	1309.43	381.07
Type 6	1088.03	320.30	1482.69	421.4
Type 7	1113.00	263.91	1272.69	361.14
Total	1039.34	303.01	1410.36	420.64

The number of groups was too large to conduct a post-test, and the sentences were first divided into grammatical and ungrammatical categories based on the grammaticality of the passive forms. Furthermore, ungrammatical sentences were subdivided based on three types of errors—passive suffix, postpositional particle error, and syntactic passive form—to examine whether significant differences exist in processing critical *Eojeol*+1 (see Table 10).

Table 10. Post-test of processing time

Item Characteristics	M	SD
Grammatical sentence (Type 7)	1113.00	263.91
Ungrammatical sentence (Types 1-6)	1029.28	310.55
Suffix (Types 1, 2, 3, and 5)	1027.18	304.59
Postpositional particles (Type 4)	912.31	204.92
Syntactic passive (Type 6)	1088.03	320.30

To examine the differences based on group, a t-test was conducted for the grammatical and ungrammatical sentences. The test results showed no significant difference in reading time for critical *Eojeol*+1 within groups. Next, it was determined whether differences existed in *Eojeol* reading time based on error type, such as suffix, case-marker, and syntactic passive. *Eojeol* with passive expressions and those with case-marker errors were treated together statistically. A one-way ANOVA was conducted for the three groups, revealing main effects ($F_{(2,222)} = 7.548$, $p < .01$) due to group differences. Finally, the results of a Bonferroni post-test indicated significant differences between the suffix and case-marker ($t = 2.501$, $df = 222$, $p = 0.0393$), and between the case-marker and syntactic passive ($t = 3.825$, $df = 222$, $p = 0.0005$). Furthermore, the reading time for critical *Eojeol*+1 was shorter than that of the other two types with different postpositional particles.

a. Final *Eojeol*

The present study examined reading times for the final processed *Eojeol* of the sentence. Since the implicative predicate is generally placed at the final *Eojeol* position in Korean, all the items used in this study included a predicate-final *Eojeol*. Furthermore, since the reading time required to process the sentence meaning tends to be reflected in the final *Eojeol* reading time, we reviewed final *Eojeol* reading time in a number of past studies (De Vincenzi et al., 2003; Ditman et al.,

2007; Knilans & DeDe, 2015; Ferreira & Henderson, 1990).

Group

To examine whether there was a difference in final *Eojeol* reading time based on group, a one-way ANOVA was conducted, and the results showed main effects based on group ($F_{(2,72)}$ = 99.57, p < .01). The Bonferroni post-test revealed a statistically significant mean difference (p < .001) between Groups 1 and 2, and a difference between Groups 2 and 3 (p <. 001). However, the difference between Groups 2 and 3 was not statistically significant, as shown in Table 11.

Table 11. Comparison of *Eojeol* processing time: Final *Eojeol* and groups

	Eojeol		Final *Eojeol*	
	Mean	**SD**	**Mean**	**SD**
Group 1 (N = 20)	1350.41	233.83	1678.42	33.88
Group 2 (N = 27)	645.87	226.01	770.87	26.20
Group 3 (N = 28)	547.84	124.01	661.84	24.17
Total	848.0	182.22	926.37	451.11

Item type

The processing time for the final *Eojeol* of the passive sentences was examined based on type (see Table 12). To compare item types with the mean *Eojeol* reading time based on type, a two-way ANOVA was conducted. The results showed main effects based on type ($F_{(6,1036)}$ = 12.73, p < .01) for the final *Eojeol* and a difference ($F_{(6,1036)}$ = 190.1, p < .01) between mean processing time per *Eojeol* and final *Eojeol*. Therefore, it cannot be said that the type of *Eojeol* (final *Eojeol* and others) and the type of group influence processing time simultaneously.

Table 12. Comparison of word processing time: Final *Eojeol* and types

	Eojeol		Final *Eojeol*	
	Mean	**SD**	**Mean**	**SD**
Type 1	1020.82	374.29	1223.82	376.39
Type 2	1136.75	238.33	1475.75	240.55
Type 3	986.34	318.67	1245.34	321.06
Type 4	942.31	304.92	1158.31	307.41
Type 5	988.82	271.01	1269.82	273.35
Type 6	1088.03	320.30	1336.03	322.48
Type 7	1113.00	263.91	1371.22	266.81
Total	1039.34	303.01	1297.34	305.36

3) Correlation between the reading time and accuracy for (Un)grammatical passive sentences

To examine the correlation between the participants' grammaticality scores and the sentence processing time, correlation analysis and multiple regression analysis were conducted. In the process, processing time results outside of the 3SD range were eliminated (see Table 13).

Table 13. Summary of regression for processing time: Groups

	Group 1	**Group 2**	**Group 3**
Group 1 processing time	.-038	-	-
Group 2 processing time	-	.534**	-
Group 3 processing time	-	-	.709**

No significant correlation was observed between reading time and A' scores for Group 1. However, Group 2 showed a positive correlation between reading time and A' scores ($r = .534^{**}$, $p < .01$), and

Group 3 also had a significantly high positive correlation between reading time and A' scores ($r = .709^{**}$, $p < .01$). These results indicate that the accuracy of grammaticality judgment for Groups 2 and 3 increased gradually as reading time increased.

Group 2 generally showed a high correlation between reading time and types. The correlation with reading time was as follows: Type 1 ($r = .54$, $p < .01$), Type 2 ($r = .40$, $p < .01$), Type 4 ($r = .60$, $p < .01$), Type 5 ($r = .38$, $p < .01$), Type 6 ($r = .59$, $p < .01$), and Type 7 ($r = .49$, $p < .01$). Most (un)grammatical passive sentence types and reading times for Group 2 showed significant positive correlation, but Type 3 showed no significant correlation with reading time.

It was a similar case with Group 3, which showed significant positive correlation with reading time as follows: Type 1 ($r = .69$, $p < .01$), Type 2 ($r = .81$, $p < .01$), Type 3 ($r = .73$, $p < .01$), Type 4 ($r = .83$, $p < .01$), Type 5 ($r = .62$, $p < .01$), Type 6 ($r = .59$, $p < .01$), and Type 7 ($r = .87$, $p < .01$).

V. Discussion

1. Passive sentence processing based on proficiency and sentence type processing of Korean passive sentences: characteristics by proficiency and passive sentence type

As their Korean proficiency improved and processing times became shorter with less cognitive loading, learners of Korean seemed to make judgments more accurately regarding the grammaticality of passive sentences. In particular, it was found that, as their Korean proficiency improved, advanced learners were able to reduce the time required to process passive sentences to a level similar to that of native Korean speakers. However, an intermediate level learner (Group 1) showed a wide gap in reading time when compared to advanced learners or native speaker groups, and the variance in terms of read-

ing time within the group was high; this implies that their passive sentence processing is still poor and generally inaccurate.

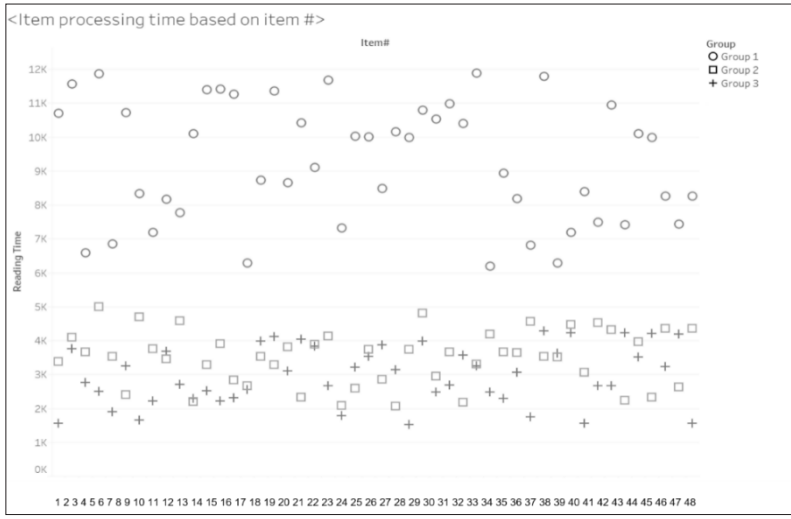

Figure 4. Comparison of final *Eojeol* reading time

When processing passive sentences, the reading time for significant *Eojeol*—the clause containing the passive verb and the final *Eojeol*—of intermediate learners (Group 1) whose Korean proficiency was relatively low did not show significant differences between passive *Eojeol* and other *Eojeol*, thus implying that they did not perceive the *Eojeol* to have errors. However, Group 2 (advanced learners) stayed longer at the critical +1 *Eojeol* to pay attention to the clause containing the passive *Eojeol*, which implies that they were making grammaticality judgments more accurately. They were also able to reduce the final *Eojeol* reading time to almost the same length as that of native speakers.

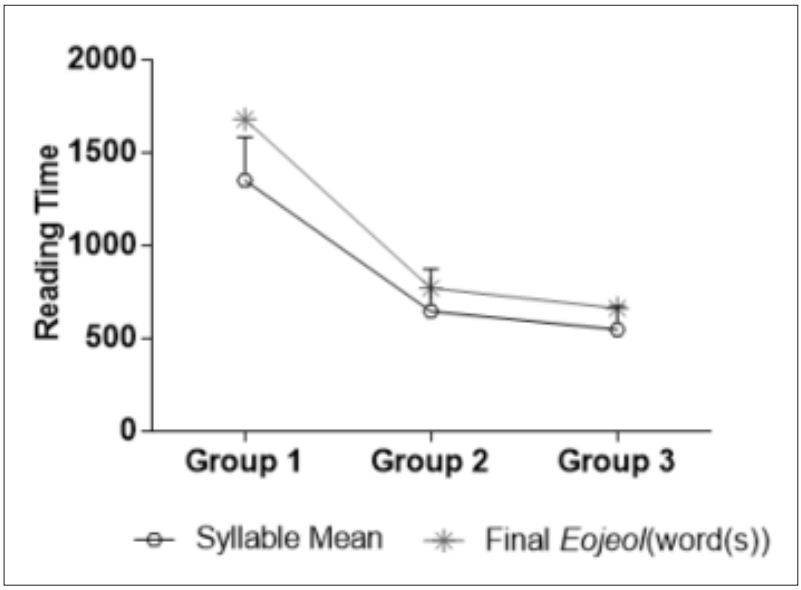

Figure 5. Groups and reading time (Syllable, Final *Eojeol*(word(s))

Regarding the final *Eojeol*, all groups showed a significant increase in terms of reading time,[2] but it seemed natural when the participants spent more time on the final *Eojeol* to process the sentence meaning and made grammaticality judgments (compared to other *Eojeol*). In particular, Type 6, which had the lowest correct answer rate, had a longer final *Eojeol* reading time; this tendency was also observed among native speakers, and seems to be the result of mixed opinions over the acceptability of double passive constructions with "*-eojida*." In recent times, "*-eojida*" double passive constructions have been used frequently, and their grammaticality has sparked controversy even among native speakers. Some argue that this construction is grammatically unacceptable, and "unnecessary," while others insist it

2 As presented in Table 11, Groups 1 and 3 spent about 1000ms (1 second) more to process the final *Eojeol*. As Group 2 did not show a significant increase in processing time for the final *Eojeol*, there seemed to be no significant difference to its reading time compared with the native speaker group.

is "acceptable" from an "emphasis" perspective. In short, even Korean native speakers are divided over the grammaticality of double passive sentences, and they take relatively more time to process them.[3]

As discussed above, the advanced learners of Group 2 spent less time processing passive sentences, but relatively more time judging the grammaticality of critical *Eojeol*, including passive verbs. In other words, there was a high positive correlation between reading time for significant *Eojeol* and the correct answer rate when processing passive sentences. Furthermore, it was confirmed that, as reading time increased, the correct answer rate also increased, as in the case of native speakers. This means that a longer processing time for a significant point, *Eojeol*, improves the accuracy of grammaticality judgment, and that learners with a high correct answer rate tend to take time while paying attention to microscopic units to process the sentence.

However, examining correct answer rate based on type revealed that learners of Korean found it difficult to acquire passive sentences for specific types despite their improved proficiency levels. As proficiency increased, learners gained the ability to select the correct active and passive verbs that were context appropriate, and thus, they used appropriate postpositional particles when producing passive sentences; however, the accuracy of grammatical knowledge was not developed enough to create specific types of passive sentences. The patterns based on type are described in detail as follows.

Types 1 and 2: First, it was found that learners of Korean faced some difficulty in selecting the correct passive verbs in the context of using passive voice even at an advanced level. Group 2 learners, despite their advanced Korean proficiency, had a relatively lower correct

---

3 For example, the passive form of the verb "jit da" (tear) is "jit gi da" (be torn). The passive suffix "-gi-" combined with the verb stem, but double passive with "*-eojida*" combined with the passive verb stem, is grammatically wrong but also frequently used. Some consider the double passive to be grammatical, as it can be interpreted as "emphasis," but others consider it to be ungrammatical because of the unnecessary repetition. It seems premature to determine the grammaticality of the double passive.

answer rate, failing to recognize errors when selecting from among active and passive forms. This result may be due to an inability to understand the context that requires passive or active forms, or because learners do not perceive the morphological differences between passive and active verbs.

Type 5: Second, there were several participants who did not recognize errors when selecting from among passive and causative verbs; this seems to be the case because Korean passive suffixes and causative suffixes share the same forms.[4] Intermediate learners often do not clearly understand the semantic functions of passive and causative. Advanced learners may also find it difficult to determine appropriate passive or causative verbs in a passive sentence context, because their understanding of the semantic functions of passive/causative forms is somewhat superficial even though they understand the semantics.

Type 6: Third, the study found learners who do not understand the difference between passive expressions that use suffix and "*-doeda*" or "*-eojida*" passive constructions, and that these learners may fail to perceive errors when selecting among the two. In Korea, predicates of the transitive verb stem and "*-eojida*" can express passive voice

4 In prior research on Korean derivative verbs, causative and passive constructions with the same form have been explained as being in a homonymous relationship, and differences have been observed in the meaning and syntax of each verb. Yang (1979) argued that, out of the 100 transitive verbs to which passive/causative suffixes can be added, 69 verbs can be both passive and causative, while Kang (2001) believed that there are 71 homomorphic causative/passive verbs. Kim (2006) presented a list of 40 homomorphic causative/passive verbs, which excluded unused or dialectic verbs. As the aforementioned research shows, researchers differ regarding the number and the list of homomorphic causative/passive verbs in Korean. However, it is clear that L2 learners of Korean find it difficult to use the 40-71 homomorphic verbs while distinguishing between passive and causative according to the semantic functions. On the basis of this understanding, it is important to attempt to classify the homomorphic verbs into several types based on the argument alternation patterns if we hold the belief that not all verbs with the same form can be considered homonymous (Kim, 2006; Park, 1978).

when they are combined. At the same time, passive items such as "*-doeda*/batda/danghada" can represent passive voice. These passive expressions are complementary, and each verb is made passive by adding the passive suffix or using "*-eojida*" or "*-doeda*." Therefore, even if learners understand the three types of passive constructions, passive forms may differ depending on the verb; it requires learners to learn each word and also familiarize themselves with its use. This study's results show that many advanced learners, not to mention intermediate learners, have not yet mastered the three types of passive forms and the differences between them. In this respect, it is important to continuously research the acquisition of these specific types of L2 Korean passives in depth. The sections below will discuss these issues in detail.

2. Implications for teaching and learning Korean passive sentences

Based on the analysis of how intermediate and advanced learners of Korean perceive and process passive sentences, we present the following educational implications.

First, intermediate learners of Group1 showed a low level of perception about Korean passive expressions in general, confirming the need for raising the level of recognition. As mentioned previously, passive voice in Korean is represented in three ways and the most common passive forms, such as passive suffix forms, '*-eojida*' and '*-doeda*' passive constructions are usually taught from the intermediate level. But intermediate learners do not seem to understand/ learn the differences in semantic functions between active and passive sentences, and between passive types. For this reason, they showed a lower level of recognition and accuracy about passive sentences in general, compared with advanced learners and native speakers. By contrast, advanced learners spend more time processing significant morphological information for producing passive sentences raising

the accuracy of grammaticality judgment although they spend less time judging the grammaticality of passive sentences in general. Therefore, intermediate learners need to improve their understanding about differences between active and passive voice, and the mechanism to produce those expressions, using, for example, 'focus-on-form' approach. In Korean, passive suffixes are '-i/ hi/ ri/ gi-,' but it is difficult to formulate how the suffixes and verb stems are combined. Thus, it would be effective to teach individual passive verbs as vocabulary for learners to become familiar with based on the understanding about the conditions, semantic functions, and creation principle. For intermediate learners, it would be helpful to use the suffixes, '-i/ hi/ ri/ gi-,' respectively to generate frequently used passive verbs and present them primarily for learning the forms and semantic functions of the passive. What is more important to remember is that each language has different ways of expressing passive and active voice even though the semantic functions are shared by many languages. Thus, it is important to teach learners to understand the context where passive forms are required and to select appropriate constructions for the context.

Furthermore, it was found that intermediate learners have difficulty selecting appropriate case-markers, in particular, when producing passive sentences. Therefore, learners should be taught systematically what are the important sentence constituents to produce passive sentences and how to select a case-marker, which is instrumental in determining the role of a sentence constituent.

Second, advanced learners of Group2 seem to have a slight understanding of passive but not accurately enough. As for Type 1 and 5, the accuracy of understanding is far lower than native speakers, which are required to take more active educational measures. Type 1 is the type of errors using active sentences when in fact passive forms are required and this implies that even advanced learners are not fully aware of the need for selecting passive verbs. Therefore, as mentioned before, it is needed to present sufficient materials to show

sentences requiring passive constructions and the context where passive sentences are used and to focus on the forms and semantic functions of the passive.

Type 5 corresponds to the errors of confusing passive with causative expressions. This is primarily because the form of passive and causative can be the same in some cases, making it difficult for learners to distinguish between the two. In the prior research on Korean derivative verbs, causative and passive constructions with the same form have been explained as being in a homonymous relationship and there are differences in meaning and syntax of each verb. Yang (1979) argued that out of the 100 transitive verbs to which passive/ causative suffixes can be added, 69 verbs can be both passive and causative while Kang (2001) believed there are 71 homomorphic causative/ passive verbs. Kim (2006) presented a list of 40 homomorphic causative/ passive verbs excluding unused or dialectic verbs. As you see, there are differences among researchers on the number and the list of homomorphic causative/ passive verbs in Korean. What is clear is that L2 learners of Korean find it difficult to use 40-71 homomorphic verbs distinguishing between passive and causative according to the semantic functions. Based on this understanding, it is important to refer to and utilize the findings of the research of Park (1978) or Kim (2006), which attempt to classify the homomorphic verbs into several types based on the argument alternation patterns in the belief that not all the verbs with the same form can be considered as homonymous. According to the research, homomorphic causative/ passive verbs can be classified into types according to whether they can take a reflexive theme or not; the former type sentences, being neutral, can be interpreted both causative and passive while the latter type verbs have dominant passive meaning with relatively weak causative meaning.[5]

---

5 According to Kim (2006, pp. 62-71), these two types of homomorphic causative/ passive verbs can be subdivided into two categories, respectively, according to whether they allow argument alternation (of six types).

From the educational point of view, it would be meaningful to teach whether the verbs can take a reflexive theme and the resulting differences in semantic functions with the focus on homomorphism of causative and passive verbs. However, the process of teaching and learning should not be cramming of propositional knowledge about passive and causative expressions. To do this, it would be better to teach students to understand semantic functions of the passive and causative verbs and to use them correctly in the context by learning individual verbs and by type, instead of approaching and explaining the phenomenon of the argument alternation of passive and causative as grammatical knowledge.

VI. Conclusion

In the present study, real-time passive sentence reading tasks were assigned to Korean native speakers as well as intermediate and advanced learners. The study examined how each word and sentence was processed by a group based on the accuracy of the learner's understanding. The study findings showed that learners of Korean improved—in terms of their speed and accuracy in processing passive sentences—as they progressed from intermediate levels to more advanced levels. However, it was found that learners at each proficiency stage, or throughout the intermediate-advanced stages, faced difficulties and experienced cognitive loadings when processing passive

---

<Verbs with both causative and passive meaning>
Type A (17 verbs): '*me i da* (to be tied up),' '*bo i da* (to be seen),' '*seu i da* (to be used),' '*an gi da* (to go in someone's arms),' etc., Type B (4 verbs): '*geu seul li da* (to be scorched),' '*nal li da* (to be flown' etc.
<Verbs with dominant passive meaning with weak causative meaning>
Type C (4 verbs): '*kkul li da* (to be knelt down),' '*ssit ki da* (to be washed)' etc., Type D (15 verbs): '*kkak ki da* (to be shaved),' '*kkek ki da* (to be folded),' '*deul li da* (to be heard),' '*tteut gi da* (to be pulled out),' '*mul li da* (to be bitten)' etc.

sentences; this study examined this tendency in detail.

First, we found that both intermediate and advanced learners faced some difficulty in recognizing the context for passive or active sentences and in selecting the correct verb forms for the given context. Groups 1 and 2 were unable to recognize the error of using the passive voice when they should have been using the active voice (or vice versa), even though they had a high level of Korean proficiency and showed lower accuracy levels than native speakers, thus, suggesting the need for systematic and continuous second language acquisition research.

Moreover, learners reduced their processing time to a level similar to that of native speakers, and Group 1 learners, who had relatively lower Korean proficiency, showed a bigger difference in terms of reading time compared to other groups; the degree of dispersion in terms of reading time within the group was also large.

We divided sentence reading times based on word units and examined the effect on the passive verb—the significant word in processing a passive sentence and the word that followed it. According to the study results, Group 1 showed no significant time difference between passive verbs and the following word and in terms of other words, thus, implying that they could not recognize words with an error. On the other hand, Group 2 spent more time on passive verbs and the word that followed compared to the other words, thus improving the accuracy of the processing.

As Korean proficiency increased, Group 2 learners had a lower reading time with regard to the final word, and this time period was similar to that of native speakers. Nonetheless, all the groups showed a significant increase in terms of the reading time for the final word compared to the other words. This indicates that the participants spent more time in understanding the meaning of the sentence and making grammaticality judgments compared to the other words. In particular, Type 6, which had the lowest correct answer rate, had a longer final word reading time even among native speakers; this re-

sult seems related to the recent frequent use of the "*-eojida*" double passive constructions.

For the Group 2 learners, there was a high positive correlation between the passive sentence reading time and the correct answer rate, and although the overall reading time decreased within the same group, learners with a longer reading time showed a higher correct answer rate, as was the case with native speakers. This result implies that, longer passive sentence processing times are more likely to result in accurate grammaticality judgments. Furthermore, learners with a high correct answer rate are more likely to spend more time processing a sentence by paying attention to microscopic units of the sentence.

The present study indicated the need for improving second language learners' level of grammatical recognition for the passive voice. It was found that many learners faced some difficulty distinguishing between causative and passive verbs, as well as between passive forms created by adding suffixes and "*-eojida*" and "*-doeda*" passive constructions, even when their proficiency level had improved. Therefore, we suggest the importance of conducting active and systematic research for these (un)grammatical passive sentence types.

However, the results of the current experiment are only applicable to passive sentence processing in Korean as a second language; therefore, these results may not be consistent with previous studies in SPRT within English acquisition as a second language. Additionally, the learner's difficulties in potential grammatical processing may change across a broader age range, as on-line sensitivity is not uniform in all age groups. Further research will indicate whether our findings can be generalized to other linguistic phenomena and other L1/L2 combinations among all age groups.

* Submitted 2020.10.30.
First revision recieved 2020.12.04.
Accepted 2020.12.18.

REFERENCES

Armstrong, S. L., Gleitman, L. R., & Gleitman, H. (1983). What some concepts might not be. *Cognition*, *13*(3), 263-308.

Chomsky, N. (1965). *Aspects of the theory of syntax*. MIT Press.

Croft, W. (2002). *Typology and universals*. Cambridge University Press.

DeDe, G., Caplan, D., Kemtes, K., & Waters, G. (2004). The relationship between age, verbal working memory, and language comprehension. *Psychology and aging*, *19*(4), 601-616.

De Vincenzi, M., Job, R., Di Matteo, R., Angrilli, A., Penolazzi, B., Ciccarelli, L., & Vespignani, F. (2003). Differences in the perception and time course of syntactic and semantic violations. *Brain and language*, *85*(2), 280-296.

Ditman, T., Holcomb, P. J., & Kuperberg, G. R. (2007). An investigation of concurrent ERP and self–paced reading methodologies. *Psychophysiology*, *44*(6), 927-935.

Dussias, P. E., & Piñar, P. (2010). Effects of reading span and plausibility in the reanalysis of wh-gaps by Chinese-English second language speakers. *Second Language Research*, *26*(4), 443-472.

Ferreira, F., & Henderson, J. M. (1990). Use of verb information in syntactic parsing: Evidence from eye movements and word-by-word self-paced reading. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *16*(4), 555-568.

Gorrell, P. (1995). *Syntax and parsing* (Vol. 76). Cambridge University Press.

Hopp, H. (2010). Ultimate attainment in L2 inflection: Performance similarities between non-native and native speakers. *Lingua*, *120*(4), 901-931.

Hwang, J. H. (2011). Teaching method of passive expressions in Korean language education: Focusing on passive form by derivative passive verbs. *Korea Grammar Education Cirlcle Conference Papers*, *2011*(2), 143-155.

Jackson, C. (2008). Proficiency level and the interaction of lexical and morphosyntactic information during L2 sentence processing. *Language Learning*, *58*(4), 875-909.

Jackson, C. N., & Van Hell, J. G. (2011). The effects of L2 proficiency level on the processing of Wh-questions among Dutch second language speakers of English. *IRAL-International Review of Applied Linguistics in Language Teaching*, *49*(3), 195-219.

Juffs, A., & Harrington, M. (1995). Parsing effects in second language sentence processing: Subject and object asymmetries in Wh-extraction. *Studies in Second Language Acquisition*, *17*(4), 483-516.

Juffs, A., & Harrington, M. (1996). Garden path sentences and error data in second

language sentence processing. *Language learning*, *46*(2), 283-323.

Just, M. A., & Carpenter, P. A. (1980). A theory of reading: From eye fixations to comprehension. *Psychological review*, *87*(4), 329.

Kang, M. S. (2001), (*A*) *Diachronic study on the Korean* '*voice*' [master's dissertation]. Chungnam university.

Kellerman, E. (1985). Dative alternation and the analysis of data: A reply to Mazurkewich. *Language Learning*, *35*(1), 91-101.

Kim, H. J., & Lee, W. K. (2018a). A Systematic Review on the Criteria and Methods of Error Analysis in Korean Language Learner's Passive Expressions. *Korean Language Education Research*, *53*(3), 115-148.

Kim, H. J., & Lee, W. K. (2018b). Validation of the Grammaticality Judgment Test of Korean Passive Expressions Through Exploratory Factor Analysis. *The Korean Language in America*, *22*(2), 122-155.

Kim, Y. S. (2006), The Argument Alternation and the Semantic Interpretation of Homomorphic Causative/Passive Verbs in Korean. *Korean Semantics*, *21*, 51-73.

Knilans, J., & DeDe, G. (2015). Online sentence reading in people with aphasia: Evidence from eye tracking. *American Journal of Speech-Language Pathology*, *24*(4), S961-S973.

Levin, B., & Hovav, M. R. (1991). Wiping the slate clean: A lexical semantic exploration. *cognition*, *41*(1-3), 123-151.

Mackey, A., & Marsden, E. (Eds.). (2015). *Advancing methodology and practice: The IRIS repository of instruments for research into second languages*. Routledge.

Marsden, E., Thompson, S., & Plonsky, L. (2018). A methodological synthesis of self-paced reading in second language research. *Applied Psycholinguistics*, *39*(5), 861-904.

Mitchell, D. C. (1984). An evaluation of subject-paced reading tasks and other methods for investigating immediate processes in reading. *New methods in reading comprehension research*, 69-89.

Marsden, E., Mitchell, R., & Myles, F. (2013). *Second language learning theories*. Routledge.

Roberts, L., & Liszka, S. A. (2013). Processing tense/aspect-agreement violations on-line in the second language: A self-paced reading study with French and German L2 learners of English. *Second Language Research*, *29*(4), 413-439.

Schütze, C. T. (2016). *The empirical base of linguistics: Grammaticality judgments and linguistic methodology*. The Language Science Press.

Smith, N. J., & Levy, R. (2013). The effect of word predictability on reading time is logarithmic. *Cognition*, *128*(3), 302-319.

Snodgrass, J. G., & Corwin, J. (1988). Pragmatics of measuring recognition memory: applications to dementia and amnesia. *Journal of Experimental Psychology: General*, *117*(1), 34.

Straus, A. T., & Brightman, R. (1982). The implacable raspberry. *Research on Language & Social Interaction*, *15*(2), 97-137.

Talmy, L. (1988). Force dynamics in language and cognition. *Cognitive science*, *12*(1), 49-100.

Townsend, D. J., & Bever, T. G. (2001). *Sentence comprehension: The integration of habits and rules*. MIT Press.

Weinberg, A. (1999). A minimalist theory of human sentence processing. In S. Epstein & N. Hornstein (Eds.), *Working minimalism* (pp. 283-315). MIT Press.

Williams, J. (2006). Incremental interpretation in second language sentence processing. *Bilingualism: Language and Cognition*, *9*, 71-81.

Yoo, Y. H. (2015). On planning the teaching objectives and designing the contents of the textbooks: The Korean passive expressions. *Korean Language in China*, *1*, 38-43.

Park, Y. K. (1978). Causative and Passive in Korean. *Journal of Korean Linguistics*, *7*, 47-70.

Yang, D. H. (1979). Korean Passive and Causative. *Hangeul*, *166*, 189-206.

ABSTRACT

A Study on the Processing of the Korean Passive through a Self-Paced Reading Task (SPRT)

Kim, HoJung · Lee, Wonki

This study investigated Korean passive sentence processing to understand how processing changes with proficiency level and (un)grammatical passive sentence type. Using an online Self-Paced Reading Task (SPRT), accuracy and reading time were measured at each proficiency level and for each sentence type. After SPRT, a Grammaticality Judgment Task (GJT) was performed. Reading times for each SPRT item and related Eojeol were measured—especially, the final and critical Eojeol, including the passive voice and the following Eojeol—considering the spillover effect.

Results showed that learners at each stage had certain limitations at each proficiency level. Processing times declined drastically as proficiency level improved. However, overall reading time declined at the advanced level; the accuracy rate indicated that intermediate and advanced learners had difficulty in recognizing subtle differences between the types of Korean passive voices. Reading times based on a critical verb and final Eojeol showed that intermediate-level Korean learners were unable to recognize critical Eojeol, while advanced-level learners' processing patterns resemble those of native speakers.

This indicated that processing speed and accuracy varied according to the learner's proficiency level and sentence type in Korean language acquisition, thus, improving the understanding of learners' cognitive loadings and grammatical competence.

KEYWORDS Second language acquisition, Passive voice, Self-paced reading task, Grammaticality judgment task, Word processing, Cognitive loading, Grammatical competence