

L2 Proficiency Effects on the Use of Verb Bias Information*

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[Abstract]

This study investigated whether L2 proficiency affected how L2 learners used verb bias information in their written production. Two groups of high proficiency and low proficiency L2 learners participated in a sentence completion task with direct object (DO) bias verbs, equi (EQ) bias verbs and sentential complement (SC) bias verbs. The results showed a significant difference between the two L2 learner groups in the percentage of DO and SC sentence completions preferred for each verb type. The low proficiency group used more DO structures and fewer SC structures for all three types of verbs compared to the high proficiency group. However, despite the low proficiency group's preference for the DO sentence structure, significant correlations between the verb bias strength index of each verb and number of DO/SC sentence completions were found for both the low and high proficiency groups. These results suggest that while low proficiency L2

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learners generally prefer to use the structurally more minimal DO structure as opposed to the SC structure, they are sensitive to verb bias properties and are able to use this information in their written production.

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1. Introduction

Knowledge of verbal information is crucial in order to successfully parse sentences. This is because the syntactic frames in which verbs appear may vary. For example, as shown in (1), a sentence beginning with *The gossipy neighbor heard the rumor ...* can have two possible continuations.

(1) The gossipy neighbor heard the rumor ...

(1a) ... yesterday.

(1b) ... was actually not true.

The difference between the two syntactic structures shown in (1)a and (1)b lie in the role of the underlined NP *the rumor*. In (1)a, the *the rumor* takes the role of the direct object of the verb *heard*. In (1)b, the NP is not the direct object of the main verb, but the subject of the embedded clause *the rumor was actually not true*. When parsing this sentence, readers will encounter a temporary ambiguity at the underlined NP, which is then resolved upon processing of the subsequent words. It is in the best interests of the reader to correctly predict the upcoming structure, as this will

eliminate the need for reanalysis and result in rapid and efficient processing. On the other hand, if the reader makes an incorrect prediction, such as anticipating a direct object structure as in (1)a when in fact the structure that unfolds is an embedded sentential complement as in (1)b, reanalysis of the sentence is required.

If the probabilities with which a verb is followed by a direct object NP or sentential complement were equal, readers would have to backtrack and reanalyze half of the sentences they read, resulting in a loss of processing time and cognitive resources. Fortunately this is not true. Verbs differ in the frequencies with which they appear in each syntactic structure. This type of verbal information is referred to as verb bias information. Based on the type of complement that a verb prefers more often, verbs are classified into three verb types: direct object (DO) bias verbs, equi (EQ) bias verbs, or sentential complement (SC) bias verbs. Native English speakers have been shown to use verb bias information to successfully predict the upcoming structure and minimize processing costs due to reanalysis (Garnsey, Pearlmutter, Myers & Lotocky, 1997; Osterhout, Holcomb & Swinney, 1994; Şafak & Hopp, 2021; Wilson & Garnsey, 2009). Studies in the bilingual domain have shown that L2 learners of English are also capable of employing verb bias information during processing. (Dussias & Cramer Scaltz, 2008; Lee, Lu & Garnsey, 2013; Qian, Lee, Lu & Garnsey, 2019).

If L2 learners are capable of using verbal information during sentence processing, will their knowledge of verb bias also affect which type of sentence structure they choose in their production? The present study aims to investigate whether L2 proficiency is a factor that affects whether or not L2 learners' knowledge of verb bias information is reflected in their written production. Previous studies suggest that even L2 learners with low proficiency employ verb bias information in their processing of English sentences (Lee et al., 2013; Qian et al., 2019). However, the

use of verb bias information in production may be a different matter when considering the consequences of disregarding verb bias preferences. As discussed previously, in sentence processing, incomplete knowledge of verb bias is likely to result in incorrect predictions and reanalysis. However, in sentence production, using a particular verb in a structure that does not match its verb bias preferences, e.g., the use of a DO bias verb in an SC structure, will not result in an ungrammatical sentence. The following section provides an overview of previous research on the use of verb bias information in the monolingual and bilingual literature.

2. Literature Review

2.1. Verb Bias

Two methods are used to obtain the verb bias preference frequencies of verbs in English: norming studies and extraction from corpus data. In norming studies, native English speakers take part in a sentence completion task, where they are provided with sentence-initial fragments consisting of a *subject NP + Verb* sequence, e.g., *The senator confided ...* (Gahl, Jurafsky & Roland, 2004; Gamsey et al., 1997). The participants are asked to provide written completions for the rest of the sentence, and the sentence completions for each verb are then coded by syntactic structure. Based on the percentage of DO and SC structures, each verb is categorized as DO bias, EQ bias, or SC bias. In the corpus-based method, the sentence frame frequencies for each verb are extracted from a large, balanced corpus of naturally-occurring speech (Marcus, Santorini, & Marcinkiewicz, 1993; Macleod, Grishman & Meyers, 1997; Lapata, Keller, & Schulte im Walde, 2001). The percentage of sentence structures in

which each verb is used determines the verb bias category.

Two types of criteria can be used to define verb bias properties. The relative classification method defines a verb as DO bias if the number of DO structures is at least twice the number of SC structures that were used. Similarly, a verb is defined as SC bias if the number of SC structures is equal to or more than twice the number of DO structures. If neither structure meets this criteria, the verb is classified as EQ bias. In contrast, the absolute method does not rely on the ratio of DO vs. SC structures, but defines a verb as DO bias or SC bias if the number of DO structures or SC structures with which the verb is used exceeds 50 percent of all sentence frames. If neither of the two structures meets this criteria, the verb is defined as EQ-bias.

Although the relative and absolute methods usually converge on the classification of verb bias category, there are some cases where the two methods result in different classification of the same verb. Most of these divergent cases occur for SC bias verbs, as the SC structure is generally found to be less frequent compared to the DO structure. For example, according to the norming data in Garnsey et al. (1997), the reported proportions of DO vs. SC sentence completions found for the verb *argue* were .11 vs. .35. In this case, the relative method would define this verb as SC bias as the proportion of SC completions is greater than two times the proportion of DO completions. In contrast, the absolute method would define this verb as EQ bias as neither the DO or SC structure exceeds.

When developing stimuli for experimental studies, this divergence in the classification of verbs into DO bias, EQ bias or SC bias categories by the relative or absolute method may lead to conflicting results. One way to solve this problem is to avoid including verbs which show a mismatch in verb bias type according to the two classification methods. Another solution is to treat verb bias as a continuous variable

and construct the experimental stimuli based on each verb's verb bias index (proportional frequency of the DO structure vs. SC structure) instead of grouping the verbs into three categories.

2.2. Use of Verb Bias in Processing and Production

Garnsey and colleagues examined the use of verb bias information by monolingual English speakers in a self-paced reading task (Garnsey et al., 1997). The experimental stimuli used in this study were temporarily ambiguous sentences as shown below in (2).

- (2) a. The editor advocated the truth *needed* to be made public. (DO-bias)
b. The salesman acknowledged the error *should* have been detected. (EQ-bias)
c. The divorce lawyer argued the issue *was* irrelevant to the case. (SC-bias)

The temporary ambiguity in sentences (2)a - (2)c lies in the NP following the underlined verb, which can initially be processed as the direct object or the embedded subject of an upcoming sentential complement. The disambiguating region is the following embedded verb in italics, which provides the information that the previous NP was the subject of the embedded clause. Reading times showed that readers spent more time on the disambiguating region compared to unambiguous controls for the DO bias verbs. These results suggested that the monolingual English participants were using verb bias to predict the upcoming structure, and the longer reading times on the embedded verb were due to surprise effects upon encountering a sentence structure that did not match verb bias information.

In a subsequent study, Wilson and Garnsey (2009) showed similar effects of verb

bias using temporarily ambiguous sentences that continued as simple DO structures. These results support their claim that readers actively use verb bias information to predict the upcoming structure and refuted claims that the previous results in Garnsey et al. (1997) were due to preferences for the simpler DO structure, as predicted by the Garden-path Model (Frazier, 1978; Frazier & Clifton, 1996). Studies using other experimental methodologies, including eyetracking and brain-based measures, reported similar effects of verb bias in monolingual processing (Novais-Santos, Gee, Shah, Troiani, Work & Grossman, 2007; Osterhout, Holcomb & Swinney, 1994; Şafak & Hopp, 2021).

Similar studies have also been conducted in second language research to investigate whether L2 learners of English use verb bias information in ways that are similar to L1 speakers. In a self-paced reading study by Dussias and Cramer Scaltz (2008), L1 Spanish L2 learners of English showed a pattern of reading times for temporarily ambiguous sentences that were similar to the results previously reported for monolingual English speakers. These results suggest that L2 learners are also capable of using verb bias in their sentence processing.

Garnsey and colleagues conducted a series of experiments with L1 Korean and L1 Mandarin learners of English (Lee, Lu & Garnsey, 2013; Qian, Lee, Lu & Garnsey, 2019). Similar to the Spanish L2 learners of English in Dussias and Cramer Scaltz (2008), the L2 learners in this study also showed sensitivity to verb bias, which was reflected in their reading times. In addition, an effect of L2 proficiency was also found. High proficiency L2 learners' reading times patterned with the monolingual L1 control group, but the low proficiency L2 learners showed a different pattern. The L2 learners with low proficiency were found to rely on both verb bias cues and the presence of the complementizer *that* in order to avoid being garden-pathed in cases where the sentence structure did not match verb bias. Garnsey and colleagues

suggested that unlike the high proficiency L2 learners, the low proficiency L2 learners had not yet learned to optimally combine these cues.

In contrast to the numerous processing studies examining how verb bias preference affects sentence processing, relatively fewer studies have been conducted on sentence production. Ferreira and Schotter (2013) examined how verb bias influences the spoken production of monolingual English speakers. Results showed that when repeating sentences with embedded clauses, English speakers mentioned the complementizer *that* more often after DO bias verbs than after SC bias verbs. Including the complementizer *that* cues the listener that an embedded clause will follow and thus alleviates the processing difficulty of a DO bias verb followed by a sentential complement. Closely related results were reported by Gahl and Garnsey (2004). English monolingual participants were found to reduce the phonology of their productions by deleting the /t/ or /d/ more often when a verb was used in a syntactic structure that matched its verb bias. These results are consistent with previous findings that report speakers reducing their production with more frequent structures, and suggest that the higher frequency of a produced sentence structure that matches the verb bias preference results in reduced prosody.

Kim (2021) investigated whether L1 Korean L2 learners of English were capable of employing verb bias information in their written production. Results showed that there was a significant positive correlation with the sentence constructions used in the L2 data and the native English speaker norming data reported in Garnsey et al. (1997), suggesting that the L2 learners were using verb bias as a continuous variable in their written production.

In a similar norming study with L1 Spanish L2 learners of English, Dussias and Cramer Scaltz (2008) found that the L2 learners' use of verb bias information in written production was similar to the monolingual control group's results for most of

the English verbs used in the study. However, differences in verb bias preference were found for some of the experimental items. For the DO bias verbs, 19 of the 20 verbs were correctly defined as DO bias by the L2 learners, and one verb was defined as EQ bias. For the SC bias verbs, one-fourth of the verbs was categorized as a different verb type by the L2 learners and the monolingual English speakers. 4 of the 20 verbs in the SC bias verb category were classified as DO bias and one verb was classified as EQ bias by the L2 learners. Based on the results of a subsequent norming study with the Spanish translation of the English verbs, Dussias and Cramer suggested that although the L2 learners had learned the verb bias information for the majority of the English verbs, verb bias preferences in a second language can be affected by different verb bias preferences in the L1.

The current study examines whether English proficiency is a factor that affects how verb bias information in English verbs is acquired and used by L2 learners of English. In Dussias and Cramer Scaltz (2008), only one of the 20 DO bias verbs was defined as a different verb type by the L2 learners as opposed to one-fourth of the 20 SC bias verbs. The SC structure is syntactically more complex than the DO structure, and requires more nodes when constructing the syntactic representation. Therefore, it is possible that the same heuristics for efficient processing such as Minimal Attachment (Frazier, 1978) apply to production processes also, so that L2 learners opt to choose the simpler DO structure for verbs whose verb bias information has not been fully acquired.

3. Research Method

3.1. Participants

40 Korean L2 learners of English were asked to complete a sentence completion task (range=20-27, $M=23.36$, $SD=3.63$). They were in their second or third year of study at a Korean university. Based on the results of a language background questionnaire, one participant who had lived in an English immersion environment for more than one year and one participant whose first language was not Korean were excluded from the main task. The remaining participants' English proficiency was measured by their scores on the TOEIC which had been obtained within six months of the experiment. The participants were then divided into two groups based on their English proficiency. Participants with TOEIC scores higher than the average ($M=800$, $SD=124.96$) were placed in the high proficiency group ($M=895.67$, $SD=124.96$) and participants with scores equal to or below the average were placed in the low proficiency group ($M=704.33$, $SD=91.80$).

3.2. Experimental Materials and Procedure

The experimental stimuli contained 33 English verbs selected from Garnsey et al. (1997). Verbs for which the absolute and relative classification methods yielded different results were excluded and 11 verbs were chosen for each of the verb bias categories. In the sentence completion task, each verb was included in a sentence-initial fragment consisting of a subject NP and the verb, e.g., *The divorce lawyer realized* The items were pseudo-randomized so that the participants did not see a verb from the same category more than two times in a row. The experimental

verbs are presented in Table 1.

Table 1. Experimental Verbs by Verb Bias

DO-bias	EQ-bias	SC-bias
accept	announce	suspect
establish	guarantee	prove
write	protest	indicate
insure	declare	suggest
print	doubt	believe
hear	guess	conclude
warn	deny	realize
understand	fear	admit
confirm	know	assume
discover	regret	claim
protest	confided	decide

The L2 learner participants completed the sentence completion task in a quiet room individually. Instructions were provided both orally and in written form in English. The instructions said to fill in the blank so that the result is grammatical sentence in English. The entire procedure took approximately 30 minutes.

3.3. Coding Procedure

The sentence completion data were coded following the procedure described in Gahl et al. (2004). When the verb was followed by a noun phrase which took the role of the direct object, the resulting sentence structure was coded as a *DO* completion. When the verb was followed by an embedded sentential complement, the resulting structure was coded as an *SC* completion. When the sentence completion resulting in

a sentence structure other than the DO or SC structure, the sentence completion was coded as *Other*. One example of a sentence structure that was included in the *Other* category is when the verb was used in an intransitive structure, e.g., *The tired nurse protested all day*. Another example of a sentence structure coded as *Other* is when the main verb was followed by a *to*-infinitive, e.g., *The wise judge decided to postpone the hearing*. Ungrammatical sentence completions were coded as *UNG* and were not included in the data analysis. Minor misspellings that were not central to the DO/SC coding scheme were not coded as *UNG* and were classified according to the criteria for DO/SC completions. After all of the sentence completion data were coded, the total number of DO and SC completions in the DO bias, EQ bias and SC bias verb categories were calculated for the low proficiency and high proficiency groups. The following section presents the results of the statistical analyses of the data.

4. Results

The distribution of DO and SC structures found in the sentence completion data for the high and low proficiency groups across the three verb bias types are presented below in Table 2.

Table 2. Percentage of Sentence Structures by Verb Type

answer	High proficiency				Low proficiency			
	DO	SC	UNG	other	DO	SC	UNG	other
DO-bias	61.54	23.08	4.43	10.95	68.53	18.18	4.44	8.85
EQ-bias	32.87	53.85	3.83	9.45	47.55	44.06	2.83	5.56
SC-bias	16.78	68.53	4.23	10.46	30.07	54.55	5.25	10.13

Overall, sentence completions with DO and SC structures were most frequently used by the L2 learners, accounting for 86.59% of the entire dataset. Sentence completions resulting in a sentence structure other than the DO or SC structure were not evenly distributed across the experimental stimuli, but were observed most frequently with the two verbs *protest* (DO bias) and *decide* (SC bias). 53.33% of the sentence completions with *protest* began with a preposition, e.g., *The tired nurse protested against the doctor's decision* or *The tired nurse protested about her heavy workload*. For the verb *decide*, 46.67% of the sentence completions began with the infinitival form of another verb, e.g., *The wise judge decided to sentence her guilty*.

Both groups demonstrated a stronger preference for the DO structure for DO bias verbs. The ratio for DO to SC completions was 2.67 : 1 for the high proficiency group and 3.76 : 1 for the low proficiency group. For the EQ bias verb type, the two L2 learner groups showed a slightly different pattern. The ratio for DO completions to SC completions for the high proficiency group was .61 : 1, indicating that the SC structure was used more often. In contrast, the DO to SC ratio was 1.08 : 1 for the low proficiency group, with the percentage of DO sentence completions slightly higher than the percentage of SC completions. For the SC bias verb type, the two groups patterned similarly. A greater preference was found for the SC structure, with the DO to SC sentence completion ratio .24 : 1 for the high proficiency and .55 : 1 for the low proficiency group.

The sentence completion data were entered into a 3 x 2 ANOVA with verb bias type (DO bias vs. EQ bias vs. SC bias) and sentence completion (DO structure vs. SC structure) as within-participants variables and proficiency group (high vs. low) as a between-participants variable. The results of the ANOVA showed a significant interaction between verb type and sentence completion ($F(2,37) = 75.76, p < .0005$). The highest percentage of DO sentence completions and least percentage of SC

sentence completions were obtained for the DO bias verb type, whereas the reverse pattern was found with the SC bias verb type. A significant interaction was also found between the factors of sentence completion and proficiency group ($F(1,37) = 4.58, p < .05$), with more DO sentence completions and less SC sentence completions observed for the low proficiency group across all three verb types. Although the numerical differences between the low and high proficiency groups for the percentage of DO structures and SC structures used were most pronounced for the SC bias verb type and least pronounced for the DO bias verb type, the three-way interaction (verb type x sentence completion x proficiency group) was not statistically significant ($F(2,37) = 1.93, p = .16$). Main effects of verb type and sentence completion were not found (all $ps > .39$)

The overall pattern of results in the analysis of the sentence completion data indicates that the L2 learners in the low and high proficiency groups differed in their use of verb bias. To explore whether the differences found between the two groups stemmed from the low proficiency L2 learners' lack of sensitivity to verb bias information, separate correlation analyses were conducted for the two groups. In the correlation analyses, the L1 verb bias preference indexes reported in Garnsey et al. (1997) provided a baseline for comparison with the verb bias preferences shown by the L2 learners in the current study.

For each proficiency group, the percentage of DO sentence completions and SC sentence completions found for each individual verb were entered into a correlation analysis with the corresponding verb bias preference indexes (DO bias index, SC bias index) in Garnsey et al. (1997). The results of the correlation analyses for the two groups are presented below in Tables 3 and 4.

Table 3. Correlation Analysis for High Proficiency Group

	1	2	3	4
1. DO-bias index (L1)	1			
2. SC-bias index (L1)	-.68***	1		
3. DO sentence completions (L2)	.65***	-.58**	1	
4. SC sentence completions (L2)	-.66***	.73***	-.76***	1

**Correlation is significant at the .001 level

***Correlation is significant at the .0005 level

Table 4. Correlation Analysis for Low Proficiency Group

	1	2	3	4
1. DO-bias index (L1)	1			
2. SC-bias index (L1)	-.68***	1		
3. DO sentence completions (L2)	.59***	-.63***	1	
4. SC sentence completions (L2)	-.49**	.70***	-.84***	1

**Correlation is significant at the .001 level

***Correlation is significant at the .0005 level

The results of the correlation analyses for the two proficiency groups show a similar pattern. Both groups show a significant positive correlation between the percentage of DO sentence structures found in the L2 learners' sentence completion data and the DO bias index (strength of DO preference) in the monolingual English norming data. Conversely, DO sentence completions were negatively correlated with the SC bias index. The percentage of SC sentence completions for both groups shows the reverse pattern, with significant positive correlations with the SC bias index and negative correlations with the DO bias index. For both groups, the percentage of the L2 learners' DO sentence completions was negatively correlated with the SC sentence completions.

5. Discussion

To establish whether L2 learners varied in sensitivity to verbal information specific to the second language, the current study employed a sentence completion task to determine the preferred sentence structures for 33 English verbs. A comparison between the high proficiency and low proficiency groups revealed a similar pattern. The preference for the DO structure incrementally decreased from the DO bias to EQ bias to SC bias verbs for both groups, suggesting that both the high and low proficiency L2 learners were sensitive to the verb bias information of English verbs. However, there were also some differences that were found between the two groups. Overall, a higher percentage of DO sentence completions was found for the low proficiency group compared to the high proficiency group across all verb types. In the EQ bias verb type, the high proficiency group preferred the SC sentence structure more often than the DO sentence structure. In contrast, the low proficiency group demonstrated a slightly greater preference for the DO sentence structure.

These similarities and differences observed between the two proficiency groups were reflected as statistically significant interactions in the results of the ANOVA. The interaction between verb type and sentence completion showed that the preferred sentence structures chosen by the L2 learners differed for the three verb bias types, with the greatest preference for the DO structure for DO bias verbs and the greatest preference for the SC structure for SC bias verbs. Taken together with an absence of a three-way interaction between verb type x sentence completion x proficiency group, these results suggest that both groups had acquired the verb bias preferences associated with the English verbs and that this knowledge was reflected in their written production.

The second interaction between sentence completion and proficiency group

indicates that despite the similar effects of verb bias observed for the high proficiency and low proficiency groups, the two groups nevertheless exhibit differences in their preferences for the DO and SC structures. A closer inspection of the data revealed that this interaction was driven by a higher proportion of DO completions for the low proficiency group compared to the high proficiency group across all three verb bias types. These interactions suggest that L2 learners of both high and low proficiency are sensitive to verbal information specific to the second language. Although both groups are capable of employing this knowledge in their written production, L2 learners with lower levels of proficiency demonstrate a greater preference for the DO sentence structure compared to high proficiency learners.

The correlation analyses between the L2 data in the current study and L1 monolingual norms collected by Garnsey et al. (1997) served two purposes. The first was to establish whether the preferences for DO and SC sentence structures demonstrated by the L2 learners accurately reflected the verb bias indexes obtained from monolingual English speakers. The second was to determine whether there were any differences between the two proficiency groups in their sensitivity to verb bias as a continuous variable.

The verbal stimuli in the current study were divided into three groups based primarily on the relative classification method used in Garnsey et al. (1997). In order to obtain the most accurate results and avoid a possible confound in defining verb bias, verbs for which the absolute classification method yielded different results were excluded. This type of split-group categorization of verbs into DO bias, EQ bias and SC bias verbs is used most often in experimental studies as it allows for the observation of clear differences among the different verb bias groups. However, this type of categorization may also obscure differences in a more finely graded sensitivity to verb bias, as verb bias preference is a continuous variable rather than

a categorical variable. For example, the DO bias index for the verbs in the DO bias verb category in Gamsey et al. (1997) ranges from .45 (*propose*) to .98 (*accept*). The SC bias strength of the DO bias verbs also range from .01 (*accept*) to .31 (*assert*).

Therefore, if significant correlations are found between the percentage of DO/SC sentence structures used for each specific verb and the verb's corresponding DO/SC verb bias index, these results would indicate a sensitivity to the continuous nature of verb bias preference that accurately reflected monolingual norms. In addition, any difference found in the correlation data between the two proficiency groups would suggest a difference in the degree of sensitivity to verbal information in English that might not have been captured by the prior split-group analysis.

The results showed highly significant correlations between the verb bias index of each specific verb and the sentence structures observed in the L2 sentence completion data. The percentage of DO sentence completions observed for each verb in the L2 learner data increased at a rate proportionate to the strength of DO bias (verb bias index) for all three verb bias groups. A similar positive correlation was observed for the SC completions. Conversely, the percentage of DO sentence completions in the L2 learner data decreased in proportion to an increase in SC bias strength in the monolingual norming data and vice versa for the SC sentence completions. Furthermore, the pattern of correlations with the monolingual norming data were similar for both the high proficiency and low proficiency groups. These results indicate that the two L2 learner groups did not differ in their sensitivity to the graded verb bias preferences of the English verbs used in this study.

In sum, the results of the current study show that L2 learners of both high and low proficiency are able to track the statistical frequencies of the syntactic structures used with English verbs. Even the low proficiency L2 learners showed that they were sensitive to the statistical properties of the L2 input to which they were exposed and

employed this knowledge in their production of English sentences. Moreover, the ability to extract statistical information about the preferred verb bias of English verbs was strikingly similar to previously reported results for monolingual English speakers (Garnsey et al., 1997). Instead of a simplified categorical division of verb bias properties similar to the transitive vs. intransitive verb categorization (Balcom, 1997; Montrul, 2001), the L2 learners displayed a sensitivity to the continuous properties of verb bias preference.

Despite the similarities found between the high proficiency and low proficiency L2 learners, significant differences regarding the relative preferences for the DO structure and SC structure were also observed. This difference lies primarily in the low proficiency L2 learners' greater preference for the DO structure compared to the high proficiency L2 learners. In the sentence completion data, the low proficiency L2 learners displayed a higher percentage of DO sentence completions compared to the high proficiency L2 learners for all three verb bias types. However, this preference for the DO structure was reflected in the sentence completion data while simultaneously taking verb bias information into account. Although the low proficiency L2 learners chose the DO structure more often than the high proficiency L2 learners, the relative proportion of DO completions incrementally decreased from the DO bias to the SC bias verbs. Thus, for the SC bias verbs, the low proficiency L2 learners' percentage of DO completions (30.07%) was lower than the percentage of SC completions (54.55%), although still approximately two times the percentage of DO completions observed for the high proficiency L2 learners (16.78%).

Why did the low proficiency L2 learners show a greater preference for the DO structure? The answer is likely to be related to the issue of efficiency in the use of limited cognitive resources during L2 writing. Writing in a second language is a very complex process, requiring robust knowledge of L2 syntax and vocabulary, including

knowledge of verbal properties in order to produce text that is grammatically accurate. This process generally places a greater load on the cognitive capacity of L2 learners with low proficiency (Kalyuga, Chandler & Sweller 1999; Schoonen, van Gelderen, de Glopper, Hulstijn, Simis, Snellings & Stevenson, 2003). The syntactically less complex and more minimal DO structure would result in more efficient use of limited cognitive resources and reduce the possibility of cognitive overload during the production process. It may seem that always opting for the simpler DO structure when both DO and SC continuations are grammatically acceptable could be the most efficient method for L2 learners with low proficiency. However, a disregard for verb bias preferences would result in a loss of efficiency during processing, as this would result in less reliable predictions of incoming input and consequently more misparsing and more reanalyses. The low proficiency L2 learners in the current study seem to have adopted a strategy that maximizes the efficiency of their limited cognitive capacity: selecting the cognitively less demanding syntactic structure, but only to an extent that accurately and reliably reflects the statistical distribution of the structures available in the input.

6. Conclusion

This study set out to investigate the relationship between L2 proficiency and the use of verb bias information in L2 written production. The results of the current study suggest that both the low proficiency and high proficiency L2 learners have acquired the same types of structural cues pertaining to English verbs that characterizes the verbal knowledge of monolingual English speakers. The sentence structures chosen by both groups of L2 learners changed in proportion to verb bias strength, which was

reflected in their sentence production data. At the same time, L2 proficiency was found to be a factor that modulates the proportion of DO structures chosen in L2 written production. These findings suggest that L2 learners with low proficiency have acquired the same types of statistical cues that characterize the linguistic competence of monolingual English speakers and high proficiency L2 learners. However, low proficiency L2 learners resort to a more frequent use of the structurally simpler DO structure in order to reduce the cognitive load associated with writing in a second language. Further studies with a longitudinal time frame which track how the proportion of DO vs. SC structures changes for low proficiency L2 learners as their L2 proficiency advances are expected to reveal more on the issue of the acquisition of verbal knowledge in L2 processing and production.

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국문초록

영어 능숙도가 제2 언어 학습자의 동사 편향 정보 사용에 미치는 영향

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본 연구는 제2 언어 학습자가 영어 작문 과정에서 동사 편향 정보를 사용하는 방식이 영어 능숙도에 따라 어떻게 변화하는지를 살펴보았다. 본 실험은 영어를 제2 언어로 사용하는 한국어 화자를 영어 능숙도에 따라 두 그룹으로 나누어 직접목적어 편향, 등위 편향, 보문절 편향 동사를 이용한 문장 완성도 과제를 진행하였다. 실험 결과, 두 그룹의 영어 학습자는 동사에 따른 직접 목적어 구조와 보문절 구조에 대한 선호도가 유의미한 차이가 나타났다. 영어 능숙도가 낮은 제2 언어 학습자 그룹은 영어 능숙도가 높은 학습자와 비교하여 상대적으로 직접목적어 구조를 더 많이 사용하였으며, 반대로 보문절 구조는 더 적게 사용하는 것으로 나타났다. 영어 능숙도에 따른 선호 구조와는 별개로 두 그룹 모두 각 영어 동사의 동사 편향 지수와 문장 구조 간 유의한 상관관계를 보였다. 이는 비록 영어 능숙도가 낮은 영어 학습자들은 상대적으로 단순한 문장 구조인 직접목적어 구조를 선호하지만, 이 선호도는 각 영어 동사의 문장 편향 정보를 영어 글쓰기 과정에서 반영된다는 것을 의미한다.

주제어: 동사 편향, 통계 빈도, 문장 완성 과제, 영어 작문, 제2 언어 능숙도

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