

The Role of Semantic Constraints in L2 Acquisition of the English Locative Alternation*

Boram Kim

(Seoul Women's University)

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The present research investigates the acquisition of the English locative alternation by Korean EFL learners, which poses a learnability paradox taking Pinker's framework of learnability theory as its basis. It focuses on two questions (1) whether the broad-range and narrow-range semantic constraints are operative in the interlanguage of Korean EFL learners as they are in L1 children's and (2) how lexical knowledge is represented initially and at different levels of interlanguage development. Three groups of learners at different proficiency levels with a control group of English native speakers are examined by using two instruments: elicited production task and grammaticality judgment task. The broad-range constraint (holism effect) is found operative in interlanguage of all the Korean learners as suggested by the previous research as to language-universal properties of broad-range constraints. As for the knowledge of narrow-range constraints and verb classes, only advanced learners show native-like knowledge of the semantic constraint. Narrow-range constraints seem more difficult to acquire due to their language-particular properties. According to different levels of proficiency, the learners exhibit gradual sensitivity to a change of state meaning and obtain complete perception of the meanings of locative verbs (manner-of-motion and change-of-state) and their constructions.

I. INTRODUCTION

The issue of learnability has been investigated in various aspects of language acquisition. Although a parameterized syntax has always been in the center of debate on learnability (e.g., Bley-Vroman, 1989; Clahsen & Muysken, 1986; Epstein, Flynn & Martohardjono, 1996; Schachter, 1988; White, 1989, 1996), last few years have witnessed an increased interest in understanding how the lexico-syntactic interface is mentally represented.

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Keeping in step with the issue devoted to the L2 acquisition of verb meaning and argument structure, the present study focuses on the learnability issue in the acquisition of argument structure alternations.

Argument structure is a complex level of representation of a predicate. It mediates between two other types of representations: the semantic or conceptual information of the lexical entries on the one hand and the syntactic projection of arguments on the other. Furthermore, argument structure alternations pose more challenge for learners: for example, why are both *John loaded eggs into the basket* and *John loaded the basket with eggs* acceptable in English, while not *John poured the glass with water* but *John poured water into the glass* is acceptable?

Regardless of productivity in language use and arbitrariness in the choice of argument structure, children acquire adult-like knowledge with little or no negative evidence (Brown & Hanlon, 1970). More specifically, they learn to distinguish between alternating verbs such as *load* and non-alternating verbs such as *pour*. Concerning second language acquisition, Juffs (1996a) suggested that a learnability problem also exists with the L2 acquisition of the lexico-syntactic interface because L2 learners have to discover which aspects of meaning are relevant to acquire argument structure alternations in the target language through exposure to input. In other words, learners do not usually encounter all verbs in their possible syntactic frames in the input, having to arrive at the correct lexico-syntactic representation from a few representative exemplars.

In the following, the logical problem of learnability in the acquisition of locative verbs is discussed by the concept of ‘semantic criteria’ as a solution to the learnability (Pinker, 1989). Relevant L2 acquisition literature is reviewed both in terms of theory—i.e., in the framework of Pinker’s learnability theory—and data related to the acquisition of locative verbs and their constructions.

1. Learnability Issues of Locative Verbs

Locative verbs all encode the relationship between a moving object (theme, content, or figure), which I will refer to as the ‘Figure,’ and a location (goal, container, or ground), which I will refer to as the ‘Ground.’ The class of locative verbs in English consists of at least three subclasses based on their syntactic possibilities, as shown in (1-3).

- (1) a. John poured water into the glass.
 Alice spilled soup on the table.
 b. *John poured the glass with water.
 *Alice spilled the table with soup.

Figure verbs

- | | |
|-------------------------------------------|---------------------|
| (2) a. *John filled water into the glass. | Ground verbs |
| *Alice covered the blanket over the baby. | |
| b. John filled the glass with water. | |
| Alice covered the baby with blanket. | |
| (3) a. John loaded apples onto the truck. | Alternating |
| Alice splashed water on the floor. | verbs |
| b. John loaded the truck with apples. | |
| Alice splashed the floor with water. | |

In English the verbs in (1) allow only the Figure construction, in which the Figure-object is encoded as a direct object and the Ground-object as a prepositional phrase (PP). In contrast, the verbs in (2) allow only the Ground construction, in which the Ground-object is encoded as a direct object and the Figure-object as PP. The verbs in (3) allow both the Figure and Ground constructions.

The locative constructions in English pose a learnability paradox in L1 acquisition. When children hear *pour water into the glass* and *fill the glass with water*, they could form such argument structures as [V NP into NP] and [V NP with NP] and overgeneralize them to produce such expressions as those in (1b) and (2a). How do they know *Alice spilled the table with soup* and *Alice covered the blanket over the baby* are ungrammatical without being explicitly told? Another aspect of the problem is arbitrariness in the choice of argument structure (Pinker, 1989). There are no simple semantic cues; for instance, near-synonyms, such as *spill* and *splash* or *pour* and *load*, have different kinds of argument structure not indicating where productive rules can be applied and where they are blocked. Furthermore, how do the children know that some verbs like *load* and *splash* in (3) alternate in their syntactic structures, whereas other verbs like *pour* and *fill* do not? The question is how a child figures out which verbs allow which syntactic structures. Most children are able to avoid such errors as in (1b) and (2a) in the absence of negative evidence (Gropen et al., 1989).

2. Pinker's Solution: "Criteria-Governed Productivity"

Pinker's solution to the learnability rests on the assumption that a child who knows the semantic properties of words and semantic constraints on the alternations can use the constraints as criteria in deciding how far to extend productive rules, which is called 'criteria-governed productivity' (Pinker, 1989, p. 52). According to Pinker (1989), criteria arise from an interaction between the nature of lexical rules and inherent meanings of verbs. He argues that lexical rules are, at least in part, semantic operations, so part of what lexical rules do is change the semantic structures of lexical entries of verbs. Argument structures

are projections of verb semantic structures via universal linking rules.

Then what semantic criteria do children use to constrain the application of alternation rules? Pinker (1989) proposed that children learn and use both ‘broad-range rules’ and conflation classes constraining the selection of the argument structure and ‘narrow-range rules’ and conflation classes distinguishing verb classes. At the broadest level of the semantic structures, each semantic structure has a thematic core¹ that expresses only the semantic features that are linked to grammatical structures, and these semantic structures can be shared by broad-range conflation classes that broad-range rules apply to. At the narrowest level, each lexical entry of a verb has a unique semantic structure shared by no other verb, which is parameterized for non-thematic semantic features, and these parameterized structures can be shared by narrow-range conflation classes that narrow-range rules apply to.

1) Broad-Range Rules and Broad Conflation Classes

Broad-range rules for locativization convert a verb of which the thematic core of the argument structure in (4a) is ‘X moves Y into/onto Z’² into a new verb whose semantic structure contains the thematic core, ‘X causes Z to change its state by means of moving Y to Z.’ Consequently, its argument structure also changes as shown in (4b) through linking rules.

- (4) a. V[NP_{Figure} into/onto NP_{Ground}] (e.g., John sprayed paint_{Figure} onto the wall_{Ground}.)
 b. V[NP_{Ground} with NP_{Figure}] (e.g., John sprayed the wall_{Ground} with paint_{Figure}.)

According to Talmy (1985), when a verb specifies a motion or change, it can also specify the manner of such a motion and some of the properties of the entity that undergoes the change. Verbs in the conflation class corresponding to the thematic core of the argument structure in (4a) specify the manner of causation of the motion of a Figure or content to a Ground or container. They, however, do not have to specify how the Ground or container changes as the result of putting something into or onto it. For example, if you *pour water into a glass*, you have to cause the water to move only in a continuous stream regardless of the end state of the glass; the glass can be full, partially full, or even empty

¹ It is a schematization of the core of the meanings of a class of possible verbs. The thematic core of an argument structure is an example of what Talmy (1985) calls a *conflation* of semantic elements. Each conflation defines a set of possible predicates in a language.

² X, the agent, is the subject; Y is the thing that changes a location or theme and is an affected entity or patient and thus is the object; and Z defines both the end of the path that Y moves along and the location with respect to which Y is situated following the motion.

(in case the glass leaks). In contrast, verbs in the conflation class associated with the thematic core of the argument structure in (4b) specify that a Ground or container undergoes a particular change resulting from the addition of material to it. All that is captured in the thematic core schematization is that the state of the Ground or container is seen different as a result of the addition; the manner in which the material was caused to move is irrelevant. For instance, if you *fill a glass with water*, the glass must be completely occupied by water, but the water could have gotten there by being poured, by dribbling, or even by being sprayed into the glass.

The argument structure in (4a) represents a manner of motion, but the one in (4b) represents a state of change of the motion. In Pinker (1989), these two basic semantic structures are considered broad-range constraints, which capture the commonalities in the constructional meanings. In relation to these broad-range constraints, the holism effect is often discussed as one of the constraints that apply to units smaller than argument structures, the individual grammatical functions composing them. Consider the holistic requirement on the Ground-object constructions in (5b), whereby the grammatical object must be completely affected (covered, filled, etc.) by the action of the verb (see Anderson, 1971; Bowerman, 1982; Rappaport & Levin, 1985; Talmy, 1976); if this is not a possible effect of the event denoted by the verb, the verb does not undergo the alternation as (5b-3) and (5b-4) show.

- (5) a-1. Kim loaded hay into the wagon.
 2. Kim sprayed paint onto the wall.
 3. Kim threw the cat into the room.
 4. Kim pushed the car onto the road.
 b-1. Kim loaded the wagon with hay.
 2. Kim sprayed the wall with paint.
 3. *Kim threw the room with the cat.
 4. *Kim pushed the road with the car.

The holism effect not only rules out the Ground-object constructions for verbs like *throw* and *push* whose action cannot result in complete filling, but also converts the interpretation of sentences with verbs that do alternate. (5b-1) and (5b-2), but not (5a-1) and (5a-2), entail that the wagon is completely full and that the surface of the wall is entirely covered with paint.

2) Narrow-Range Rules and Narrow Conflation Classes

Compatibility with broad-range rules is only a necessary, not a sufficient, condition for a

verb to alternate. Broad-range rules and conflation classes still cannot rule out ungrammatical sentences in English like (7b) and (8b).

- (6) a. I sprayed paint on the floor.
- b. I sprayed the floor with paint.
- (7) a. I dribbled paint onto the floor.
- b.*I dribbled the floor with paint.
- (8) a. I covered the floor with paint.
- b.*I covered paint onto the floor.

You can certainly imagine an event in which dribbling paint over a floor results in affecting it as completely as spraying paint on it. Yet you can naturally say *I sprayed the floor with paint* but not *I dribbled the floor with paint*. Another example is that although you covered a floor by means of spraying paint on it, you do not say *I covered paint onto the floor* because *cover* belongs to the non-alternating narrow conflation class “verbs of covering a surface completely” (see Pinker, 1989, pp. 126-127 for details).

A necessary criterion for a verb to participate in the locative alternation is that it should allow us to predict both a type of motion and an end state. Yet membership in the verb classes (6), (7) and (8) is not completely predicted by the broad constructional meaning of the locative. Thus we cannot just skip the question of why some verbs participate in the locative alternation and others do not. Following Rappaport and Levin (1988), Pinker (1989) suggested that there are “finer-grained criteria” that antecedently determine whether a verb can retain components of meaning for end states or motions. That is, sufficient conditions for alternation are determined by a set of narrow-range rules that classify verbs into narrowly defined semantic classes, so-called narrow conflation classes. The motivation for the classes comes from the Principle of Contrast (Clark, 1987). Figure verbs as in (7) cannot merely specify the movement of a substance to a location but must specify some particular manner of motion (e.g., flowing very slowly in small irregular drops) or some particular kind of substance (e.g., a liquid). Likewise, Ground verbs as in (8) should specify some particular change of state, not just the fact that a change of state (e.g., completely covered floor with paint) has occurred by covering or filling. The same applies to alternating verbs as in (6); the verbs should contain information that specifies a particular change of state and what kind of thing moves or how it moves.

Based on the list of 142 locative verbs by Rappaport and Levin (1985), Pinker (1989) presented 4 Figure-oriented³ alternating, 3 Figure-oriented non-alternating, 2 Ground-

³ Pinker’s criterion of whether alternating verbs have either a primary manner of motion meaning or a primary change-of-state meaning is determined by which argument is obligatory in certain argument structures, which is called the “PP omission test” (Meesook Kim, 1999). For example, *pile* is

oriented alternating, and 5 Ground-oriented non-alternating narrow classes with detailed analyses of the meanings of English locative verbs (pp. 126-127). Table 1 presents some of the selected narrow conflation classes that were dealt with in this study. For example, the narrow-range rule sensitive to “insertion of a designed kind of object” allows *load* to alternate. This rule accounts for why the verbs *load*, *pack*, and *stock* alternate. In contrast, the narrow-range rule does not apply to verbs that have the meaning of “covering a surface completely,” and this explains why the verbs *fill*, *cover*, and *coat* do not alternate.

TABLE 1

Narrow Conflation Classes for Locative Verbs in English (from Pinker, 1989, pp. 126-127)

I Figure-oriented verbs

A. Alternating verbs

1. *Smear*-class (simultaneous contact and motion of a mass against a surface): smear, dab, plaster, rub, spread, etc.
2. *Pile*-class (vertical arrangement on a horizontal surface): pile, heap, stack, etc.
3. *Spray*-class (ballistic motion of a mass): inject, spray, splash, sprinkle, spatter, etc.
4. *Scatter*-class (non-directed motion of a mass): scatter, bestrew, sow, strew, etc.

B. Non-alternating verbs

1. *Pour*-class (a mass is enabled to move via the force of gravity): pour, dribble, drip, spill, slop, ladle, shake, etc.
2. *Coil*-class (flexible object extended in one dimension): coil, spin, twist, wind, etc.

II Ground-oriented verbs

A. Alternating verbs

1. *Stuff*-class (a mass is forced into a container against the limits of its capacity): cram, crowd, stuff, jam, etc.
2. *Load*-class (insertion of a designed kind of object): load, pack, stock, etc.

B. Non-alternating verbs

1. *Fill*-class (covering a surface completely): fill, cover, bandage, blanket, coat, tile, etc.
2. *Adorn*-class (addition of an object or mass to a location): adorn, burden, deck, soil, etc.
3. *Soak*-class (a mass is caused to be coextensive with a solid or layer like medium): soak, drench, saturate, etc.
4. *Clog*-class (an object impedes the free movement of, from, or through the object in which it is put): block, chock, clog, plug, etc.

3. Research in L2 Acquisition of Locative Verbs

A question arises whether the same constraints proposed by Pinker (1989) function in the process of L2 acquisition. A relatively limited amount of empirical research has been

classified as a Figure-oriented alternating verb since it is acceptable without the *into/onto* phrase as in *John piled books (into the shelves)*, but unacceptable without the *with* phrase as in *John piled the shelves *(with books)*.

devoted to the investigation of whether the broad-range and narrow-range rules are operative in L2 learners' interlanguage like in L1 children's. In an attempt to figure out the availability of the broad-range and narrow-range constraints in L2 grammar, some studies on the locative alternation have focused on the two aspects, i.e., the holism effect and narrow-range verb classes. In the following, previous studies on the locative alternation are reviewed and discussed by taking the two aspects into account.

The findings of previous research seem controversial on the issue whether L2 learners have the knowledge of broad-range and narrow-range constraints. Juffs (1996a, 1996b) carried out an experiment with Chinese-speaking learners of English at four different proficiency levels under the hypothesis that they would have difficulty in learning non-alternating Ground verbs such as *cover*, *block*, *decorate*, and *stain* since the target structure forms a subset of the Chinese counterpart. Unlike the hypothesis, the advanced Chinese learners and native speakers behaved very similarly on the elicited production task for the class of verbs. Nevertheless, all the Chinese subject groups showed a tendency to favor the Figure-object frame.

Even though the advanced learner group seemed to show native-like competence in the elicited production task, their responses to the grammaticality judgment task were significantly different from the native speakers'; they accepted Figure-object frames for non-alternating Ground verbs, which are not possible in English. In this regard, Juffs (1996a, 1996b) noted that L1 influence persists until quite advanced stages of acquisition in case positive L2 input fails to pre-empt overgeneralizations based on the representation transferred from L1.

Based on Myong-Hee Choi (2001), Myong-Hee Choi and Lakshmanan (2002) conducted an experiment focusing on one of the broad-range constraints for the locative alternation, the holism effect. They pre-tested 20 Korean learners of English in the U.S. with a grammaticality judgment task, and nine of them met the criteria (16 points or above out of a maximum 20 in the pre-test) and passed the task. Choi and Lakshmanan claimed that the nine learners' judgments were native-like, and thus they had native-like knowledge of the narrow-range constraints. However, given that the grammaticality task administered in the study presented only two options for responses, acceptable and unacceptable, it may be premature to conclude that the learners had acquired the language-particular narrow-range constraints since the two options may have forced the subjects to guess grammaticality when they did not have intuition about it.

In the picture-cued sentence interpretation task, only the responses of the nine subjects were included in the data analysis. The results showed that the object-holism effect associated with the Ground-object frame was not observed in case of the Korean learners—i.e., a significant interaction between structure (Figure-object frame/Ground-object frame) and space (quarter, half, and complete to the extent which the Ground is affected) was found only for the native speakers but not for the Korean learners.

Nevertheless, the results need to be reconsidered with great care since the data were based only on the responses of the nine learners who were selected by the results of the grammaticality judgment on locative constructions, not on the basis of their general proficiency in English.

Meesook Kim (2004) took the same approach as Juffs (1996a, 1996b) in the way that the study put its basis on a cross-linguistic perspective. She tried to look into the acquisition of locative verbs by Korean EFL learners on the basis of a cross-linguistic comparison of English and Korean locative constructions from the perspective of the Subset Principle (Berwick, 1985) and the transferability of lexical properties (see Adjémian, 1983). She tested the knowledge of English locative verbs of the beginner group of 40 EFL learners enrolled in a university in Korea using a grammaticality judgment task. The results, rejecting her hypothesis, indicated that ‘a partial overlap between L1 argument structure and L2 argument structure demonstrates strong L1 effects, regardless of whether L2 argument structure forms a subset or a superset of its L1 counterpart’ (p. 119).

Based on Hye-Ri Joo (2000) and Bley-Vroman and Hye-Ri Joo (2001), Hye-Ri Joo (2003) argued that Korean EFL learners have knowledge of the constructional meaning of the locative alternation (i.e., knowledge of the holism effect), which is associated with the broad-range rules, but that even advanced Korean EFL learners have not achieved native-like knowledge of the narrow-range rules. Fifty-nine college students in Korea, whose TOEFL scores ranged from 550 to 650, responded to two tests in the experiment: a forced-choice picture selection task and a forced-choice sentence selection task. On the basis of the results from the experiment, Joo claimed that the learners’ knowledge of locative constructions reflects the holism effect but no narrow-range constraints. With respect to this interpretation of the results, Schwartz et al. (2003) pointed out that her conclusion was premature on two counts. First, the instruments were inappropriate for the conclusion because they tested interpretive effects, not acceptability or grammaticality. Second, the tasks may have caused the phenomenon known as ‘coercion’⁴; the learners may have contextually coerced verbs beyond their lexical specifications so that the verbs could describe pictures in the experimental task even though they have target-like lexico-semantic representations.

Among the studies reviewed above, only three of them, Bley-Vroman and Hye-ri Joo (2001), Myong-Hee Choi and Lakshmanan (2002) and Hye-Ri Joo (2003), were engaged in the investigation of the status of the broad- and narrow-range constraints in the L2

⁴ Jackendoff (1997) noted that strict compositionality does not suffice for certain aspects of language use in which an expression is used in a manner that does not conform to its lexical specification. In this case, the context coerces the expression to function in some other capacity. In other words, the context can play a role in extending the lexical meaning of an expression along some natural dimensions, beyond its lexical semantic restrictions.

acquisition of the English locative. Although the studies made a contribution to the introduction of the area of learnability of semantics-syntax correspondences with the emphasis on the semantic constraints, they do not seem to provide sufficient implications for development of a SLA theory and pedagogy; they just paralleled other previous studies in that the broad-range constraint is acquired by L2 learners, while the narrow-range constraint is not readily accessible. Bley-Vroman and Hye-Ri Joo (2001) and Hye-Ri Joo (2003) involved only advanced learners in the experiment to examine the operation of the semantic constraints in the acquisition process of the English locative. The studies did not consider any developmental sequence of the acquisition of the semantic constraints, which is essential to yield a complete understanding of the acquisition process of the English locative alternation.

As for research methodology, all the previous research on the acquisition of the English locative employed an experimental paradigm, which uses two-dimensional pictures to elicit a participant's response and production. However, such an experimental framework does not seem appropriate to fully present a manner-of-motion and a change-of-state meaning of locative verbs as in authentic settings, thereby eliciting what is to measure.

In sum, the picture of the status of both the semantic constraints is far from complete due to lack of L2 empirical data, especially on developmental sequences. In this regard, the present study is intended to investigate if there is any developmental sequence in the acquisition of the locative alternation with distinctive features. Besides, the study is designed to present more natural cues to elicit what is intended to measure using a video clip of acted-out scenes as a way to overcome shortcomings of previous research methods.

II. RESEARCH QUESTIONS

The present study investigates the acquisition of the English locative alternation by Korean EFL learners within the framework of Pinker's learnability theory (1989). The main focus of the study is on the operation and development of the broad- and narrow-range constraints in Korean EFL learners' interlanguage and a developmental pattern in the acquisition of the English locative alternation. Subsequent research questions of the study are:

1. Are the semantic constraints of broad-range and narrow-range rules and conflation classes operative in the interlanguage of Korean EFL learners?
2. How does the proficiency level affect the learners' use and judgment of the English locative alternation?

III. RESEARCH DESIGN

1. Participants

Four groups—three experimental and a control native-speaker groups—participated in the present study. Learners of different levels of proficiency were chosen in order to test for developmental effects. The first group was 40 Korean EFL learners, whose TEPS (Test of English Proficiency developed by Seoul National University) scores ranged from 150 to 350 (refer to Appendix A for the descriptions of proficiency levels according to score ranges). They were drawn from a variety of undergraduate programs in Seoul Women's University: Science (14), Mathematics (8), Business Administration (7), Korean Language and Literature (5), English Language and Literature (3), Arts (2), and Philosophy (1). They were 20 freshmen and 20 sophomores, who had learned English as a foreign language for at least six years mostly in a public educational setting, where the focus was primarily on reading and listening.

The second group consisted of 38 Korean EFL learners, whose TEPS scores varied from 550 to 750. They were juniors (18) and seniors (20) who were majoring in English Language and Literature, with four of them taking English as a minor at Seoul Women's University. The participants whose learning environment had been mostly a classroom situation had received an average of 7.6 years of instruction in English as a foreign language.

The third group was comprised of 26 graduate students who were enrolled in a master's (22) or a Ph.D. (4) program in English Education at Seoul National University. They were so-called high-level learners in SLA studies, whose TEPS scores ranged from 801 to 990. They were highly advanced in terms of grammar, vocabulary, and reading skills with comparatively good listening, speaking, and writing skills as well. They had taken formal linguistic courses. They had all learned English as a foreign language for an average of 9.2 years, mostly in a classroom setting in the same way as the other two learner groups. Yet some of them had taken a short-term intensive English course in the U.S. with the experience of interacting with native speakers of English during their stay.

As for the control group, there was a group of 20 native speakers of English (ENS), who completed the same two tests as the Korean EFL learners. They are instructors of English teaching at two different universities in Seoul, Korea: Konkuk University (10) and Seoul Women's University (10).

2. Materials and Procedures

In order to investigate the knowledge of the locative alternation, two tests—an elicited

production task and a grammaticality judgment task—were used in the experiment. The study included 14 English locative verbs—four non-alternating Figure verbs, four non-alternating Ground verbs, and six alternating verbs—based on the classification of English locative verbs reported by Rappaport and Levin (1985) and Pinker (1989) as shown in (9):

- (9) a. Figure class: *pour, coil, spill, dump*
 b. Ground class: *fill, cover, decorate, clog*
 c. Alternating class: *pile, spray, scatter, spread, stuff, load*

Test items were developed based on Gropen et al. (1991), Juffs (1996b), and Pinker (1989).

The elicited production task was first administered, which was followed by the grammaticality judgment task in order to avoid any influence of input from the grammaticality judgment task on the participants' responses. For the Korean EFL learner (KEFL) groups, the tests were administered during class hour by the researcher and the instructors who were in charge of the courses in which the participants were enrolled. The researcher made sure that they read the instructions, written in Korean, about how to respond to each task. They were given maximum of twenty-three minutes to finish the grammaticality judgment task and 16 minutes to complete the production task—the length of the video clip was 16 minutes including 30 second intervals between test events, which were devised to give the participants adequate time to write down a sentence describing each event. As for the English native speaker (ENS) group, the participants completed both tests individually. Even though there were no time constraints on their task, most of the participants took less than 26 minutes to finish.

1) Elicited Production Task

The participants were to describe in writing a videotaped event using a specific verb as they watch a video clip. The video clip included 18 sets of events: 2 sets of examples and 16 sets of actual test items. In the video clip, each verb was presented once except *spray* and *load* ; they were presented twice in both contexts—partly affected Ground and completely affected Ground, whereas other alternating verbs such as *pile, spread, and scatter* were presented only in the context of partly affected Ground, with *stuff* presented only in the context of completely affected Ground. Both in paper handouts and video clips, all the participants were given specific instructions concerning how they should respond to the task. The nouns that the participants were to use were shown underneath the corresponding objects in the scenes they were watching. The verb they were to use also

appeared as the man in the video clip acted it out. The nouns of the objects in each scene and the verb were also given in the handout, where they were to write a sentence after watching each scene.

2) Grammaticality Judgment Task

A questionnaire containing 28 sentences, which requested the subjects to judge their grammaticality using a four-point (0–3) Likert-type scale, was used. Pictures depicting meanings of given verbs in the test were provided since the knowledge of locative verbs could not be assessed if the participants had not yet encountered the verbs under consideration. In the written instructions, the participants were asked to refer to the pictures in case they were not sure about the meaning of the verb in a test sentence.

The questionnaire items contained two types of sentences: a Figure-object frame and a Ground-object frame. The 28 test sentences were classified into six subtypes devised to investigate the effect of the verb class and sentence type: (a) a Figure verb in the Figure-object frame (FF) (e.g., *John poured water into the cup.*); (b) a Figure verb in the Ground-object frame (FG) (e.g., **John spilled the table with wine.*); (c) a Ground verb in the Figure-object frame (GF) (e.g., **Mary covered the tablecloth on the table.*); (d) a Ground verb in the Ground-object frame (GG) (e.g., *Mary filled the bowl with soup.*); (e) an alternating verb in the Figure-object frame (AF) (e.g., *Mary piled books on the shelf.*); (f) an alternating verb in the Ground-object frame (AG) (e.g., *Mary piled the shelf with dishes.*).

3. Analyses

Data from two different types of tests were separately analyzed due to their distinctiveness in test method facets. For the elicited production task, 16 sets of videotaped events were all included in data analysis. The 16 test items were classified into four subtypes: (a) Figure verbs in Figure scene⁵ (4 items); (b) Ground verbs in Ground scene⁶ (4 items); (c) alternating verbs in Figure scene (5 items); (d) alternating verbs in Ground scene (3 items).

The dependent variable was the scores of produced sentences in response to videotaped events. In case the target frame was taken depending on a given verb and a videotaped event, the response sentence was scored 2. That is, a score of 2 was assigned to the

⁵ In Figure scene, the Ground argument was presented as not being wholly affected, which rather highlighted a manner of motion meaning of the verb.

⁶ In Ground scene, the Ground argument was presented as wholly affected, which highlighted a change of state meaning of the verb.

responses in which a Figure scene was described using the Figure-object frame and a Ground scene using the Ground-object frame. When an alternative frame was taken in case of an alternating verb, the response was scored 1. That is, a score of 1 was assigned to the responses in which the Ground-object frame was taken to describe a Figure scene and the Figure-object frame to describe a Ground scene with an alternating verb. The use of non-targetlike frame for a given verb was scored 0. The cases of scoring are exemplified in the following:

FIGURE 1

Examples of Scoring Produced Sentences

a. *He spilled some coffee on his shirt.* (2 points)



b. *He sprayed some black ink onto the doll.* (1 point)



c. *He filled some salt into the jar.* (0 point)



A three-way ANOVA was performed with scores of sentence production as the dependent variable and Group Type treated as a grouping factor, whereas Type of Scene (Figure scene and Ground scene) and Verb Class (Figure verbs, Ground verbs, and alternating verbs) were considered as repeated measure factors in order to test for interaction between two factors. Four two-way repeated measures ANOVAs were done for each group separately (ENS, Advanced, Intermediate, and Beginner groups) in order to make the discussion of results more accessible for accurate interpretations. The alpha level was first set at .05 experiment-wise and then divided by five (the number of ANOVAs conducted) to adjust for the family-wise error rate⁷. Hence, the significance level was set at $\alpha < .01$ for individual statistical decisions.

As for the grammaticality judgment task, 28 sentences were all included in data analysis. The test sentences were grouped into six subtypes—(a) Figure verbs in Figure-object frame (FF), (b) Figure verbs in Ground-object frame (FG), (c) Ground verbs in Figure-object frame (GF), (d) Ground verbs in Ground-object frame (GG), (e) alternating verbs in Figure-object frame (AF), and (f) alternating verbs in Ground-object frame. Each of the subtypes FF, FG, GF and GG consisted of four test sentences respectively, and the subtypes AF and AG had six test sentences each.

A three-way analysis of variance (ANOVA) was performed with the four-point Likert scale scores as the dependent variable and Group Type treated as a grouping factor, while Verb Class (Figure verbs, Ground verbs and alternating verbs) and Sentence Frame (Figure-object and Ground-object) were treated as repeated measure factors in order to test for interaction between the two factors. Four two-way repeated measures ANOVAs were also conducted for each group separately, and thus the significance level was set at $\alpha < .01$ for individual statistical decisions.

IV. RESULTS

The results of elicited production data analysis are associated with the status of broad constructional meaning of the locative alternation in the development of interlanguage, whereas those of grammaticality judgment test mainly concern the status of narrow verb classes in interlanguage grammar. It is the interaction of the main variables that receives a focus of interpretation since a significant interaction effect of Verb Class and Type of Scene and that of Verb Class and Sentence Frame reflect knowledge of the broad-range constraint and that of the narrow-range constraint respectively.

⁷ The family-wise error rate is the rate at which a statistical test would be expected to produce one or more false positives among a class (family) of tests, under the null hypothesis.

1. Elicited Production Test

The means and standard deviations for the production by the ENS and KEFL groups are shown in Table 2. The four subtypes, FF, GG, AF and AG, were classified on the basis of the context of the scene: (a) Figure verbs presented in the Figure scene (FF) (e.g., *The man spilled coffee on his shirt.*); (b) Ground verbs presented in the Ground scene (GG) (e.g., *The man covered the table with a tablecloth.*); (c) alternating verbs presented in the Figure scene (AF) (e.g., *The man sprayed some black ink onto the paper.*); and (d) alternating verbs presented in the Ground scene (AG) (e.g., *The man sprayed the doll with black ink.*).

TABLE 2
Descriptive Statistics for Group Types and Subtypes of Scene

Group Type	Subtype of Given Scene			
	FF <u>M (SD)</u>	GG <u>M (SD)</u>	AF <u>M (SD)</u>	AG <u>M (SD)</u>
ENS (n = 20)	2.00 (.00)	2.00 (.00)	1.94 (.57)	1.28 (.99)
Beginner (n = 40)	1.55 (1.91)	1.07 (2.54)	1.79 (2.26)	1.01 (.89)
Intermediate (n = 38)	1.66 (.94)	1.68 (1.76)	1.96 (.39)	1.17 (.69)
Advanced (n = 26)	1.69 (.99)	1.96 (.54)	1.92 (.58)	1.50 (.90)

The descriptive statistics indicate that all the participants marked the lowest points in AG, which suggests they had more trouble with the alternating verbs presented in the Ground scene. For the test items with Figure scenes, the KEFL groups did better on the alternating verbs than on the Figure verbs unlike the native speakers, who did better on the Figure verbs. For Ground scene items, both the ENS and KEFL groups performed better on the Ground verbs than on the alternating verbs. The comparison of the standard deviations of ENS and KEFL scores (see Table 2) shows that the ENS group's performance on the subtypes is somewhat more homogeneous than that of the KEFL groups, as indicated by the smaller standard deviations for the ENS group.

In both the ENS and KEFL groups, the interaction effect as well as the two main effects was significant (see Table 3–6). Since the significant interaction effect indicates knowledge of the broad-range constraint, it may be interpreted that all the participant groups have knowledge of the broad-range constraint. However, a great care should be taken in this interpretation. Although the η^2 ⁸ shows that the interaction overrides the main effects in all the participant

⁸ In order to test the strength of association in the data, that is, to consider the proportion of variance in the dependent variable for which can be accounted by the independent variable, η^2 was

groups, the η^2 of Beginner group does not seem to indicate a very strong relationship accounted for by the interaction compared with that of the ENS group; the interaction accounts for 82% of the variability in the ENS group and 58% in the Beginner group.

TABLE 3
Repeated Measures ANOVA within the ENS Group

Source	SS	df	MS	F	η^2
Verb Class	205.350	2	102.675	903.857*	.12
Type of Scene	114.075	1	114.075	355.803*	.06
Class x Scene	1508.150	2	754.075	2351.971*	.82
Total	1827.575	5			

* $p < .01$

TABLE 4
Repeated Measures ANOVA within the Beginner Group

Source	SS	df	MS	F	η^2
Verb Class	639.108	2	319.554	160.575*	.26
Type of Scene	408.204	1	408.204	164.187*	.16
Class x Scene	1432.508	2	716.254	345.236*	.58
Total	2479.82	5			

* $p < .01$

TABLE 5
Repeated Measures ANOVA within the Intermediate Group

Source	SS	df	MS	F	η^2
Verb Class	557.158	2	278.579	335.153*	.18
Type of Scene	244.281	1	244.281	231.441*	.09
Class x Scene	2211.509	2	1735.146	1735.146*	.73
Total	3012.948	5			

* $p < .01$

TABLE 6
Repeated Measures ANOVA within the Advanced Group

Source	SS	df	MS	F	η^2
Verb Class	413.744	2	206.872	725.540*	.19
Type of Scene	66.692	1	66.692	172.939*	.03
Class x Scene	1654.308	2	827.154	1697.842*	.78
Total	2134.744	5			

* $p < .01$

estimated for the significant factors (Hatch & Lazaraton, 1991).

Besides, the group effect was significant in the three-way ANOVA with repeated measures ($F = 25.602$ $p < .01$). According to post hoc tests (Tukey HSD and Scheffe), between the KEFL groups and the ENS group, there was a significant difference only between the ENS and the Beginner group, but no significant difference was found between the ENS and the other KEFL groups (Intermediate and Advanced). Among the KEFL groups, there was a significant difference between the Intermediate and the Beginner group as well as between the Advanced and the Beginner group. That is, the Beginner group was the only group that behaved differently from the rest of the groups.

2. Grammaticality Judgment Test

The means and standard deviations for the grammaticality judgments by the ENS and the KEFL groups are shown in Table 7. The scores reported here are based on the four-point scale (0,1,2,3). The standard deviations of ENS and KEFL scores show that the ENS group's performance on the four subtypes is somewhat more homogeneous than the KEFL groups'. For the ENS group, the means on the two subtypes, FF and GG (2.84 and 2.85 out of 3), contrast with those on the other two subtypes, FG and GF (.01 and .03 out of 3) because FF (Figure verbs in Figure-object frame) and GG (Ground verbs in Ground-object frame) included grammatical sentences—e.g., *John poured water into the cup* and *Mary filled the bowl with soup*, while FG (Figure verbs in Ground-object frame) and GF (Ground verbs in Figure-object frame) included ungrammatical sentences—e.g., **John spilled the table with wine* and **Mary covered the tablecloth on the table*. The other subtypes, AF (alternating verbs in Figure-object frame) and AG (alternating verbs in Ground-object frame), on the other hand, addressed a preference tendency, not a grammar problem, since alternating verbs allow both sentences—e.g., *Mary piled books on the shelf* and *Mary piled the shelf with books*.

TABLE 7
Descriptive Statistics for Group Types and Sentence Subtypes

Group Type	Subtype of Given Scene					
	<u>FF</u> <u>M (SD)</u>	<u>FG</u> <u>M (SD)</u>	<u>GF</u> <u>M (SD)</u>	<u>GG</u> <u>M (SD)</u>	<u>AF</u> <u>M (SD)</u>	<u>AG</u> <u>M (SD)</u>
ENS ($n = 20$)	2.84 (.74)	.01 (.22)	.03 (.37)	2.85 (.59)	2.36(2.83)	1.76(3.38)
Beginner ($n = 40$)	2.44(1.93)	1.50(2.01)	1.82(2.29)	2.06(2.19)	2.28(2.11)	1.71(3.10)
Intermediate ($n = 38$)	2.53(1.71)	1.09(2.43)	1.44(3.14)	2.33(2.08)	2.27(2.47)	1.17(3.72)
Advanced ($n = 26$)	2.48(1.47)	.93(2.29)	1.03(2.39)	2.50(1.79)	2.19(2.71)	1.36(2.64)

As in the results of the elicited production test, the interaction effect (ENS: $F = 1304.135$ $p < .01$, Beginner: $F = 32.381$ $p < .01$, Intermediate: $F = 84.453$ $p < .01$, and Advanced: $F = 74.509$ $p < .01$) as well as the two main effects was significant in all the participant groups. The results of the η^2 strength of association test show that in the Beginner group Verb Class accounts for more of the variability than the interaction of Verb Class and Sentence Frame (see Table 8). In case of the Intermediate group, the interaction accounts for more of the variability in the dependent variable, which seems to reflect their knowledge of narrow-range rules and verb classes. However, post hoc tests revealed that there was a significant difference in their judgments between the ENS and the Intermediate group as well as between the ENS and the Beginner group ($F = 14.625$ $p < .01$). Only the Advanced group behaved similarly to the native speakers judging the test sentences.

TABLE 8
Proportions of Variability Observed in the ENS and KEFL Groups

Group Type	Source		
	Verb Class	Sentence Frame	Class x Frame
ENS	30%	1%	69%
Beginner	16%	18 %	19%
Intermediate	20%	23%	57%
Advanced	28%	7%	65%

V. DISCUSSION AND CONCLUSION

1. Availability of Broad-Range and Narrow-Range Constraints to Korean EFL Learners

The results of elicited production test indicate that knowledge of the constructional meaning of the locative (one of the broad-range constraints) was operative in the interlanguage of the Korean learners, as all the learner groups exhibited a statistically significant effect for the interaction. However, the beginners were still in the middle of a development process, while the intermediate and advanced learners showed native-like knowledge of broad-range constraints in their production—the beginners were the only learner group whose mean score was significantly different from the native speakers’ and from the other learner groups’.

Previous research has suggested that narrow-range constraints seem both more difficult to acquire and heavily susceptible to L1 influence, as opposed to broad-range constraints, which seem to be acquired by non-native speakers (Bley-Vroman & Yoshinaga, 1992;

Inagaki, 1997; Joo, 2003; Juffs, 1996a, 1996b especially for Ground-class locatives). The case of the acquisition of narrow-range rules and conflation classes is more complex compared to that of broad-range constraints. Goldberg (1995) claims that learners should first have a system that structures the semantic space of verbs along the right dimensions so that coherent narrow-range classes are contiguously formed in this space. In Pinker's (1989) system, similarly, learners are to have conceptual features—a set of semantic elements, e.g., manner, path, properties, etc.—that are the potential defining characteristics of the narrow-range verb classes.

The results of the present study paralleled those of previous research in a way, but they also suggest that it is not impossible to acquire native-like knowledge of narrow-range rules and classes. The findings based on the results of grammaticality judgment test suggest that the KEFL groups at different proficiency levels represent different degrees of accessibility to narrow-range constraints. The beginners showed little knowledge of narrow-range constraints; they did not make distinctions among Figure, Ground, and alternating verbs as they did not reject ungrammatical sentences such as **John poured the cup with orange juice* or **Mary filled pencils in the basket*. As for the intermediate learners, they were in the middle of the development process of knowledge of L2 narrow-range constraints; on alternating verbs, they behaved quite similarly to the native speakers, whereas they rated much higher than the native speakers on the sentences with non-alternating verbs, which indicates that they did not reject ungrammatical sentences. The advanced learners had the knowledge of narrow-range constraints of English locative verbs. No significant differences were found from the native speakers; the proportion of variability accounted for by each factor turned out to be very similar to what was observed in the native speakers.

2. General L2 Proficiency and Development of Knowledge of English Locative Verbs

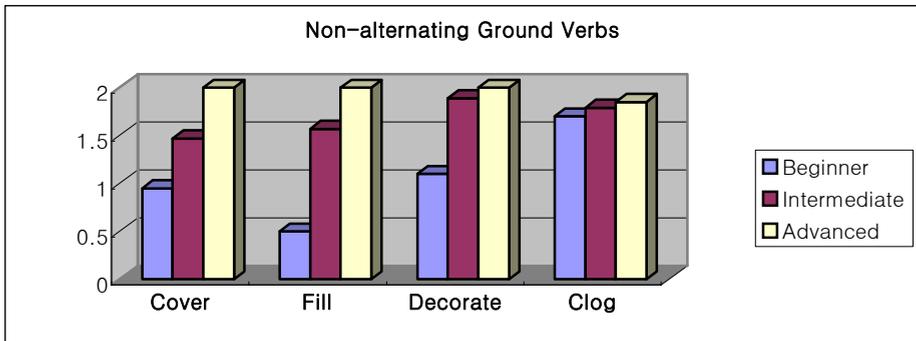
The results showed that the learners' knowledge of English locative verbs and their alternation was predictable by the level of general proficiency in English. The beginners, as indicated by significant difference between their judgment and that of the native speakers on the classes of verbs, clearly have shaky intuitions about English locative verbs, especially about Ground class. In the production test, the learners failed to show sensitivity to a predicate meaning of the change of state of locative verbs, thus producing ungrammatical sentences, taking the Figure-object construction for Ground verbs. Nevertheless, no much difference was found between the beginners and the native speakers in using alternating verbs.

The intermediate learners did better than the beginners in their judgment tasks,

especially on ungrammatical sentences (Figure verbs in Ground-object sentences and Ground verbs in Figure-object sentences) and grammatical sentences with Ground verbs. As for their performance on the elicited production test, the intermediate learners exhibited a lot more sensitivity to a change-of-state meaning than did the beginners; they eventually scored better on Ground verbs than on Figure verbs despite very small difference in the means between Figure verbs presented in Figure scene and Ground verbs presented in Ground scene (.02). That is, they reached a somewhat stable stage in distinguishing the thematic core of different argument structures, whereas the beginners were still in the middle of the development process.

No distinctive developmental feature is observed in the Korean EFL learners' performance on Figure verbs, but there was a noticeable development in their performance on Ground verbs (Including alternating Ground verbs) in terms of different proficiency levels. The findings suggest that learners gradually develop sensitivity to a change of state meaning and thus keep the balance between the meanings of manner of motion and change of state. The developmental sensitivity to a change of state meaning is reflected in the gradual growth by the groups at the different level of proficiency in Figure 2.

FIGURE 2
Performance on Non-alternating and Alternating Ground Verbs
by the Groups of Korean EFL Learners



Pedagogical approaches to English grammar have placed a strong emphasis on sentence frames and functional categories. The argument structure at the level of lexico-syntactic interface has not been a focus of L2 instruction, or not has it been incorporated in teaching materials. L2 acquisition of verb meaning has been left out and treated as a matter of simple vocabulary learning, as if it was the learner's job to build up L2 vocabulary. The findings of the study suggest that the lexico-syntactic aspects of the acquisition of verb meaning need to receive more attention in materials and instruction.

Acquiring verbs is more complex than is has been assumed to be; it involves learning

not only the idiosyncratic meaning of the lexical entry but also the basic structural aspects of meaning that define verb classes, how lexical information is projected onto syntax, and how syntax contributes to a verb meaning. Therefore, the knowledge of lexico-syntactic correspondences plays an important role in developing syntactic knowledge as well as increasing vocabulary. Systematic instructional approaches to lexico-syntactic correspondences will facilitate learning of both grammatical constructions and verb meanings.

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Boram Kim
General English Program, Division of General Education
Seoul Women's University
126 Gongneung 2-Dong, Nowon-Gu
Seoul 139-774, Korea
Tel: (02) 970-5899
E-mail: boramj8@swu.ac.kr

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