

日本人の成人学習者による項構造交替の第二言語学習

L2 Learning of Argument Structure Alternation by Adult Japanese Learners

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成人第二言語学習, 根本相違仮説, ロバート・ブレイブローマン,
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Adult L2 learning, Fundamental Difference Hypothesis, Robert Bley-Vroman,
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ABSTRACT

本研究の目的は、ロバート・ブレイブローマン (Robert Bley-Vroman) による Fundamental Difference Hypothesis (FDH) の妥当性を実証的に検証することである。FDH によれば、子どもの第一言語獲得と成人の第二言語学習には共通点がほとんどない、これら 2 つは本質的に異なる、とされる。本研究では英語の母語話者と日本人の成人第二言語学習者の能力を所格交替というひとつの現象において捉え、その 2 つのグループのもつ文法の違いがどのような要因に起因するものかの分析を行った。

実験結果は、成人第二言語学習者は第二言語の学習に複数の要因を持ち込むことを示唆し、成人第二言語学習者と母語話者の間のいくつかの決定的な違いを提示した。また実験結果から、成人第二言語学習者の所格交替の文法の特徴は、1) 限られた普遍文法の利用可能性、2) 主に連合機構 (associative mechanisms) による学習、3) 強固な学習者の母語の影響、の三点として要約された。これら三点は、どれも第一言語獲得の主な特徴とは一致せず成人第二言語学習者に特徴的であり、子どもの第一言語獲得と成人の第二言語学習は本質的に異なると主張した FDH を支持するものであった。

1. Introduction

The question of what the main characteristics of second language (L2) learners' syntactic knowledge of L2 are has been one of the most elusive questions in the roughly 30-year history of second language acquisition (SLA) studies. Robert Bley-Vroman (1989) espoused the Fundamental Difference Hypothesis (FDH), in which he claims that child first language (L1) acquisition and adult L2 learning have little, if anything, in common; they are fundamentally different. According to Bley-Vroman, the domain-specific language-learning capacities associated with linguistic universals, while clearly necessary to account for L1 acquisition, are no longer available to adult L2 learners, and that the roles of Universal Grammar (UG) and the language-specific learning procedures are replaced in an adult foreign language learning by the learners' explicit and tacit knowledge of their native language and general cognitive problem-solving principles that allow adults to learn how to do all sorts of things from driving cars to solving problems of logic. Although the claim of the FDH is basically in accordance with the general observation of the characteristics of adult foreign language learning, only a handful of research studies which can offer empirical support for the claim have been conducted (e.g., Bley-Vroman & Yoshinaga, 1992; Inagaki, 1997; Wolfe-Quintero, 1992). The data and arguments presented in this paper are intended to contribute to the body of research devoted to testing the validity of the FDH.

2. The Locative Alternation and its Acquisition

Since the 1990's, acquisition of argument structure including cases with the locative alternation has become the focus of research in the area of SLA (e.g., Hirakawa, 1995; Inagaki, 1994, 1997; Juffs, 1996a, 1996b; Moore, 1993; Sawyer, 1995; Sorace, 1993, 1995; White, 1991; White et al., 1998; Wolfe-Quintero, 1992). The locative alternation involves a change in the argument structure of verbs between two variants, a content/theme object form and a container/goal object form (e.g., Levin, 1993), as illustrated in the following pair of (1a) and (1b).

(1a). splash water onto one's face (=theme object form)

(1b). splash one's face with water (=goal object form)

As is shown in the following examples of (2) and (3), however, not all the locative verbs alternate, allowing only one form of the two. The verbs such as *fill* only allow the container/goal object form and they are thus called "container non-alternating verbs", while the verbs such as *pour* only allow the content/theme object form and they are thus called "content non-alternating verbs".

(2a). *fill water into the glass

(2b). fill the glass with water

(3a). pour water into the glass

(3b). *pour the glass with water

Like most argument structure changes, the locative alternation poses a well-known learnability problem called Baker's Paradox (Baker, 1979). Children, although generally conservative, are found to apply the alternation rule productively, making occasional overgeneralization errors such as **fill water into the glass* or **pour the glass with water* (e.g., Bowerman,

1982). They then cut back from overgeneralization errors gradually, arriving at an adult grammar. In addition, native speakers, both children and adults, often extend the rule to production and judging grammaticality of sentences which include novel verbs (i.e., made-up verbs) or new verbs that have just entered into a language (e.g., Brain et al., 1990; Gropen et al, 1989, 1991; Maratos et al., 1987). Native speakers, however, do not extend their productivity to all similar verbs: They know exactly which verbs can undergo alternation and which can not. This “partial productivity” (Goldberg, 1995) exhibited by native speakers and the process by which native speakers recover from overgeneralization on their way toward acquiring an adult grammar both raise a question about how they come to know which verbs alternate and which do not. The puzzle becomes a paradox—to use Baker’s turn of phrase—because it can be shown that: 1) children do not rely on negative evidence (i.e., instruction or correction); 2) there are no simple semantic cues to tell children which verbs are alternators and which are non-alternators; and 3) the non-occurrence of a particular form, such as (2a) or (3b), does not guarantee children that this form actually does not exist. Despite these difficulties, native speakers come to have tacit knowledge of the possible syntactic frames of verbs.

Pinker (1989) presents a theory of verb representation which is directly intended to solve the learnability problem. Pinker claims that the alternation requires two rules: 1) a lexical semantic rule that changes the thematic core of a verb—with the locative alternation, this rule changes “cause X to go onto Y” into “cause Y to change state by means of causing X to go onto Y”—, and 2) a linking

rule that maps meaning onto syntactic forms (e.g., “link the affected entity to object position”). According to Pinker, the alternation is captured as an alternation between the two thematic cores and linking rules define regular ways of assigning arguments to syntactic positions. In the case of the locative alternation, content verbs are associated with the thematic core “cause X to go onto Y”, where X is an affected entity, and they don’t undergo an alternation. On the other hand, container verbs are associated with the thematic core “cause Y to change state by means of causing X to go onto Y”, where Y is the affected entity. These verbs, too, do not undergo an alternation. One linking rule then maps respective affected entities onto the direct object positions. A necessary condition for a locative verb to alternate, therefore, is that it has both of the thematic cores as part of its meaning. Alternating verbs such as *spray* involve both thematic cores and thus allow the alternation. The requirement that an alternating verb possesses two thematic cores is what Pinker calls the Broad Range Rule (BRR).

However, having two thematic cores is not a sufficient but only necessary condition: Not all the verbs that share the same thematic cores actually alternate. Pinker claims that productive alternations are constrained in application to narrow subclasses of semantically similar verbs which are defined by the Narrow Range Rules (NRR). The NRR are more specific versions of a particular broad range rule and they only apply to a subset of the verbs covered by the Broad Range Rule. For example, verbs of “imparting force to move a substance”, like *splash*, alternate, but verbs of “enabling gravity to move a substance”, like *pour*, do not. Thus the sufficient condition for alternation is a member-

ship of one of the alternating narrow range verb classes. Both the BRR and the NRR are sensitive only to specific kinds of information in the semantic structure of verbs; namely, the grammatically relevant meaning elements (e.g., CAUSE, GO, HAVE, MANNER, PATH, etc.). Pinker proposed 8 narrow range classes for the content verbs—4 of which are alternating and 4 of which are non-alternating—and 9 classes for the container verbs—4 of which are alternating and 5 of which are non-alternating (See Pinker, 1989, pp. 126-127, for the narrow range verb classes for the English locative alternation).

In Pinker's account, the linking rules and the BRR are general semantic constraints on alternations, and appear to be universal; that is, they may not have to be learned. In contrast, the NRR are language or dialect specific, and thus must be learned one at a time, by generalizing a verb's alternation pattern only to verbs with very similar meanings. Thus the learning of argument structure alternations is understood as a process of forming narrow subclasses of verbs by utilizing universal semantic features that are shared by the members of a class. This process of learning which verbs alternate and which do not is accomplished by generalizing minimally from individually learned verbs. Overgeneralization is a result of incomplete acquisition of verb lexical structures and it decreases as verb lexical structures are acquired in all their semantic complexity.

3. L2 Learning of the Locative Alternation

The availability of universals

Based on Pinker's theory, it can be argued that full-fledged knowledge of the locative alternation in L2 needs to include at least three

elements: 1) verb meanings, 2) the Broad Range Rules, and 3) the Narrow Range Rules. The BRR is—at least theoretically—innate, and thus, in principle, it need not be learned. The learning of verb meanings from the input also doesn't seem to pose fundamental difficulty for L2 adult learners given their general cognitive ability, although whether or not the completeness of their knowledge is compatible with native speakers' is unknown. The key issue here, therefore, is whether adult Japanese learners can acquire the NRR which constrain the locative alternation in the target language—in this case, English.

Unfortunately, detailed analysis for the narrow range verb classes of Japanese locative verbs—analysis upon which Pinker's theory depends, has not yet been conducted. However, given the small number of alternating verbs in Japanese (e.g., Fukui et al., 1985), it seems implausible that Japanese L2 learners of English form narrow range classes merely from the properties available in their L1 Japanese. Therefore the task of adult Japanese learners of English in acquiring the NRR for the English locative alternation is essentially the same as that of children learning English as their L1: Successful learners have to form narrow subclasses of verbs utilizing universal semantic features that are shared by the members of a class by generalizing minimally from individually learned verbs. The question is: Is this task manageable for adult L2 learners?

In the field of SLA, six studies have directly investigated L2 learners' acquisition of the BRR and/or the NRR (Bley-Vroman & Yoshinaga, 1992; Hua, 1991, cited in Juffs, 1996a; Inagaki, 1997; Moore, 1993; Sawyer, 1995; Wolfe-Quintero, 1992). The results of these studies are rather contradictory and

thus inconclusive especially in terms of the learners' acquisition of the NRR: In two out of three experiments carried out by Sawyer (1995), Japanese learners of English showed partial sensitivity to the NRR; Hua's study (1991, cited in Juffs, 1996a) showed Chinese L2 learners acquired the NRR quite early; In Inagaki's study (1997), both Chinese and Japanese L2 learners showed sensitivity to the NRR for one pair of narrow classes but not for the other pair of classes; In Wolfe-Quintero's study (1992), high proficiency learners but not low level learners were found to be sensitive to the NRR; Bley-Vroman & Yoshinaga's study (1992) showed Japanese learners failed to acquire the NRR.

L1 influence and associative mechanisms

There are two other factors that need to be taken into account when considering the L2 learning of the locative alternation. One point to be discussed here is the influence of the learners' L1. L2 learners already possess a system of knowledge of their L1 and are widely known to have tendencies to transfer some properties of L1 in using and/or acquiring L2. Although manifestations of L1 transfer may well result in facilitating effects on L2 learning (e.g., Hylenstam, 1984), L1 influence is more eminent and poses problems in the course of L2 development when it causes interference. In terms of acquisition of L2 argument structure, there is some empirical evidence that L1 transfer continues even with advanced learners, suggesting the possibility that transfer errors may never be completely eliminated (e.g., Inagaki, 1997; Juffs, 1996a). In addition, it has also been shown in the previous studies that L1 transfer at the competence level is more persistent than at the performance level (e.g., Moore, 1993).

The role that this prior linguistic knowledge plays in the course of L2 development is of concern here.

The other point to be discussed here is the role of associative mechanisms. Associative mechanisms are defined as "the process of associating particular verbs with particular syntactic frames based on instances, from which no abstraction of rules occurs" (Inagaki, 1994, p.4). In other words, associative mechanisms are presumed to account for learning the elements of a verb's syntactic frame one by one, based on positive evidence from input. Associative mechanisms are often contrasted with rule abstraction, which is defined as abstraction of general rules for the same syntactic frameworks. Although associative mechanisms are claimed to have some place in L1 acquisition in general (e.g., Pinker, 1991, 1998), several researchers claim that L2 learning differs from L1 acquisition in that associative mechanisms play a much larger role in L2 learning than in L1 acquisition (e.g., Bley-Vroman & Yoshinaga, 1992; Inagaki, 1994, 1997).

Turning to the particular case of L2 learning of the locative alternation, the issue then is whether it is governed by rule abstraction, just as in the case of L1 acquisition, or by associative mechanisms. If L2 learners have access to universals according to which they abstract rules, then their acquisition process will be rule-governed and their grammar will be productive and constrained in nature just as are the grammars of native speakers. Also, L2 learners will show sensitivity to the NRR for the locative alternation in English. On the contrary, if L2 learners mainly rely on L1 structures and/or associative mechanisms, then their grammar will be rather conservative and will not show productivity, which is

the case predicted by the Fundamental Difference Hypothesis. In this view, L2 learners will not be able to acquire the productive NRR for the locative alternation in English, although they may improve their acquisition of syntactic frames for the locative alternation through associative mechanisms.

One vital methodology devised for L1 studies and then adopted in SLA studies in order to discern the effect of rule abstraction and associative mechanisms is the use of novel verbs (i.e., made-up verbs) as test items (e.g., Bley-Vroman & Yoshinaga, 1992; Brain et al., 1990; Gropen et al., 1989, 1991; Inagaki, 1997; Maratos et al., 1987). The rationale here is that if rules are acquired, then they should be applied to novel cases. If learners merely resort to association mechanisms, then they should not be able to deal with novel verbs because they have never heard these verbs used in real sentences.

Research questions

Based on the above discussion, the following research questions are formed.

Research Question 1: Are there any differences between native speakers' and adult L2 learners' knowledge of the locative alternation? If so, to what extent are adult L2 learners' knowledge representations compatible with those of native speakers?

Research Question 2: Are adult Japanese learners of English sensitive to the NRR for the English locative alternation?

4. Experimental Study

Purpose and hypotheses

The purpose of the present study is to investigate if there are any differences between

native speakers' and Japanese adult L2 learners' knowledge of the NRR for the locative alternation in English. The following set of hypotheses is posited for the present study.

Hypothesis 1: Native speakers of English will show sensitivity to the NRR for the locative alternation. They will distinguish sentences containing alternating verbs from those containing non-alternating verbs, in both real and made-up verb conditions.

Hypothesis 2: Adult Japanese learners of English will distinguish sentences containing alternating locative verbs from those containing non-alternating locative verbs when the verbs are real.

Hypothesis 3: Adult Japanese learners of English will not distinguish sentences containing alternating locative verbs from those containing non-alternating locative verbs when the verbs are made up.

Hypothesis 4: With sentences containing real locative verbs, the judgments of adult Japanese learners of English will approximate those of native speakers as their proficiency increases.

Hypothesis 5: With sentences containing made-up locative verbs, the judgments of adult Japanese learners of English will not approximate those of native speakers even when their proficiency increases.

Method

Subjects. A total of 106 Japanese learners and 111 native speakers participated in the studies. The Japanese subjects were all undergraduate students at International Christian University (ICU), in Tokyo, Japan and ranged in age from 18 to 25 years ($M=19.81$, $SD=1.19$). The native speakers were also undergraduate students studying at five different

TABLE 1
Verbs Used in the Experiment

Verb	Verb Class	Real	MU
Content Alternator	<i>Simultaneous forceful contact</i>	spread	moop
	<i>Vertical arrangement</i>	pile	tonk
Content Non-Alternator	<i>Mass moving via gravity</i>	pour	crell
	<i>Mass expelled from inside</i>	emit	frape
Container Alternator	<i>Mass forced into a container</i>	stuff	pell
	<i>Mass of a size put into a container</i>	pack	clafe
Container Non-Alternator	<i>A layer covers a surface</i>	cover	feen
	<i>Addition of an object causes a change</i>	pollute	prit

colleges/universities in the United States and ranged in age from 18 to 54 years ($M=25.40$, $SD=8.20$). The 21 Japanese subjects were excluded after the screening procedure based on the criteria of no experience of living in English-speaking countries for over one year before the age of 15, which was needed because of the study's relevance to the FDH. The 24 native speaker subjects were also excluded because of their language background or linguistic knowledge.

The Japanese subjects were further divided into three language proficiency levels based on TOEFL scores: High (TOEFL >585 , $n=30$), Middle (TOEFL 585-565, $n=23$), and Low (TOEFL <565 , $n=32$). In order to highlight prospective differences related to proficiency levels, the data from the middle group was totally excluded from further analysis and only data from the high and low groups was included in all data analyses. The final population included in data analyses was 32 low-level non-native speakers (LNNS), 30 high-level non-native speakers (HNNS), and 87 native speakers (NS).

Materials. The material was a written questionnaire consisting of Part 1 and Part 2. Part 1 was for the made-up verbs while Part 2 was for the real verbs. Eight novel verbs were constructed (defined) so as to fall into 8

different narrow range classes for the locative alternation proposed by Pinker (1989). These were paired with real verbs from corresponding classes. The eight classes chosen for the study is shown in Table 1.

Part 1 presented 8 short paragraphs, each containing one made-up locative verb using only the base form for that verb, i.e., the theme object form for a content verb and the goal object form for a container verb. Each paragraph was followed by two sentences using the made-up verb just introduced in the preceding paragraph, one in the theme object form and the other in the goal object form. After each sentence was a 7-point Likert scale, where -3 indicates *completely unacceptable*, 0 indicates *unable to decide*, and $+3$ indicates *completely acceptable*. The subjects were asked to read the paragraph to learn the meanings of the made-up verbs and then to indicate for each sentence the degree of acceptability by circling one of the numbers on the scale. The instructions directed the subjects to make their rating based on what they felt about the sentences rather than whether they were right or wrong.

Part 2 was a grammaticality judgment test on 58 short sentences, of which 48 contained locative verbs. The sentences containing locative verbs were all paired, using identical vocabulary in each pair, with the only differ-

ence being the alternation patterns. Thus there were 24 pairs with 24 different locative verbs, of which 8 verbs were for the present study and 16 verbs were for the other study which is not reported in this paper. The remaining 10 sentences were control sentences. Each of the 58 sentences in Part 2 was followed by a 7-point Likert scale, exactly the same one as used in Part 1. The instructions directed the subjects to rate the acceptability of each sentence by circling one of the numbers on the scale.

Procedure. With the Japanese subjects, the questionnaire was distributed and filled out in a classroom setting, with small groups of 15-20 each time. With native speakers, the questionnaire was distributed in the classroom and filled out at home and returned the next day. No time constraints for completion of the test were imposed in either case. The approximate time required to complete the whole questionnaire was 15 minutes for native speakers and 20 minutes for Japanese subjects.

5. Results

The means and standard deviations of ratings for the real and made-up verbs are reported in Table 2 and 3 respectively. Hypotheses 1-3 mainly concern whether the subjects differentiate the alternating from non-alternating class verbs. Figure 1 through

6 visually represent the mean ratings of the goal object forms of the content verbs and theme object forms of the container verbs in each group.

As for NS, Figure 1 and 2 indicate that English NS distinguished the alternating from non-alternating classes with both of the content and container verbs. They discriminated between the two classes when the verbs were real as well as when the verbs were made-up. In sum, NS were sensitive to the narrow range classes both when the verbs were real and made-up, distinguishing the alternating from the non-alternating class verbs. These results support Hypothesis 1: Native speakers of English will show sensitivity to the narrow range classes for the locative alternation, distinguishing the sentences containing alternating verbs from those containing non-alternating verbs, both when the verbs are real and made-up.

Both of the non-native groups, on the other hand, showed the same patterns which were significantly different from those of NS. Figure 3 and 4 indicate that, when the verbs were real, HNNS distinguished the alternating from the non-alternating classes with the container verbs (1.56 vs. -1.78), but not with the content verbs (-1.15 vs. -1.15). When the verbs were made-up, HNNS did not differentiate the alternating from non-alternating classes, neither with the content verbs (-0.71 vs. -0.91) nor with the container verbs (0.55

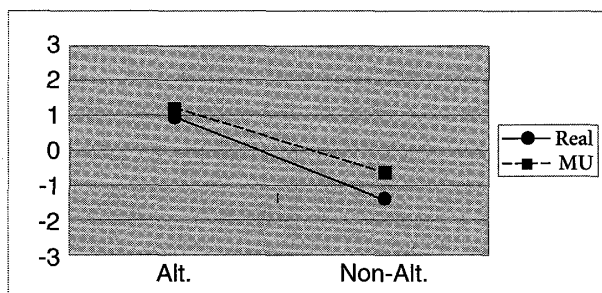


FIGURE 1: Content Verbs With Goal Obj.—NS

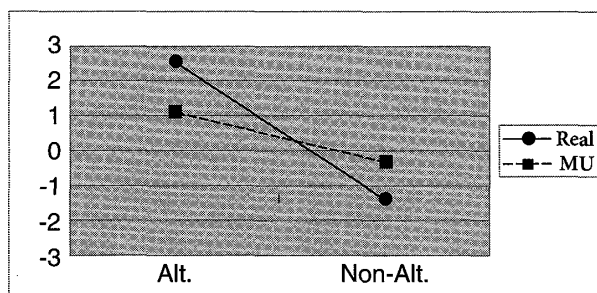


FIGURE 2: Container Verbs With Theme Obj.—NS

TABLE 2
Mean Judgments and ANOVA Summary for
Different Syntactic Configurations With Real Verbs

Verbs	NS (<i>n</i> = 87)	HNNS (<i>n</i> = 30)	LNNS (<i>n</i> = 32)	<i>F</i>
Content Alternator				
Theme Obj.	2.28 ^a (0.79)	2.30 ^b (1.01)	1.54 ^{a,b} (1.27)	7.443**
Goal Obj.	0.94 ^{a,b} (1.40)	-1.15 ^b (1.34)	-0.93 ^a (1.49)	36.030***
Content Non-Alternator				
Theme Obj.	2.51 ^a (0.78)	2.15 (1.05)	2.03 ^a (1.11)	3.969*
Goal Obj. (U)	-1.37 (1.41)	-1.15 (1.70)	-1.00 (1.67)	0.771
Container Alternator				
Theme Obj.	2.48 ^{a,b} (0.67)	1.56 ^b (1.41)	1.57 ^a (1.27)	14.990***
Goal Obj.	2.59 ^a (0.60)	2.25 ^b (1.11)	1.64 ^{a,b} (1.34)	12.594***
Container Non-Alternator				
Theme Obj. (U)	-1.32 (1.50)	-1.78 (1.16)	-1.14 (1.64)	1.603
Goal Obj.	2.53 (0.81)	2.50 (0.84)	2.62 (0.62)	0.223

TABLE 3
Mean Judgments and ANOVA Summary for Different Syntactic Configurations With Made-Up Verbs

Verbs	NS (<i>n</i> = 87)	HNNS (<i>n</i> = 30)	LNNS (<i>n</i> = 32)	<i>F</i>
Content Alternator				
Theme Obj.	1.60 (1.52)	2.30 (0.95)	2.00 (1.19)	3.227*
Goal Obj.	1.12 ^{a,b} (1.33)	-0.71 ^b (1.52)	-0.53 ^a (1.46)	27.892***
Content Non-Alternator				
Theme Obj.	1.67 (1.55)	2.31 (1.00)	2.06 (0.95)	2.895
Goal Obj. (U)	-0.70 (1.69)	-0.91 (1.57)	-0.79 (1.59)	0.198
Container Alternator				
Theme Obj.	1.12 (1.51)	0.55 (1.36)	0.71 (1.44)	2.109
Goal Obj.	1.26 (1.78)	2.11 (1.14)	0.98 (1.81)	3.939*
Container Non-Alternator				
Theme Obj. (U)	-0.33 (1.70)	0.35 (1.84)	0.43 (1.20)	3.584*
Goal Obj.	1.94 ^a (1.30)	2.73 ^a (0.61)	2.35 (0.90)	6.051**

Note (TABLE 2 & 3). All *df* = 2, 146. Standard deviations are given in parentheses. Means that differ significantly according to Scheffe are co-superscripted. (U) represents sentence types regarded ungrammatical in Pinker (1989). Alt. = alternating classes; Non-Alt. = non-alternating classes; NS = native speakers; HNNS = high non-native speakers; LNNS = low non-native speakers. **p* < .05. ***p* < .01. ****p* < .001.

vs. 0.35). LNNS showed exactly the same tendencies as HNNS. Figure 5 and 6 indicate that, when the verbs were real, LNNS distinguished the alternating from the non-alternating classes with the container verbs (1.57 vs. -1.14), but not with the content verbs (-0.93 vs. -1.00). When the verbs were made-up, LNNS did not differentiate the alternating from non-alternating classes, neither with the content verbs (-0.53 vs. -0.79) nor with the container verbs (0.71 vs. 0.43).

In sum, the two Japanese groups, HNNS and LNNS, were sensitive to the narrow range classes for the container verbs but not for the content verbs when the verbs were real.

The case of the container verb supports Hypothesis 2, which states that adult Japanese learners of English will distinguish the sentences containing alternating locative verbs from those containing non-alternating locative verbs when the verbs are real, but the content verb case does not. As for the made-up verbs, both of the Japanese groups were not sensitive to the narrow range classes with both of the verb types, showing their inability to distinguish the alternating from the non-alternating classes. These results support Hypothesis 3: Adult Japanese learners of English will not distinguish the sentences containing alternating locative verbs from

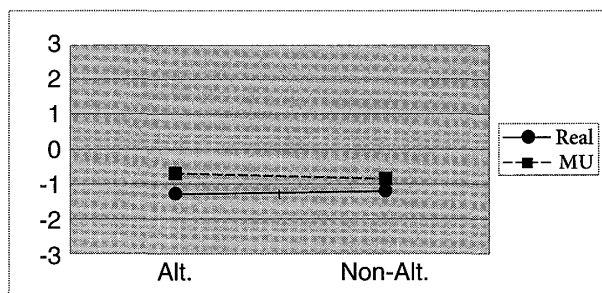


FIGURE 3: Content Verbs With Goal Obj.—HNNS

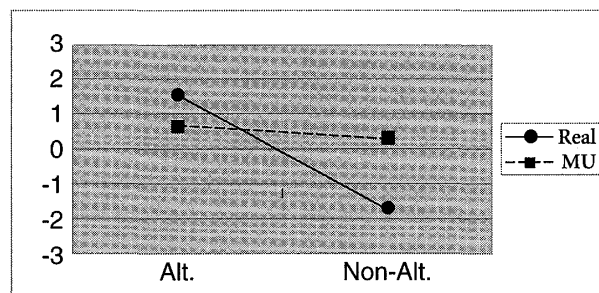


FIGURE 4: Container Verbs With Theme Obj.—HNNS

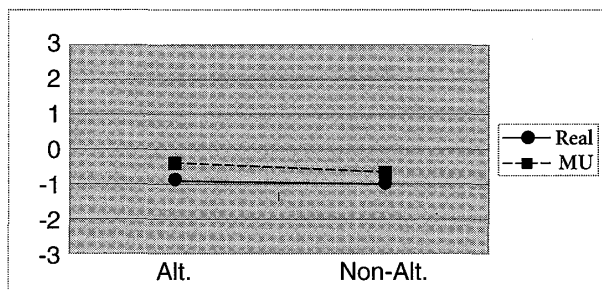


FIGURE 5: Content Verbs With Goal Obj.—LNNS

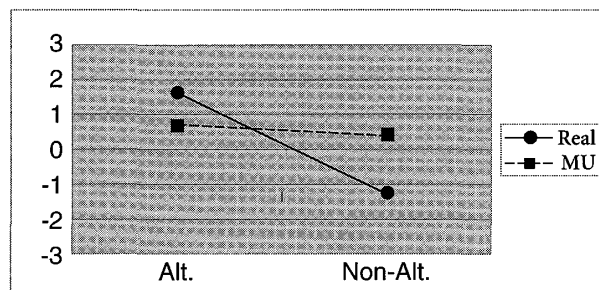


FIGURE 6: Container Verbs With Theme Obj.—LNNS

those containing non-alternating locative verbs when the verbs are made-up.

Planned comparisons of the ratings of the goal object forms containing alternating class verbs to those containing non-alternating class verbs, and of the ratings of the theme object forms containing alternating class verbs to those containing non-alternating class verbs in NS, HNNS, and LNNS indeed confirm these results. The results of the planned comparisons are reported in Table 4. The differences between the alternating and non-alternating classes were significant for both of the real content and container verbs in the NS group ($p < .001$ for the content verbs; $p < .001$ for the container verbs). This was also the case for the made-up verbs ($p < .001$ for the content verbs; $p < .001$ for the container verbs). The same differences in HNNS and LNNS group were significant only for the container real verbs ($p < .001$ in HNNS; $p < .001$ in LNNS), but not significant for the content real verbs, the content made-

up verbs, and the container made-up verbs.

Hypotheses 4 and 5 mainly concern whether there are any differences in the responses of the Japanese groups with different English proficiency levels. Eight separate one-way repeated measures ANOVA were performed for each syntactic configuration, for both the real and made-up verbs separately. In addition, Scheffe tests were run for all significant results. These results are also summarized in Table 2 and 3.

In regard to the real verbs, the general tendency seems to be in accordance with the expectation: The more proficient the L2 learners become, the closer to native speaker norms their judgments come. The results of ANOVA, summarized in Table 2, indicate that there were significant differences among three groups for five out of 8 syntactic configurations. Of these five syntactic configurations, *Post hoc* Scheffe tests revealed significant differences between HNNS and LNNS for two structures, theme object form of content

TABLE 4
Results of Planned Comparisons

	Real & MU	Real	MU
	<i>df</i>	<i>F</i>	<i>F</i>
Content Verbs Alt. vs. Non-Alt.			
NS	1, 86	143.803***	57.486***
HNNS	1, 29	0.000	0.401
LNNS	1, 31	0.029	0.473
Container Verbs Alt. vs. Non-Alt.			
NS	1, 86	441.365***	37.505***
HNNS	1, 29	112.128***	0.248
LNNS	1, 31	67.600***	0.569

Note. *** $p < .001$.

alternators ($p < .05$) and goal object form of container alternators ($p < .05$), suggesting that HNNS moved in the direction to match the NS norms. Even with theme object form of content non-alternators, which is one of the other three constructions where there were significant differences among the groups but not between HNNS and LNNS, the mean ratings of the three groups are in the expected direction. In addition, the lack of significant group differences in the remaining 3 other syntactic configurations, goal object form of the content non-alternators, theme object form of container non-alternators, and goal object form of container non-alternators, suggests that both HNNS and LNNS have already matched the NS norms. Therefore, although group differences are not always statistically significant, the general tendency seems to be in line with the expectation. These results support Hypothesis 4 to some degree: With the real verbs, the judgments of adult L2 learners will approximate those of native speakers as their proficiency increases.

The Japanese learners' responses to the made-up verbs, on the other hand, appeared not to approximate those of NS. In contrast to the real verbs, the responses of HNNS and LNNS to the made-up verbs did not indicate

any improvements in accordance with the proficiency level at all. The results of ANOVA, summarized in Table 3, indicate that there were significant differences among three groups for five out of 8 syntactic configurations. However, *Post hoc* Scheffe tests failed to show significant differences between HNNS and LNNS for any of these five constructions, indicating the source of the significant group differences in ANOVA lay rather in the difference between NS and the two non-native groups. These results support Hypothesis 5: With the made-up verbs, the judgments of adult Japanese learners of English will not approximate those of native speakers even when their proficiency increases.

6. Discussion

In the present study, native speakers showed sensitivity to the NRR for the English locative alternation proposed by Pinker (1989). The native speakers' ability to differentiate the alternating from the non-alternating classes with not only real existing verbs but made-up verbs with which they had no past experience suggests that they have acquired related rules during native language development and also that they are able to

apply these rules productively. These results replicated the results of the previous studies, which confirmed the native speakers' sensitivity to the NRR in other argument structure alternations in English: the dative alternations (Bley-Vroman & Yoshinaga, 1992; Gropen et al., 1989; Inagaki, 1997; Sawyer, 1995) and the causative alternation (Moore, 1993). The present study was the first one conducted to confirm the same native speakers' sensitivity to the NRR with the up-to-now unexplored construction, the locative alternation.

The results of the present study also appear to support the Fundamental Difference Hypothesis (Bley-Vroman, 1989), which claims the adult language learner has no access to universals which are not already in use in the L1. In contrast to the native speakers' performance, that of the adult Japanese learners of English revealed a discrepancy between real and made-up verbs. The Japanese learners showed some ability to distinguish the alternating from the non-alternating verbs with the real container verbs, though less clearly than did NS. Some improvement in the judgments was also observed in accordance with the proficiency levels. Regarding the made-up verbs, on the other hand, the Japanese learners, regardless of their proficiency levels, appeared to be totally indifferent to the narrow range classes, treating the alternating and the non-alternating verbs in the same way. As for real verbs, even when the learners do not operate on the internal productive rules as native speakers do, they are still able to handle the verbs and move to match native speakers' production based on the accumulated input through which they can learn syntactic frames in which a particular verb can occur. In the case of the novel verbs, however, the existence of

the internal rules is crucial, since the learners have not heard the verb in the input before and thus can not rely on familiarity effect from associative mechanisms. Thus, their inability to distinguish the alternating from the non-alternating made-up verbs suggests that they lack such productive rules in their mental representations of English; mental representations which the native speakers were found to possess. Therefore, the results of the present study are, in general, in accordance with the expectations motivated by the hypotheses based on the FDH.

There are still several points, however, which need to be discussed in greater detail due to their relevance to the basic claims of the FDH. The three points to be discussed extensively below are: 1) differences between the real content and container verbs in the Japanese learners' responses; 2) the Japanese learners' responses to the made-up verbs; and 3) associative mechanisms and L1 influence in L2 learning.

Differences between the real content and container verbs in the Japanese learners' responses

In this experiment, Japanese learners distinguished the alternating from non-alternating verbs for the container verbs but not for the content verbs. As for the content verbs, the Japanese learners rejected the goal object forms of the non-alternating verbs (e.g., **Sam poured the glass with the orange juice*), which are ungrammatical, as well as those of the alternating verbs (e.g., *Brian piled the desk with papers*), which are grammatical and were accepted by native speakers. Although an explanation of associative mechanisms as a primary base for L2 learning of the locative alternation would predict that

Japanese learners would be sensitive to the differences between the alternating and the non-alternating classes to some degree when the verbs are real, the Japanese learners' responses to the content verbs did not meet this expectation at all. There are two possibilities for explaining these responses of the Japanese learners: one related to an external factor, input frequency, and one related to an internal factor, L1 influence.

One possible explanation is that the learners have not learned that the goal object forms are possible with these alternating verbs (i.e., *pile* and *spread*), presumably due to the imbalance of the occurrence of the two forms in the input, and thus simply treated them as non-alternating verbs (i.e., like *pour* and *emit*). With the real content alternating verbs, the native speakers' acceptance of the goal object form was less strong (e.g., *pile the desk with papers*, $M=0.94$, $SD=1.40$) than of the theme object form (e.g., *pile the papers on the desk*, $M=2.28$, $SD=0.79$), despite the fact that they are both supposedly grammatical. This contrasts with their equally strong acceptance of the two forms for the container alternating verbs (the theme object form, $M=2.48$, $SD=0.67$; the goal object form, $M=2.59$, $SD=0.60$). This kind of imbalance between two variants of the alternation with an alternating verb in native speakers' acceptability judgments is also observed in some of the previous studies (e.g., Inagaki, 1997). In addition, standard deviations of the less accepted forms are rather large, suggesting that the native speakers' judgments were not very convergent on these forms and that there were actually some native speakers who judged them unacceptable. With regard to this point, some researchers have argued that verbs are associated with different syntactic

structures to varying degrees (e.g., Boland et al., 1995; Shapiro et al., 1993; Wolfe-Quintero, 1992, 1998). Given the view of the relative difference in strength of association between a verb and each syntactic frame for that verb, it would be understandable that the less favored syntactic structure may have been judged not optimal, or even not acceptable, by some native subjects. In other words, these might be cases where native speakers' judgments do not always concur.

This imbalance between the two possible forms may be related to the frequency differences with which each form is actually used. There are some experimental results that show syntactic frames that are less preferred are not produced as often by native subjects (e.g., McElree, 1993; Wolfe-Quintero, 1998). Turning to the particular case of the locative alternation, the difference in strength of association of a verb and two locative structures may well lead to frequency differences in use: Native speakers may actually not use the less favored form as often as the more favored one. This imbalance in the input frequencies for L2 learners might have led them to wrongly conclude that these alternating verbs were actually non-alternating and thus to reject the goal object forms of these verbs, since they had seldom heard them in the input.

The other explanation is the influence of the learners' L1, Japanese. The Japanese counterparts of the two content alternating verbs used in the present experiment, *spread* and *pile*, are actually non-alternators in Japanese (*hirogeru* and *tsumu*), whose goal object forms are ungrammatical. When L2 learners lack internal productive rules for the locative alternation, as was suggested in the Japanese learners' responses to the made-up verbs in the present study, it might be quite

possible that they simply relied on their L1, transferring the syntactic frames of the Japanese counterparts to the English verbs.

The possibility of L1 influence can also be discussed in the broader perspective of a comparison between English and Japanese verbs. Some researchers argue that Japanese verbs including locative verbs have a strong tendency to take a theme argument in a direct object position (e.g., Matsumoto, 1997). In the case of the English locative alternation with real content verbs, therefore, this tendency in Japanese may have affected the Japanese learners' judgments, even if L1 transfer had not occurred on a verb-by-verb basis.

Both explanations given here, input frequency and L1 influence, to explain the Japanese learners' difference between the content and container cases seem to be fairly persuasive. It does not seem possible to draw a definite conclusion on which is the better explanation based on the results of this single study. Considering the complex nature of L2 learning, it may be possible that both factors contribute to construct interlanguage grammar, intrinsically interacting in the course of L2 development.

The Japanese learners' responses to the made-up verbs

In contrast to their responses to the real verbs, the Japanese learners were found to be indifferent to the differences between the alternating and non-alternating verbs when the verbs were made-up. In some of the previous studies, the adult L2 learners were found to be sensitive to the narrow range classes with the made-up verbs, though only to some degree (e.g., Bley-Vroman & Yoshinaga, 1992; Inagaki, 1997; Moore, 1993). In the present study, the adult L2

learners displayed complete insensitivity to the NRR as applied to novel verbs.

Deeper examination of the Japanese learners' responses, however, reveals that there exist some patterns in their responses to the novel verbs. Both HNNS and LNNS showed particular patterns towards extended forms containing the made-up verbs which are different from those of NS: they showed similar slight rejection of the goal object form of the content verbs, whether it was alternating (HNNS=-0.71; LNNS=-0.53) or non-alternating (HNNS=-0.91; LNNS=-0.79), and slight acceptance of the theme object forms of the container verbs, whether it was alternating (HNNS=0.55; LNNS=0.71) or non-alternating (HNNS=0.35; LNNS=0.43). In short, the Japanese subjects showed preference of the theme object form over the goal object form even when they had no former exposure to these particular verbs. This tendency parallels the observation of Japanese motion verbs that they have a strong tendency to take a theme argument in the direct object position (e.g., Matsumoto, 1997). Since there was theoretically no room here for the associative mechanisms to play a role, this can be considered as evidence that some aspects of Japanese language affected Japanese L2 learners' judgments of the English locative alternation.

Associative mechanisms and L1 influence in L2 learning

Besides questioning adult L2 learners' sensitivity to the NRR, the results of the present study suggest that both the L1 influence and associative mechanisms through input may play important roles in adult L2 learning of the English locative alternation.

The differences in the Japanese learners' responses to the real and made-up verbs show that associative mechanisms could be one of the primary bases for adult L2 learning of the locative alternation. The Japanese learners seem to develop some knowledge of which verbs are alternating and which are not based on one-by-one associations through exposure, not based on the narrow-class membership which is proposed to be the case with the native speakers. This view of the development of the L2 learners' knowledge is supported by their proficiency-based improvements in judgments for the real verbs. The basic tendency seems to be the more they hear, the more they learn. Given this explanation, it is not surprising that the Japanese learners, regardless of their L2 proficiency levels, cannot deal with novel cases with which no exposure is available.

Some of the results in the present experiment also suggest that the adult L2 learners' knowledge is influenced by their first language. The Japanese learners responded to the content verbs and the container verbs differently, probably due to effects triggered by the structures of their L1, Japanese. In addition, their responses to the made-up verbs revealed there are some specific patterns, which are attributable to the structures of Japanese.

7. Conclusion

The results of the present study suggest that adult L2 learners might bring multiple sources into the L2 learning task. Based on the results of the experimental study reported here, adult L2 learners' knowledge representations of the locative alternation seem to be characterized in terms of: 1) limited availabil-

ity of universals; 2) primary reliance on associative mechanisms; and 3) persistent L1 influence. None of these points is presumed to be included in the main characteristics of L1 acquisition, and thus can be regarded as unique to adult L2 learners. These results appear to support the Fundamental Difference Hypothesis by Bley-Vroman (1989), which claims that child first language acquisition and adult L2 learning are fundamentally different. The present study, with reference to a single grammatical structure, has made clear some of the factors contributing to these "fundamental" differences between native speakers and adult L2 learners, and thus has given empirical support to the FDH.

The results of the present study can also be seen from the line of "near-native studies", which have revealed that fluent adult L2 learners do not achieve native-like competence in certain areas of grammar (e.g., Coppieters, 1987; Sorace, 1993). Although the L2 subjects in the present study were all those who attained relatively high proficiency in English, their grammar appeared to manifest some crucial differences from that of native speakers. These results seem to indicate the intrinsic distance between learners' performance and their underlying grammar. By shedding light on what non-native speakers can/cannot attain, the studies of differences between L1 acquisition and adult L2 learning make our eyes turn to not only what learners do but also what they know and why they do what they do. These explorations will surely make an essential contribution to SLA research as well as to our overall understanding of language acquisition.

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