

Acquisition of the English Preposition *at*

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Key words : L2A, English Prepositions, the Influence of Prototypicality, Economy-Driven Development Hypothesis, Dimension, Temporality, Boundary, Misdevelopment, Causal Factors, Faulty or Misleading Proximal Cues

1. Introduction

Which prepositions are easier than others? Which meaning/sense of each preposition is more difficult than others?

- ① He looks rough, but his is very delicate () heart.
- ② I was () the dentist when he telephoned me.
- ③ I am a professor of linguistics () Shinshu University.
- ④ She is () her happiest when she is with her boyfriend.
- ⑤ He lost an eye () the traffic accident.
- ⑥ He was shot () his right arm.
- ⑦ The instant that she saw me, she ran () the opposite direction.
- ⑧ The sun rise () the east.

It seems that L2 (Second/Secondary/Additional Language) learners encompassing both EFL (English as a Foreign Language, EFL) learners (e.g. Japanese, Korea, or Chinese) and ESL (English as a Second Language, ESL) learners (e.g. Singaporean, Philippines) whose first languages (L1s) are non-Indo-European languages find it difficult to master English prepositions.¹ The L2 learners seem to show persistent variability and produce commission errors or omission errors in the production of English prepositions.²

Attempting to answer these questions, several L2 studies have been conducted and have reported various accounts and put forward hypotheses to account for the developmental order in the acquisition of English prepositions. Representatively, there are ‘the Prototypicality Hypothesis (PH)’ by Yamaoka (1995, 1996) and Hayashi (2001) among others, and ‘the Economy-Driven Development Hypothesis (EDDH)’ by Bong (2010). Although some studies on the development order/pattern in the L2A of English prepositions have taken ‘L1 effects’ into account, little attentions have been paid to ‘errors’ including commission and omission induced by L2 learners, although there are some studies on common errors made by the L2

learners. Bong (2008) analyses errors found in L2 acquisition of English prepositions by Japanese-speaking learners, and reports that there are some similarities between L1 development and L2 development. More specifically, Japanese L2 learners of English produce ‘commission errors’ that are similar to (the same as) to those errors of commission that found in the first language acquisition (L1A) of English (cf. Johnston and Slobin 1979). The two most common errors of this type in the L1A and L2A reported involve using *for* in place of *to*, and *by* instead of instrumental *with*. Nonetheless, Bong (2008) suggests that ‘error analysis’ should be taken into account in the future studies on L2 acquisition of English prepositions.

In contribution to the discussions of development order and of L1 roles in L2A, this paper explores the L2A of the English preposition *at* by Japanese speaking learners (JSLs). In the following chapters, this paper first reexamines and reviews the representative previous studies on the L2A of English prepositions by Japanese speaking learners. In what follows, examining the current experimental data of L2A of English prepositions by Japanese learners, this paper also analyses ‘errors’ produced by JSLs and discusses ‘development order’, paying attention to both differential difficulty and roles of L1: that is, this paper attempts to test developmental order hypotheses such as prototypicality hypothesis and economy-driven development hypothesis.

2. Previous Studies

Several L2A studies on English prepositions have been carried out and put forward various hypotheses and possible applications of linguistic theory to L2A research: representatively, the Prototypicality Hypothesis (PH) proposed by Yamaoka (1995, 1996) and further developed in Hayashi (2001, 2008), and the Economy-Driven Development Hypothesis (EDDH) proposed by Bong (2005, 2009), and further developed in Bong (2010a, b, c, 2011).

2.1 Hayashi’s Study (2008)

Hayashi (2008) investigated L2A of the three English prepositions ‘at’, ‘on’ and ‘in’, discussing the influence of prototypicality and L1 transfer in L2A of English prepositions by Japanese-speaking learners (JSLs). He argues that *prototypical senses are not necessarily easier to acquire* than less prototypical ones, undermining his own claim (Hayashi 2001) of the influence of prototypicality in L2 acquisition on the one hand. On the other hand, he supports the claim that L1 transfer operates in L2 acquisition at the conceptual level but differs in the degree of L1 influence depending on the prepositions (Bong 2010c).

Prototypicality Hypothesis is derived from the theory of prototype in the semantics of prepositions. The theory of prototype is a mode of graded categorization in cognitive grammar/linguistics. That is, senses/meanings of prepositions are hierarchically organized and

are *more central or prototypical* than others, so that each preposition has a prototypical sense (or prototypical senses) and lower/less prototypical senses. On the basis of this prototype theory, senses/meanings of prepositions have been undergone to various graded categorizations in the literature (e.g. Herskovits 1988, Dirven 1993). For example, the most typical senses of prepositions are *locative and literal senses* while the least prototypical ones are *abstract senses*. Adopting this theory, some previous L2 studies argue for the influence of ‘prototypicality’ that stating that prototypical instances are those which take *a concrete nous as their objects*, prototypical senses are easy to acquire, while less prototypical ones are difficult to acquire (e.g. Yamaoka 1995, 1996: cf. Hayashi 2001, 2008). However, Bong (2010c, 2011) argues that prototypical senses are not necessarily easier (or earlier) to acquire than less prototypical ones, providing the data that are not consistent with the prototypicality hypothesis, undermining the claims.

The task used in Hayashi’s (2008) study was a 3-part paper-and-pencil acceptability judgment task: The first part consisted of 16 sentences with the preposition ‘at’; the second part incorporated 17 sentences with the preposition ‘in’; and the third part was composed with 18 sentences with the preposition ‘on’. The participants were asked to judge the acceptability of the instantiations with a preposition underlined in each sentence on a 5-point scale, with ‘1’ being totally unacceptable and ‘5’ totally acceptable. The scaled acceptability judgment test on the acquisition of the prepositions ‘at’, ‘on’, and ‘in’ has incorporated sentences involving various types of objects (place, time, abstract). Those sentences can be divided into two groups: conventional use and unconventional use.

Table 1. Representative Examples used in the Scaled Acceptability Judgment Task

Conventional (Correct) Use of <i>at, in, and on</i>	Unconventional (Incorrect) Use of <i>at, in, and on</i> .
a. Look <u>at</u> this map.	a. ?We keep the money <u>at</u> a box.
b. There is a picture <u>on</u> the wall.	b. ?He lives <u>on</u> 5 Oxford street.
c. We live <u>in</u> the country during the summer.	c. ?He cut his foot <u>in</u> a piece of glass.

Hayashi (2008) conducted an experiment with 90 JSLs of English, who were grouped into three according to their English proficiency: using TOEIC IP test as shown below:

Table 2. Proficiency Level based on the TOEIC IP / Overall Mean Scores of ‘at’, ‘in’, and ‘on’

Group	N	Means	SD	PP		J1	J2	J3	NS
J1	30	369.50	36.70	‘at’	Correct	3.16	3.40	3.59	4.94
J2	30	511.00	38.98		Incorrect	2.33	2.27	1.77	1.03
J3	30	665.33	67.57	‘in’	Correct	3.10	3.47	4.09	4.95
(Quoted from Hayashi 2008)					Incorrect	3.04	2.74	2.64	1.03
				‘on’	Correct	3.48	3.62	4.00	4.95

		Incorrect	2.61	2.30	1.91	1.03
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Hayashi (2008) emphasizes that according to the level of English proficiency they acquire English prepositions differently: “An increase in learner’ proficiency level influences the acquisition of the three prepositions differently.” (Hayashi 2008: 120). To reinterpret his statement on the basis of the data presented in Hayashi (2008), the possible implication would be that it may be difficult to say that there is some kind of a normal developmental pattern in L2 acquisition of English prepositions by JSLs. Questions arise whether there is a particular misdevelopment or not, whether the development pattern is transient or constant, and whether it is possible to account for the learners’ variability depending on their proficiency.

Having examined the results presented in Hayashi (2008), Bong (2010c) suggests that overall results indicate a normal development pattern: *higher the proficiency higher the achievement/accuracy*. Although ‘misdevelopment’ in some senses of prepositions is not articulated, the L2 data presented in his study indicate some misdevelopment or unusual developmental patterns with some instances/sentences, similar to the misdevelopment pattern advocated in Bong’s series of work (Bong 2005, 2009, 2010a, b, c).

Bong (2010c) also points out that Hayashi (2008) does not make any generalization such as what senses of prepositions are more difficult or misdeveloped’, although he discusses how L2 learners groups behave with respect to ‘prototypicality’ and L1 influences with some instances. For example, he interprets the data in the following way: that the prototypical sense of the preposition ‘on’ was the easiest to acquire, and the degree of prototypicality influenced the acquisition of the preposition for J2 and J3 participants; and that the prototypical sense of ‘at’ and ‘in’ was also *the easiest to acquire for the J3* participants. This line of argument or of interpretation of L2 data, in effect, is ***misleading***. The expression ‘easy to acquire’ should mean that the L2 learners acquire/know the prototypical sense of prepositions at an earlier stage (e.g. J1) of development than the later development stages (e.g. J2, J3) in the acquisition process. However, his interpretation in turn is not consistent with assumptions of the ‘development’ study in L2 acquisition that groups with different English proficiency levels should represent some sections (stages) in the gradual developmental process.

Nevertheless, Hayashi’s (2008) study sheds light on the underdeveloped areas of L2 studies that need to be explored further: the influence of ‘prototypicality’, the role of L1 at the conceptual level, and development patterns of the L2A of English prepositions. To overcome shortcomings of Hayashi’s (2008) study, any follow-up L2 studies that address such research questions would be very welcome in the field of L2 studies (Bong 2010c). In addition, if one wants to draw a generalization about L2 acquisition, one will benefit from examining a more variety of L2 acquisition data that are not confined to previous interpretations, but free to test the L2A hypotheses at stake.

2.2 Bong’s Study (2010c)

Bong (2010c) investigates L2 acquisition of the three English prepositions, namely *in*, *on*, and *at*, by Japanese speaking learners (JSLs) and Korean-speaking learners (KSLs) of English, addressing the research questions about (i) the influence of prototypicality, examining which senses or which prepositions are easier than others; (ii) the roles of L1 post-positional particles of *naka*, (*no*) *ue*, and *de* in Japanese, and of *ane*, *uie*, and *eseo* in Korean; and (iii) the comparison of the two L1 groups. Bong (2010c) argues that prototypical senses are not necessarily easier (or earlier) to acquire than less prototypical ones, providing the data that are not consistent with the prototypicality hypothesis, undermining the claims of Prototypicality Hypothesis.

In the Bong’s (2010c) experimental study, sixteen KSLs participated in the experimental study, while 82 adult JSLs did. Based on the results of a bridged Oxford Placement Test (OPT) used for measuring the general proficiency in the English grammar, ten KSLs and ten JSLs who were assumed to be of equal proficiency were selected for this study. The participants were given a scaled acceptability judgment task in order to explore their knowledge about the three English prepositions: *in*, *on* and *at*. Their task performances were analyzed in accordance with the research questions mentioned above.

Table 3 Details of Experimental Japanese and Korean Subjects

Group (Num)	OPT mean	OPT Score Range	Group (Num)	OPT mean	OPT Score Range
Japanese JG1 (13)	22.1 (44%)	15-24(30%~49%)	Korean KG1 (4)	17.0 (34%)	15-24 (30%~49%)
Japanese JG2(57)	29.5 (59%)	29-34(50%~69%)	Korean KG2 (3)	29.3 (59%)	29-34(50%~69%)
Japanese JG3(22)	37.4 (75%)	35-44(70%~89%)	Korean KG3 (2)	37.5 (75%)	35-44(70%~89%)
Total (92 subjects)			Total (9)		

Table 4 Overall Mean Accuracy Scores-Types (Quoted from Bong 2010c)

Types	Prepositions	Japanese Gs	Korean Gs	Types	Prepositions	Japanese Gs	Korean Gs
Correct	At-10 sentences	2.15 (53.9%)	2.49 (61.9%)	Incorrect	At-6 sentences	2.69 (67.2%)	2.37(59.3%)
	On-12 sentences	2.23 (55.9%)	2.55 (63.7%)		On-6 sentences	2.73 (68.3%)	2.74(68.5%)
	In-11 sentences	2.19 (54.7%)	2.49 (62.4%)		In-6 sentences	2.26 (56.4%)	2.11(52.8%)

Table 5 Overall Mean Accuracy Scores-Japanese & Korean (Quoted from Bong 2010c)

Groups/ Tokens	Japanese JG1 (ELE)	Japanese JG2 (INT)	Japanese JG3(ADV)	Groups/ Tokens	Korean KG1 (elementary)	Korean KG2 (Intermediate)	Korean KG3 (Advanced)
At-16	2.25 (56.1%)	2.31 (57.7%)	2.54 (63.6%)	At-16	2.28 (57.0%)	2.48 (62.0%)	2.69 (67.2%)
On-18	2.26 (56.4%)	2.42 (60.43)	2.44 (61.1%)	On-18	2.31 (57.6%)	2.65 (66.2%)	3.17 (79.2%)
In-17	1.93 (48.3)	2.18 (54.5%)	2.21 (55.3%)	In-17	2.15 (53.7%)	2.41 (60.3%)	2.71 (67.7%)

Overall, Bong (2010c) interprets the data of Table 3 and 4 as indicating that there is a trend suggesting

that regardless of their L1, with increasing proficiency both the JSL and KSL subjects show a gradual but extremely moderate development of the uses of the three prepositions. However, the advanced groups of both Japanese and Korean subjects performed in judging prepositions far less confidently (just over 60% correctness) than in judging and producing grammatical aspects as attested in OPT (over 75% correctness). The results of this kind can be interpreted in many ways. Interestingly, the results support the common belief that prepositions are difficult to master, and the claim of variability and fossilization in L2A.

Let us move onto the topic of ‘prototypicality effects’. The data of ‘at’ shown in Table 6 are extracted from Bong (2010c) for the current discussion.³ **On prototypicality effects**, Bong (2010c) interprets the data shown in Table 6 as indicating that KSLs performed better with some of instances assumed to be ‘less prototypical’ than more prototypical one, *not confirming* the ‘prototypicality effect’ argued in the previous studies such as Yamaoka (1995, 1996) or Hayashi (2001, 2008). This study also suggests a new perspective of the determinant factors in L2 acquisition, modifying the claims about the influence of prototypicality and the L1 transfer claim in L2 acquisition. In short, Bong (ibid.) presents the results that undermine the arguments for the prototype theory applied to L2 acquisition that prototypicality of senses/meanings are *determinant factors for L2 acquisition/development order*.

Table 6. Breakdown of Accuracy Mean Scores of *At*

Instances	Japanese	Korean	Sum	Remark
O -at the front door	2.54	3.00	2.58	Proto
O-at this map	3.88	3.67	3.86	C sense
O-at the age of 80	2.61	2.78	2.62	B sense
O-at war	0.70	1.33	0.75	A sense
O-at Lesson 7	2.09	3.22	2.19	Proto
O-at work	2.00	2.33	2.03	A sense
O-at a dollar each	1.77	1.89	1.77	B sense
O-at the children	1.66	1.56	1.65	C sense
O-at our request	1.61	1.88	1.63	B sense
O-at the hospital	2.70	3.11	2.73	Proto
X-at danger	3.20	2.56	3.14	11at

More specifically, Bong (2010c) presents the results of ‘at’ that indicate that there is *no clear indication* that the development pattern follows the hierarchy of other graded and categorized senses (Sense A, B, and C) attested in Hayashi (2008). For example, the results of both examples of Sense A, ‘at war’ and ‘at work’ show that both L1 groups performed a little bit better with ‘at work’ than with ‘at war’, but they do not seem to accept both types readily. Instead, they reject the sentences with Sense C

of 'at'. This result indicates that both L1 groups have not yet acquired the Sense A of 'at'; instead they must be at the stage of 'not sure' or the L2 learners have not established the semantics of Sense A for 'at' yet. Interestingly, both L1 groups have acquired one use of Sense C in the sentence 'Look at this map', but have not yet established the sense C in the sentence 'She is angry at the children'. This *'developmental asymmetry'* in effect undermines the foundation for the roles/influences of the prototypicality in acquisition. *The developmental asymmetry* of this kind can be also observed in the type of 'Sense B': 'He died at the age of eighty' vs. 'We bought two books at a dollar each.' As a result, this finding suggests that it is difficult to generalize the process or the development pattern of acquisition of prepositions by means of the theory of the prototypicality. In other words, prototypicality of senses/meaning of prepositions might not be the main determinant factors for the development pattern in SLA, although it may be a crucial criterion for the semantics.

With respect to the roles of L1 knowledge, Bong (2010c) argues that there is no significant effect of L1 meaning transfer found in the results, while some significant effects of the *relationship between the verb or the object and the preposition* in a sentence can be observed. All the learners have performed well in accepting the use of 'at' in a sentence like 'Look at the map' (both the KSLs and JSLs scored over '3', while they misjudged the use of 'at' in a sentence like 'English and France are at war' as 'not acceptable'. If the learners made use of their L1 equivalent or correspondence or translation strategy that the meanings/uses of *ni/de* in Japanese and *e/esseo* in Korean are semantically mapped into the semantics of the preposition 'at' in English, the expected results would be the other way around: the former should have been rejected while the latter accepted: ??*chizu-de minasai* (look at the map). Interestingly, from the results, we can conjecture that both L1 groups do seem to establish *a similar lexicon for L2 English* as far as the prepositions 'at' is concerned. This finding supports the view of 'Lexicon-Contact' (Bong 2005, 2009), although it requires further exploration how L2 learners establish (interlanguage) L2 lexicon and why they take such a course of acquisition.

Bong (2010c) concludes as follow. First, there was no significant improvement between the three learners groups of both L1 groups. This finding supports the common belief that prepositions are difficult to acquire (a gradual but moderate development for both JSLs and KSLs. In addition, there was no significant difference between the two L1 groups (JSLs and KSLs) found from the results obtained from the experimental study. Secondly, there was no significant difference in the degrees of difficulty in acquiring the prepositions 'at', 'in' and 'on'. This finding suggests that a classification of prepositions should be further explored (e.g. Bong 2008). Thirdly, although the learners' systems of L2 English prepositions are different from that of English native speakers (i.e. divergence), the roles of L1 equivalents are not very prominent in the acquisition of English prepositions. Instead, the possibly biased input quality owing to the institutional learning environment (e.g. dictionary explanation) and other factors such as verb types seem to play an important role in establishing core concept/meanings of prepositions for L2 lexicon, leading sometimes to misdevelopment in the process of 'construction' (combination) of semantic features. These findings suggest that to find out what senses for each prepositions L2 learners have established, L2 research of this kind must be carried out. Lastly, there

was no development pattern in the L2 acquisition of the three prepositions that is in accordance with the hierarchy derived from the graded categorization of senses of prepositions, not confirming the prototypicality effects in L2A of English prepositions.

2.3 Remarks on the two previous studies

In sum, the results of Bong's (2010c) study support neither the claim that the role of prototypicality is not crucial in determining the development order/pattern in the acquisition process, nor the claim that the indiscriminate mapping of L1 equivalents (such as meanings, senses, functions, and so on) to L2 forms (changing the arbitrary phonological forms), in other words 'L1 equivalent/correspondence/translation strategy', takes place in the L2 acquisition process, at least in the scope of 'prepositions, 'at', 'on' and 'in'. Instead, the findings from Bong's (2010c) study support the hypothesis-testing claim of the Economy-Driven Development hypothesis that both L1 groups establish a L2 lexicon in a similar way, but the L2 lexicon may be divergent or different from the lexicon of English native speakers, and the claim of the complex factors for misdevelopment that are inextricably bound up with establishment of L2 lexicon in the L2 acquisition process.

3. The Current Study

In order to overcome those shortcomings due to methodological limitations, I conducted an experiment of L2A of English prepositions by JSLs in 2011 that took into account the discussions in Bong (2010c), and results of Bong's (2008) study.⁴ This experimental study was carried out in order to find out not only whether JSLs are sensitive to the properties (types/characteristics-features) of the objects (Complements) of prepositions (Heads), but also to see whether there is any evidence of the influence of prototypicality in the L2 acquisition of English prepositions by JSLs.

3.1 Methodology

The experimental study consisted of a proficiency test for which Allan's (1992) Oxford Placement Test was employed, and a cloze test of 140 sentences in which the 10 major prepositions (*at, by, for, from, in, into, of, on, to, with*) were incorporated. The proficiency test was conducted first, followed by the cloze test in 2011. The data discussed below have been singled out from the experiment study undertaken among JSLs of English as a foreign language (EFL). In addition, due to the space and time limitation, this study reports and discusses only part of the results obtained from the main experiment that are essential for the main purpose of this study.

Three experimental groups have been selected for this paper: three groups of Japanese-speaking learners (JSLs) on the basis of their English proficiency: elementary, pre-intermediate and intermediate. In addition, one control group of English native speakers to act as a control for the reliability of the

tokens used the experiment tasks. Most of the Japanese participants were first-year college students in Japan at the time of the experiment. The participants took the English proficiency test of Oxford Placement Test (OPT Allan 1992) that was incorporated in standardizing their English proficiency in the experiment. The proficiency test consists of a multiple-choice listening test with 100 items and two multiple-choice grammar tests with 50 items each and is intended to identify grammatical proficiency levels. On the basis of performance in the proficiency test, for the current study only 57 experimental subjects have been selected to act as an experimental sample (OPT score range 100~150, OPT mean 126.49 (68.8%)), and grouped into three: elementary (OPT score range 100~120, OPT mean 112.69 (56.3%)), pre-intermediate (OPT score range 121~129, OPT mean 124.67 (62.3%)), and intermediate (OPT score range 130~150, OPT mean 137.65 (63.2%)). The details of the experimental subjects are illustrated below:

Table 7. Details of 57 Experiment Japanese Subjects⁵

Prof./Group (number)	JSL G1 (13)	JSL G2 (24)	JSLG3 (20)
Listening (100)	61.08 (61.1%)	64.38 (64.4%)	69.80 (69.9%)
Grammar 1 (50)	24.31 (48.6%)	29.25 (58.5)	33.35 (66.7%)
Grammar 2 (50)	27.31 (54.6%)	31.04 (62.1%)	34.50 (69.0%)
Total (200)	112.69 (56.3%)	124.67 (62.3%)	137.65 (68.8%)

Table 8. Sample Sentences used in the Experiment

Type	Sample Sentences	Features Of the Object
Spatial Objects	I was () the dentist when he telephoned me. 彼が電話してきたとき、私は歯医者 <u>に</u> いました。	+3Dimension +Temporality or Temp.
	Two lines meet () a point. 2本の線が1つの点 <u>で</u> 交わっている	+0Dimension -Temporality or Temp
	He hit () the ball, but missed. 彼はその球を狙って打ったが、当たらなかった。	+3Dimension + Direction/Temporality
Temporal Objects	Can you meet me () 4pm in the afternoon. 午後4時 <u>に</u> 会ってくれない？	+0Duration of Time +Boundary(point)
	The farewell party ended () dawn. お別れ会は夜明け <u>に</u> 終わった。	+Duration of Time -Boundary (Vague)
	He started to study hard () the beginning of September. 彼は9月初めに勉強を真剣に始めた	+Duration of Time +Boundary(origin)
Abstract Objects	She is () her happiest when she is with her grandchildren. 彼女は孫と一緒にいるときがもっとも幸せである。	-Dimension (abstract)
	He looks rough, but he is very delicate () heart 彼は見かけは粗野な感じだが、心はとても繊細だ。	-Dimension (abstract)

The cloze test was designed to investigate how JSLs use prepositions and what elements (parts of speech, verb, adjective, antecedent noun or object noun, or sentence as a whole) are main factors to determine which preposition to use in English sentences.⁶ Many of sentences used in the test were derived from Ishii (2008) with some modifications. The token sentences were presented in both English and Japanese in order to provide clear contexts for the participant, and to find out whether JSLs make use of Japanese translation of each token when they fill the gap in the cloze test. The token sentences used in the experiment were selected, after studying and modifying sample sentences from Ishii (2008), in order to meet the requirements of the current experiment design. In the test, there were a total of 140 English sentences with Japanese translation each. The 140 token sentences contained 10 prepositions with various senses and various types of parts of speech/various sentence structures. Of 10 prepositions, this paper presents the results of ‘at’ will be presented, and the cloze test on the acquisition of the preposition ‘at’ has incorporated sentences involving various types of objects (place, time, abstract) and various types of antecedents (verbs, adjectives, or nouns). Sample sentences for the preposition ‘at’ are given above in Table 8. Moreover, the data selected for this study will be examined in order to address the following research questions shown below:

Table 9. Research Questions

Argument Points	Specific Research Questions
(I) Differential Difficulty -Influence of Prototypicality	a. Which senses of the preposition ‘at’ are easier (faster) than others? b. Which senses of the preposition ‘at’ are more difficulty than others?
(II) Lemmatic Properties -Development Pattern	a. What roles do lemmatic properties (semantic and syntactic features) of L1 and L2 input play?
(III) Economy-Driven Development Hypothesis	a. Is there any evidence for Hypothesis Testing (Economy-Driven Development Hypothesis) in the L2A of English preposition ‘at’

3.2 Results of ‘at ‘ and Discussion

In order to see how JSLs complete (form) each sentence with preposition, 14 sentences with Japanese translation were employed in the cloze test. Of 14, the results of 13 sentences will be examined. Based on the Standard English criteria for preposition occurrences obtained from English native speakers’ judgment/completion of the task, I have counted adequate preposition insertions (productions) in a sample of 57 JSLs of English, cross-classified by three proficiency groups, displayed in Table 10 below. In addition, in order to find out which sense of the preposition ‘at’ is more difficult to acquire than others, I have classified various types of its uses. Based on the traditional classification of ‘prepositions’ as forming closed (lexical category), their basic meanings are assumed as ‘spatial’, ‘temporal’ and ‘abstract’ relation. However, I have further divided their basic meanings on the basis of ‘P’s features matching (agreeing) with the features of their complements/objects (NP): i.e. ±Dimensions, ±Temporality, ±Temporal Boundary, and etc., suggested in Bong (2011a, b), assuming a feature construction and selection process in any language acquisition. More specifically, a mental

lexicon of a language is a collection of features (semantic features, syntactic features, phonetic features, and so on), and is formed or established by going through the acquisition procession of feature selection and construction to form lexical items, which then undergo ‘syntactic operations’ in accordance with the features (see Bong 2005, 2009). Assuming the matching between features of the Head ‘P’, and those of the Complement ‘NP’, I broke down the frequency scores cross-classified by the three proficiency groups and by the three basic meanings as displayed in Table 10.

Table 10 Frequencies of correct ‘at’ and of Errors of Commission or Omission⁷

Instances	Correct/By groups			Correct	Error /By Error types			
	JSLG1 (13)	JSLG2 (24)	JSLG3 (20)	total (57)	Comm. ‘in’	Comm. ‘on’	Comm. ‘others’	Omit. ()
Spatial Relation: Objects (A){ + Zero Dimension, - Temporality}								
11. Two lines meet <u>at</u> a point.	6	14	11	31/57 (54.4%)	3	14/57 (24.5%)	9	0
Spatial Relation: Objects (B) {Three Dimension ,+ Temporality}								
6. I was <u>at</u> the dentist when	4	6	5	15/57 (26.3%)	35/57 (61.4%)	2	7	0
13. I am ~ <u>at</u> Shinshu Uni.	0	8	8	16/57 (28.1%)	16/67 (28.1%)	5	20 (r. for)	0
Spatial Relation: Objects (C) {+Dimension, +Temporality (proximity)}								
7. She lives <u>at</u> 12 Crystal Street.	1	5	1	7/57 (12.3%)	40/57 (71.3%)	8	2	0
Spatial Relation: Objects(D): {+3Dimension, +Temporality, Direction (origin, <u>path</u>, endpoint)}								
4. hit <u>at</u> the ball, but missed.	3	5	5	13/57 (22.8%)	0	14	13	12
12. shot <u>at</u> the bear, but the bullet~	1	3	3	7/57 (12.3%)	1	6	32	11
5. threw a bone <u>at</u> the dog.	0	2	3	5/57 (8.8%)	0	1	51	0
Temporal Relation: Objects {+Time, +Boundary (point, origin)} for 3&2, -Boundary (vague) for 10								
3. meet me <u>at</u> 4 in the afternoon.	9	22	17	48/57 (84.2%)	0	8	1	0
2. study hard <u>at</u> the beginning of Sept.	1	5	8	14/57 (24.6%)	14/57 (24.6%)	19/57 (33.3%)	10	0
10. ~party ended <u>at</u> dawn.	2	0	1	3/57 (5.3%)	18/57 (31.6%)	17/57 (29.8%)	18	1
Abstract Relation: Objects {-Dimension (abstract), -Boundary}								
9. She is <u>at</u> her happiest	1	2	1	4/57	24/57	8	13	8

when she~				(7.0%)	(42.1%)			
1. delicate at heart	1	1	1	3/57 (5.3%)	17/57 (29.8%)	5	29	3
8. ~put the microwave <u>at</u> three meters from the table.	2	1	2	5/57 (8.8%)	4	20/57 (35%)	20 (r. to)	4
Total (13)	31 (18.3%)	74 (23.7%)	66 (25.4%)	171 (23.1%)	172 (23.1%)	118 15.9%	218	39

(RQ: I &II) Differential Difficulty: whether the Prototypicality Effects or Hypothesis-Testing Effects

First of all, let us consider the research question (I-a) given in Table 9: Which senses of the preposition ‘at’ are easier than others? The result of No.3 token of ‘at’ –*Can you meet me (at) 4 in the afternoon?*’ -indicates that JSLs find the temporal use (sense or meaning) of ‘at’ ***the easiest*** as far as the preposition ‘at’ is concerned. That is, the result that 84% of Japanese participants were able to fill in the blanks indicates that the learners seem to have acquired the temporal use of ‘at’: in other words, in the case that the Head P ‘at’ subcategories (selects) a Complement NP with features of {+Time, +Boundary (point, origin), +Duration (0 Zero)..}. ***The second easiest*** for JSLs seems to be the spatial use of ‘at’ as in the sentence of *Two lines meet (at) a point.*: in other words, in the case that the Head P ‘at’ subcategorizes (selects) a Complement NP with features of {+Dimension (0 zero), -Temporality, +Boundary....}. Note that both include the feature [+Boundary] (see below for further discussion). In other words, features (including semantic features, syntactic features and so on that involve in the processes of selection, construction, and operation) are important in determining the degree of difficulty in acquiring prepositions: that is, ***not the proto sense***, but the semantic features of ‘dimension’ or of ‘Time’ in the semantics of prepositions may be one of the crucial factors that determine L2 development in L2 acquisition process.

In effect, results of this kind cast doubt on the prototypicality hypothesis in that the proto senses of ‘at’ are assumed to be senses of ‘spatial relations’ as classified in the theory of proto type. Crucially, there seems to be no plausible way that the Prototypicality Hypothesis can account for the result that JSLs performed better with the senses that involve with temporal uses than with spatial uses of the preposition ‘at’. According to the Prototypicality Hypothesis predicts that L2 learners should perform better with the token 11 (*~meet at a point*) for Spatial Relation than the token 3 (*~meet me at 4 in the afternoon*) for Temporal Relation. On the contrary to the prediction, the L2 learners seem to have acquired earlier or learned faster the ‘Temporal Relational uses of ‘at’, than the ‘Spatial Relational uses of ‘at’. In short, the results answer the research question (I-a) and ***casts doubt on the Prototypicality Hypothesis***, but suggest that features that undergo selection, construction and operation processes should be taken into more consideration.

This line of argument leads us to suggest that it is necessary to explore further into what semantic features involve in determining degrees of difficulty or development patterns of acquisitions of both L1 and L2. Interestingly, the developmental order of [Spatial Relation>Temporal Relation>Abstraction Relation] do not seem to be applicable to the SLA of English prepositions by Japanese

adult learners. Rather, it seems necessary to explore further into various uses/senses/meanings of each preposition. For example, Spatial Relation should be further analyzed into semantic features such as {**±Dimension, ±Temporality/ ±Direction, etc.**} In addition, Temporal Relation should be analyzed into semantic features such as {**± Time, ± Boundary/ ± Duration,..**}.⁸ Interestingly, these semantic features can give rise to a plausible account for ‘Abstract Relation’ by means of [**-Dimension**]: in other words, things that do not physically exist in our perceived world, but exist in the abstract or conceptual world. In short, *the suggested feature-based account for L2 developmental pattern/order seems to be more plausible than the proto type account or other accounts.*

Furthermore, the results of ‘Spatial Relation’ shown in Table 10 suggest that JSLs seem to find it more difficult to learn or more difficult to acquire *the use of ‘at’ with the object that implicates the spatial proximity with no spatial boundary as in the token 7: {+Dimension, +Temporality, -Boundary}*, and *the use of ‘at’ with the object that implicates the direction of path as in the tokens 4, 12, and 5: {+Dimension, +Temporality. -Boundary}*, than *the use of ‘at’ with the object that implicates the meaning of spatial inclusion as in the tokens 6 & 13: {+Dimension, +Temporality, +Boundary}*. In other words, the majority of the L2 learners seem to have *find it difficult* to learn or to master the property of ‘at’ that it can subcategorize both [+Boundary] and [-Boundary] sense, or to have mis-analyze the property of ‘at’ as it categorizes the former [+Boundary] only. In other words, it can be argued that the [-Boundary] property may be the property (feature) that is not readily noticed or hypothesized by the L2 learners when learning the English preposition ‘at’ or when testing hypotheses about the properties ‘at’ (See Bong 2005, 2009 for the detailed discussion on ‘hypothesis-testing acquisition process’). In addition, recall that the L2 learners find it easiest to acquire the uses of ‘at’ when it subcategorizes objects with {+Dimension, +Temporality, +**Boundary**}. That is, the [+Boundary] seems to play important role in determining the differential difficulty in the acquisition of the English preposition ‘at’ as far as JSLs concerns. On this line of argument, we can conclude that the features [+/-Boundary] in addition to the features [+/- Temporality] play important role in determining *the Differential Difficulty*, namely the development order of L2 acquisition of the English preposition ‘at’. To be more specific, my argument is that the easiest or earlier development of features (in the selection and construction) involves in the set of {+Dimension, +Boundary} and the more difficult or later development seems to involve in the set of {-Dimension, -Boundary}. This line of argument predicts that the abstract relation, assumed to be {-Dimension, -Boundary}, should be most difficult to acquire. As expected, less than 10% of the L2 learners were able to insert ‘at’ in the tokens 9, 1, and 8 which are used as denoting ‘abstract relation’. We can tentatively conclude that a feature set that includes the properties [**-Dimension, -Boundary**] is the most difficult feature-combination and that a feature set that includes the properties [**+Dimension, +Boundary**] is the easiest feature-combination, answering the research questions (I-a) and (I-b) for the differential difficulty: that is, the easiest sense vs. the most difficult sense of the preposition ‘at’ in question respectively, and the research question (II) for the lemmatic properties: that is, {Dimension, Temporality, Boundary,}.

(RO: II & III) Lemmatic Properties and Economy Driven Development Hypothesis

Let us further examine errors reported in Table 10. First, consider the results of B and C type objects used for denoting ‘Spatial Relation’, as in the Token 6, and the Token 7 respectively. The results of the commission errors that over 60% of the L2 learners use ‘in’ in place of ‘at’ indicate that the majority of the L2 learners prefer ‘in’ to ‘at’: that is, they inserted ‘in’ in place of ‘at’. There seem to be two possible interpretations for the commission errors made by the L2 learners. One is that the L2 learners might have mis-analyzed the properties **{+Dimension, +Boundary}** as the property for ‘in’. The other is that the L2 learners might have not yet acquired the property of **[+ Dynamicity]** in selecting features for ‘at’. Results of this kind can be evidence for the argument that they are either at **the stages of hypothesis-testing**, which may result in either mis-development of selecting features, namely ‘variability’ or ‘fossilization’ in L2A, answering the research question (III) positively. The process of hypothesis-testing can be observed not only in L2A but so in L1A: that is, the same ‘commission errors’ have been reported in L1A (see Johnston & Slobin 1979 for example).

One might argue that the L2 learners might have used their L1 postpositional particles, most plausibly ‘*de*’ or ‘*ni*’ in analyzing a set of features for the preposition ‘at’ and ‘in’ respectively, or that the L2 learners have mapped the same set of features of their L1 ‘*de*’ or ‘*ni*’ onto the L2 ‘at’ or ‘in’. However, if the L2 learners matched the Japanese translation ‘*de*’ or ‘*ni*’ to the blank of each token sentence, the results would be somewhat different from what Table 10 presents. Nonetheless, it is very likely that the L2 learners could have mis-analyzed the features of ‘at’ or of ‘in’. In addition, the results of commission errors indicate that with respect to the spatial inclusion properties **{+Dimension, +Temporality, +Boundary}** of the preposition ‘at’ when its object is concrete in dimension and boundary (e.g. the dentist), the L2 learners seem to prefer ‘in’ to ‘at’ in filling the blanks. Moreover, they might not have selected the properties **[+Temporality]** for ‘at’, or might be at the stages of hypothesis-testing for selecting a set of features for ‘at’, evidencing again for the Economy-Driven Development Hypothesis, answering the research question (III) positively.

Another observable evidence for the hypothesis-testing process claimed in the Economy-Driven Development Hypothesis (Bong 2005, 2009) can be found in the results of performances on the sentences like the token 1, 2,6,7,9, and 10. These tokens can be grouped as one by their commission (substitution) errors: i.e. ‘in’ is used more or less the same as or more in the place of ‘at’. The other commission errors found in the tokens 4, 5, 12, 13 can be grouped as one by their translation correspondence: the examples are not directly matched between English prepositions and Japanese post-positions (particles such as ‘*ni*’, ‘*de*’ in Japanese) as given in (3) or (4): (3c) in particular. One possible interpretation of results of this kind is that Japanese learners might have hypothesized a set of features for a lexical item ‘at’ by referring features in the Lexicon, and sets of features (features constructed) in their L1 lexicon.

These findings discussed above in effect support the claims of the ‘Economy-Driven Development Hypothesis in the L2 acquisition of the English preposition ‘at’, owing to the results of commission errors that give rise to evidence for the argument that at the stages of hypothesis-testing (developmental stages), the meanings of prepositions not only the L2 learners but also L1 learners

develop may diverge from the senses that adult English native speakers have. In addition, the L2 learners may construct an interlanguage lexicon for the target language, which may contain divergent lexical items or features from the native speakers' lexicon.

4. Conclusion

First of all, for the Different Difficulty, the main finding is that the easiest sense of the preposition 'at' is the use of 'at' selecting the properties {+Time, +Boundary} in the type of 'temporal relation', and the second easiest is the use of 'at' selecting properties {+Dimension, +Boundary} in type of 'spatial relation', followed by {+Dimension, +Temporality, +Boundary}; while the most difficult sense of the preposition 'at' is the properties {-Dimension, -Boundary}.

Secondly, for the Lemmatic Properties, it has been argued that not the proto sense but the other properties (features) such as [\pm Dimension], [\pm Temporality], [\pm Boundary], and so on are more important factors than the proto sense(s) as far as 'at' preposition is concerned and the syntactic features (involved with such as subcategorization, categorical features and compatibility or agreeing operation between a set of features of Head and that of Complement) of the target language are also important in L2 acquisition. In addition, there is no clear evidence that the L2 learners use their L1 lexicon with respect to selection and construction of features, but there is evidence for the claims of the Economy-Driven Development Hypothesis: namely, the hypothesis-testing process in L2A, and consequently the misdevelopment or fossilization effects.

Lastly, for the Economy-Driven Development Hypothesis, the L2 learners (JSLs) have shown to go through the stages of hypothesis-testing in selecting and constructing lexical items evidenced by the commission errors made by the L2 learners, which are similar or the same as those commission errors made by L1 learners of English reported in the literature.

In conclusion, these findings cast doubt on the prototypicality hypothesis, but support the claims of the Economy-Driven Development Hypothesis: namely, (i) the 'hypothesis testing process' claim that learners analyze the input, test hypotheses about the target language at the developmental stages of both L1 and L2, and result in language change or dialects of languages in L1A, and in misdeveloped variability or fossilization in L2A; and (ii) the misdevelopment claim that the complex factors are inextricably bound up with establishment of L2 lexicon in the L2 acquisition process. Specifically, lemmatic properties of not only L1 but also L2 involve in forming a lexicon and lead or guide to establish an interlanguage lexicon which may not be the same as the target language lexicon, resulting in misdevelopment or fossilization in L2A, similar to 'language change' or 'dialects' in L1A.⁹

Notes

¹ In this paper, I shall use the term 'L2' (second/secondary language, in addition to their first language) under which both 'FL' (Foreign Language), and 'SL' (Second Language) are subsumed: L2A=SLA+FLA.

² Commission errors occur when a wrong preposition is used. For example, 'in' is used in place of 'at' as in

'I am an English professor in (in place of 'at') Shinshu University. On the other hand, omission errors take place when learners fail to use a preposition where one is called for. For example, a learner produces a sentence like 'He hit the ball, but missed.' Instead of the intended sentence 'He hit at the ball, but missed.'

³ See Bong (2010c) for further detailed data and discussions.

⁴ Bong's (2008) study works as a pilot study for the current study. Bong (2008) conducted an experimental study with 27 JSLs of English, who were first-year-college students at the time of the test. The results obtained from the pilot study were taken into consideration in designing the current experiment.

⁵ All selected 57 subjects were native JSLs of English predominantly in a classroom setting in Japan.

⁶ Many of the token sentences used in the test were derived from Ishii (2008) with some modifications.

⁷ The argument implicated here is that it is not always the case that the development order is [Spatial Relation > Temporal > Abstract Relation] (See Bong 2008 for the discussion).

⁸ See Bong (2011a, b) for other possible or tentatively assumed 'features such as [Inclusion], [Exclusion], [Proximity], [+Direction, [Origin], [Path] and [Endpoint], and so on.

⁹ In order to make this argument more plausible, further studies would be necessary. For further detailed discussions on similarities and differences between L1A and L2A, and differ, see Bong (2005, 2009).

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