

Acquisition of the English Preposition *on*: Assessing the Prototypicality Hypothesis

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1. Introduction

Why do so many people seem to struggle learning English prepositions? In particular, one syllable prepositions (e.g. *at, as, in, on, to, up*, etc.) seem to be more difficult for adult learners of English as a second language (L2, subsuming any secondary or additional language in addition to first language) to acquire (interchangeably with ‘master’ or ‘learn’) than more than two or more syllables prepositions (e.g. *about, against, across, including, inside*, etc.). The question arises why the lower the number of syllables the more difficult to acquire, and whether some senses (interchangeably with ‘uses’, ‘meanings’) of prepositions (representing polysemous words) appear to be acquired earlier (interchangeably with ‘faster’ or ‘easier’) than others. This kind of acquisition issues has been discussed under the topics of ‘development order/pattern’ or ‘differential difficulty’ in second language acquisition (L2A) studies, and given rise to various hypotheses (or theories).

There are several studies on differential difficulty and variability in L2A of English prepositions, addressing research questions which prepositions or which senses of prepositions are easier to acquire than others, what roles L2 learners’ L1 plays in order to account for ‘variability’, and what factors are crucial in determining the differential difficulty (development order or pattern) (Bong 2010; 2011a, b, c; 2012a, b, cf. Yamaoka 1995; 1996, Hayashi 2001; 2008). In attempt to answer these research questions, several L2 empirical studies have been carried out and have put forward hypotheses to account for the developmental order and variability in the L2 acquisition of English prepositions. Note that there is a traditional hypothesis on development order of English prepositions in first language acquisition (L1A) studies: e.g., spatial relation acquired earlier than temporal relation.

As for the development pattern (differential difficulty), there are two competing hypotheses: one is Cognitive grammar/linguistics driven hypothesis, ‘the Prototypicality Hypothesis (PH)’ proposed by Yamaoka (1995, 1996) and adopted by Hayashi (2001, 2008) among others, and the other is based on a

Minimalist Model of language acquisition: namely ‘the Economy-Driven Development Hypothesis (EDDH) by Bong (2005, 2009, 2010, 2011a, b, c, 2012a, b). The former refers L1A of English prepositions to an extension process of cognitive principles in learning schematic properties of prepositions (or maybe any polysemous words) ‘through body movement’ assuming ‘semantic relatedness’ between senses of prepositions and other schematic principles that are operative, while L2A involves an extension of Schematic Principles (SPs), not through body movement, but via L1. On the other hand, the latter hypothesis assumes that language acquisition (LA) including L1A and L2A undergoes the feature selection-construction process (so-called **interface between syntax and lexicon**) in forming lexical items which is governed by Economy Principles (EPs), and setting or resetting parameters through testing hypotheses about members or sets of features (feature selection and construction process) for a lexical item and thus for a language, which in effect give rise to ‘parametric differences’ between languages (Bong 2005, 2009) .

Both hypotheses have taken into account internal factors such as ‘L1 effects’ in order to explain some data divergent from predictions derived from each hypothesis. However, little attentions have been paid to external factors which might have, in turn, caused input variants or increased ambiguity and obscurity in identifying senses of or lemmatic features of English prepositions as L2 input: e.g. learning environment in L2A, L2 learner’s dictionary entry description, and so on. In contribution to the discussions of development order (differential difficulty), internal factors (L1 effects, operations at the Interface level), and external factors (possible causes for input variants, not only theoretical linguistic assumptions about the primary linguistic data, but also external sources referred to by learners, such as dictionary description), this paper explores the L2A of the English preposition ‘on’ by Japanese speaking learners (JSLs).

This paper attempts to test developmental order hypotheses both the prototypicality hypothesis and the economy-driven development hypothesis, and their accounts on variability paying attention to both internal factors and external factors. In the following sections, the theoretical underpinnings of the prototypicality hypothesis as well as the data used to support its claims are examined in order to show where and how the hypothesis fails and succeeds, focusing on experimental data of L2A of the English preposition ‘on’ by JSLs. This paper also examines briefly an alternative account: its theoretical underpinning of the alternative hypothesis, isolating central elements and ideas of language acquisition that constitute the basis of the alternative hypothesis. This paper concludes that the prototypicality hypothesis is less convincing than the alternative account, namely the feature selection-construction process in **the tri-part interface level** between lexicon, semantic component, and syntactic component in account of L2A of at least the English preposition ‘on’ by JSLs.

2. Theoretical Background of the Prototypicality Hypothesis

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 (interchangeably with uses or meanings) of prepositions are hierarchically organized and some senses 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 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 noun 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). Bong (2011) recapitulates this adoption of the proto type theory into L2 acquisition as the Prototypicality Hypothesis (see Bong 2010, 2011a,b,c).

Under this theory, all senses of any polysemous word (such as prepositions) are assumed to be related to one another, and to have a prototypical sense (or prototypical senses), and others less prototypical ones extending in some way from the prototypical sense (sense) (Hayashi 2008). Upon this model, the preposition 'on' in question is to have a prototypical sense (or senses) and less prototypical ones that are derived in the process of extension from the prototypical sense (or senses) (Hayashi 2008, cf. Lakoff 1987; Taylor 1989). Under such general cognitive principles such as metaphor, graded prototypicality, image-schema transformations, etc., schematic properties of a language (at least, prepositions in English) are assumed to be learned based on body movement. This is the case only for the first language acquisition. However, the proponents of these cognitive principles (e.g. Hayashi 2008) believe that it is almost impossible for second language learners to acquire the schematic properties of the target language in the same ways as first language acquisition. The learnerability of the schematic properties is accounted for by means of L1 transfer that gives rise to L1 effects (influence, medium – learning through L1) and L1 constraining (interference - L1 based concepts) under the hypothesis in question.

However, the claims of the Prototypicality hypothesis such as learning schematic properties of a language based on body movement in L1A seem to have not been well discussed or well motivated in the literature. Nonetheless, some conceptual assumptions such as 'through body movement in L1A' are simply incorporated in their core assumption as some kind of 'constraints on learning a language.' Another apparent weakness of the hypothesis in question is that the logic behind the claim that both L1 learners and L2 learners can acquire 'the prototypical sense/senses', while both learners extend the prototypical sense or sense differently due to the existence of L1 has not yet been well motivated. The question is **why L1 does not interfere with or constrain on identifying or leaning 'prototypical sense/senses' of a polysemous L2 word in L2A, but do interfere with or constrain on extending the prototypical senses.**

To recapitulate the arguments of the Prototypicality Hypothesis discussed here, L2 learners cannot acquire the same schematic properties of a target language as the native speakers of the target

language have, but L2 learners should find prototypical senses easy/easier to acquire than less prototypical ones. Thus, ultimately the acquired/learned schematic properties of the target language should be different from the L2 native speakers' due to L1 transfer which means under the hypothesis in question 'learning through L1 and constraining of L1 based concepts'. The hypothesis claims that L2 learners can acquire the prototypical sense (senses) and they find it easy to acquire 'the prototypical sense (senses)', which is/are the atom (s) for other related senses that are supposed/assumed to be derived or extended from it (the prototypical sense). However, L2 learners cannot have the same schematic properties of a target language because L2 learners cannot extend 'the prototypical sense (senses) in the same ways the native learners of L2 do due to L1 transfer.

3. Previous Studies for the Prototypicality Hypotheses

3.1 Semantic Relatedness of Senses of the Preposition 'on': Hayashi's Study (2008)

Hayashi (2008) conducted a semantic relatedness test on how each sense of the three prepositions (*on*, *at*, and *in*, here I shall focus on examining the results of the preposition '*on*' only) with 40 English native speakers (ENSs) consisting of 36 American, 3 British, and one Canadian, and 129 English majored college students representing a sample population of Japanese-speaking learners (JSLs) of English as L2. The two main research questions are whether L1 transfer affects Japanese learners' formation of lexical networks of the senses of the three prepositions, and whether an increase in learners' proficiency level influences the growth of the lexical networks of the three prepositions differently. Note that in the L2A of the three English prepositions, namely L2 lexical networks of senses, first question is to address L1 influence across one group of experimental subjects (n.b. one language sample population) while the other question is to address 'developmental pattern' through quasi-longitudinal experimental subject groups: three developmental groups, not including early stage (initial state) and the ultimate attainment stage or near native level.

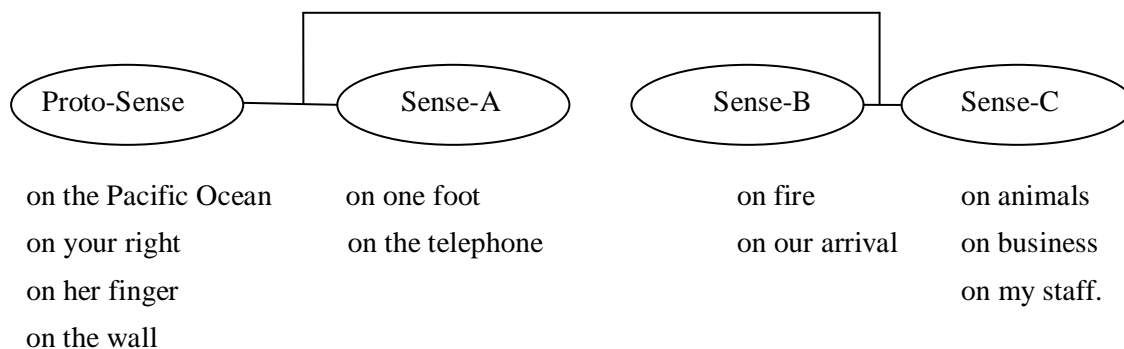
In the semantic relatedness test, Hayashi used a total of 33 different sentences taken from various dictionaries (see Hayashi 2008 for the detailed references) of which 12 sentences were with the preposition '*on*'. The 12 sentences with '*on*' were paired into 66 sets (pairs), of which only one third were used in the actual test for the Japanese participants. The both groups of experimental subjects (participants) were asked to rate the similarity in meaning of the prepositions used in each pair on a scale of 1 to 5, with 1 being 'very similar' and 5 being 'very different'.

3.1.1 Lexical Network of 'on' for English Native Speakers

Based on the results from a sample group of ENSs, Hayashi (2008: 97) analyses that senses (or uses) of the preposition '*on*' can be categorized into four types, which are graded with respect to their relatedness or closeness. It is assumed that Closest to Sense-Proto, which represents that prototypical sense of the preposition '*on*', is to be Sense-A for English native speakers (ENSs), and that Sense-B

and Sense-C are closes to each other and are perceived as being abstract. One major difference between the instances in Sense-Proto cluster and the instances in Sense-A cluster is that in the latter, the ‘concrete contact’ of the TR (Trajectory) with the LM (Land Mark) is bleached and a functional aspect of ‘support’ is foregrounded (Hayashi 2008: 96).

Figure 1. Lexical Network of ‘on’ for Native Speakers (adopted from Hayashi 2008:97)



Hayashi (2008) analyses these clusters in the following way. First cluster is called ‘Proto-Sense’, in other words, ‘prototypical sense’. Hayashi (2008) suggests that one factor that determines the prototypicality is ‘concreteness of the LMs: the objects *‘the wall’*, *‘her finger’*, and *‘the Pacific Ocean’* are regarded as all concrete. However, the object *‘your right’* cannot be accounted for by means of this concreteness factor, not to mention the vagueness of the term ‘concreteness’: it is the existence or the physical entity. Nonetheless, the secondary proto-sense criterion ‘in contact with’ was introduced in order to put these four instances (sentences) into one cluster group. However, **it is very unlikely that something is in touch with ‘your right’**, but Hayashi argues that “it seems natural to conceptualize that the TR (the house) is in contact with the LM (your right)” (p95). **In short, it seems ‘ad-hoc’ in establishing criterion/or criteria for determining prototypicality, and the argument of ‘naturalness of conceptualization’ is neither convincing nor suggestive.**

As for the Sense-A, the determining factor for this cluster group is suggested as the notion of ‘support’ which is explained as ‘a functional aspect’ highlighted in these instances, in addition to the notion of ‘contact’ from the above Proto-Sense criteria. To support this claim, Hayashi (2008) refers to Matsumoto’s (1992) metonymy argument: “The ‘on’ in ‘(stand) on one foot’ is thought to extend metonymically from the ‘on’ in the phrase ‘(stand) on the ground or (stand) on the floor’”. **Note that it is not very clear why this cluster is separated from the Proto Sense cluster even though both clusters share the notion of concreteness and contact. Moreover, Hayashi (2008) does not provide any explanation for the instance with ‘on the telephone’, which seems to be completely different from ‘on one foot’ with respect to the notion of ‘support’.**

As for the Sense-B, the notion of ‘state’ is given to this cluster, in addition to the notion of ‘contact’: the term ‘contact in state’ is used in the case of *‘on fire’*, while the sentence *‘They greeted us on our arrival.’* is interpreted as the TR is in contact with the LM, and the relationship between the TR and the LM is that of Temporality. That is, it is suggested as ‘the extension of physical contact into

temporal contact’. For this cluster, the Sense-B, Contact in State and Temporal Contact are given as determining factors. **Note that it is not clear what common features there are between these two different instances: ‘on fire’ vs. ‘on our arrival’ (Abstract vs. Temporal relation)(n.b. there is no distinction between temporal and abstract relation under the proto theory), and why these two instances are clustered together, since there is no specific account given in Hayashi (2008).**

Finally the last cluster, so called ‘Sense-C’, that consists of ‘on animals’, ‘on business’, and ‘on my staff’ is given a description to each instance that we can find from dictionaries (see the following section on ‘dictionary description’ below): “as for ‘I read a book on animal.’, the land mark (LM) is conceptualized as something that the TR (*book*) concerns, namely ‘the topic’; and in ‘I’m here on business.’ the LM refers to ‘a cause or a reason’ for the TR being what it is.; and in the sentence ‘I am proud to have you on my staff.’ the TR (*you*) has become a part of the LM (*my staff*)” (quoted from Hayashi 2008: 96). Hayashi (2008) clusters these apparently different instances into one ‘Sense-C’, noting that **there seems to be no shared attributes between these instances: there are rather different than similar.**

To summarize Hayashi’s (2008) discussion, the first two clusters, Sense-Proto and Sense-A are given their own criteria for determining their nature as one cluster while the latter two clusters, Sense-B and Sense-C are regarded as ‘abstract’ since there are no similarities but they are different each, as illustrated below:

Table 1. Instances with ‘on’ used for the four cluster groups in Hayashi (2008)

	Token Sentences (instances)	Sense Type	Clusters	Remark- Criteria
1	She has a ring <u>on</u> her finger.	Proto Sense	Cluster 1 Sense-Proto	Concreteness & Contact
2	San Francisco is <u>on</u> the Pacific Ocean.	Proto Sense		
3	You will see the house <u>on</u> your right.	Proto Sense		
4	There is a picture <u>on</u> the wall.	Proto Sense		
5	How long can you stand <u>on</u> one foot?	A-Sense	Cluster 2 Sense-A	Concreteness, Contact & Support.
6	We talked <u>on</u> the telephone.	A-Sense		
7	The house is <u>on</u> fire.	B-Sense	Cluster 3 Sense-B	Contact in State
8	They greeted us <u>on</u> our arrival.	B-Sense		Temporal Contact
9	I read a book <u>on</u> animal.	C-Sense	Cluster 4 Sense-C	Abstract
10	I’m here <u>on</u> business.	C-Sense		Abstract
11	I am proud to have you <u>on</u> my staff..	C-Sense		Abstract

In short, none of the accounts for clustering is compelling or convincing. In addition, the criteria suggested for the relation between TR and LM, or the characteristics of LM are inconsistent in incorporating the concept of concreteness, for example. I shall leave aside issues on the credibility of the tests of relatedness and closeness. However, the cluster members, and each sense will be examined further in detail when we discuss the empirical L2A data and an alternative account based on the

Minimalist Feature Selection-Construction system below.

3.1.2 Lexical Networkw of ‘on’ for JSLs

Not let us now move onto examining the clustering of sentences suggested as ‘lexical Networks of ‘on’ for Japanese-speaking learners (JSLs) of English in Hayashi (2008).

Figure 2. Lexical Network of ‘on’ for J1 Group (JSLs) (adopted from Hayashi 2008:100)

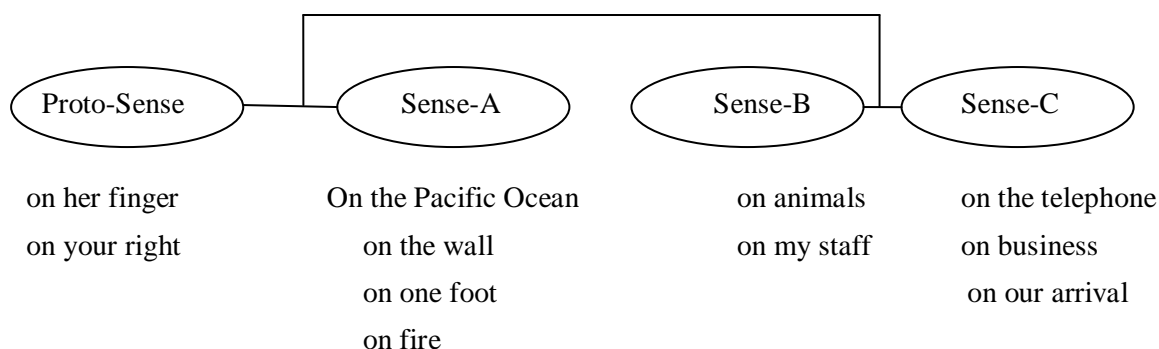


Figure 3. Lexical Network of ‘on’ for J2 Group (JSLs) (adopted from Hayashi 2008:100)

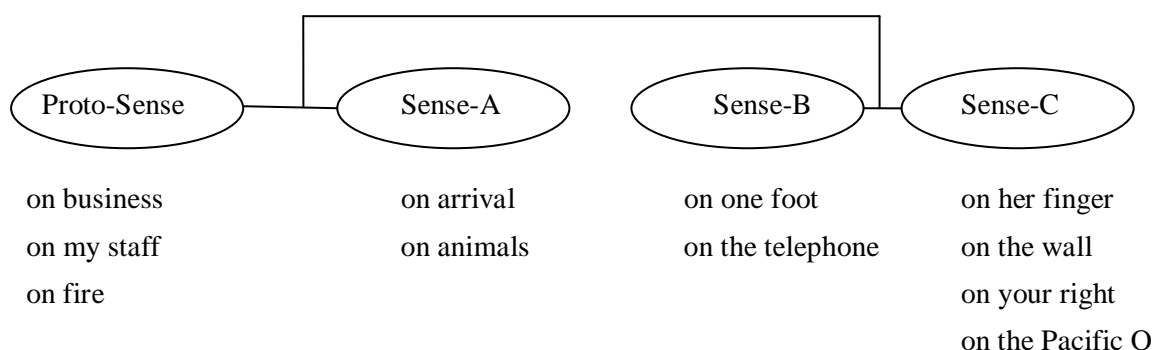
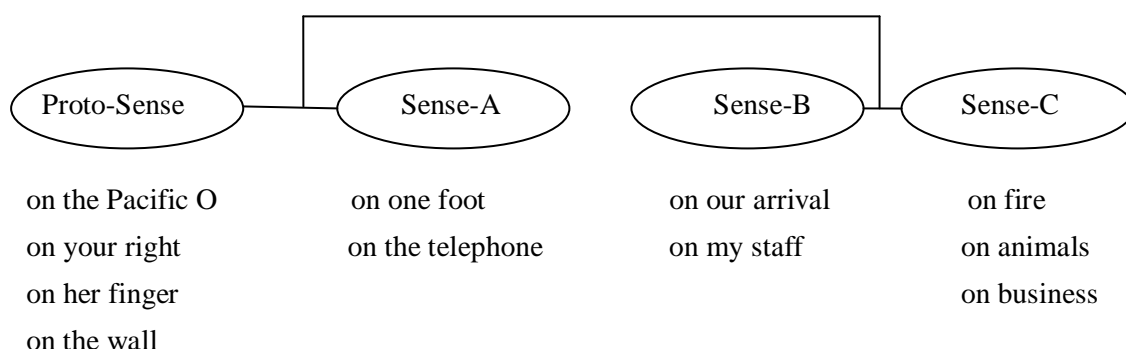


Figure 4. Lexical Network of ‘on’ for J3 Group (JSLs) (adopted from Hayashi 2008:100)



3.1.3 Discussion on L1 transfer and Developmental Pattern

Obviously, the networks of ‘on’ for the three subject groups of JSLs appear to be different one another, and compared to the one for the control group of ENSs, they seem very different. Hayashi’s main

argument is ‘L1 transfer account’ for this divergence (variability), and interprets the data as supporting the arguments of L1 transfer in L2A of the preposition ‘*on*’, but not in the preposition ‘*at*’ (i.e. L1 transfer takes place randomly or depending on preposition, see below) and of the role of attributes of the object of prepositions.

More specifically, as for the latter, Hayashi (2008) interprets the data as indicating that J2 group of JSLs (TOEIC IP mean 501.07) linked Sense-Proto to Sense-C in the way that “the concrete contact of the TR which the LM is bleached and a functional aspect of ‘support’ is foregrounded”, concluding that J2 group of JSLs show understanding of extension of sense that approximates that of ENSs. Furthermore, Hayashi (2008) further interprets the data as showing that J3 group of JSLs (TOEIC-IP mean 668.75) linked Sense-Proto to Sense-A in the same way as ENSs, in the way that a functional aspect of ‘support’ is being analysed as being foregrounded. Based on this line of arguments, Hayashi concludes that “even at the level of the J2 (TOEIC-IP 501.07) JSLs can approximate they understanding of the extension of senses of ‘*on*’ to that for ENSs and that the concept of ‘contact’ or ‘support’ is perceived and acquired, although JSLs do not learn the preposition ‘*on*’ through body movement, while L1A is assumed to learn the preposition through body movement in the adoption of this prototype theory into acquisition study. However, **notice that Hayashi (2008) suggested that control group of ENSs linked Sense-Proto to Sense-A, not Sense C, discussed above. In addition, Hayashi (2008) leaves aside the fact that there are some differences between J2 group’s understanding of the extension of senses and that of ENSs. The question arises why the J2 and J3 behave differently in linking Proto-Sense to other senses, and there is no account provided for how or why the J1 group of JSLs behaved differently from the J2 and the J3 of JSLs, and ENSs.**

Furthermore, in Hayashi’s (2008) analysis, the lexical networks of ‘*on*’ suggested do not show any consistent effect on developmental pattern or consistent L1 transfer effect across the groups. However, Hayashi (2008) attempts to argue for the presence of L1 transfer effects. For example, the Japanese lexical item ‘*~(no) ue*’ is argued to be transferred in determining the semantic relatedness. Hayashi (2008) suggests that JSLs should have used ‘*~(no) ue*’ for judging the relatedness of senses of ‘*on*’ in the examples like ‘on the telephone’ and ‘*on one foot*’, since they were clustered into the same group, but only with the J2 and J3 groups, not with J1 group of JSLs (TOEIC IP mean 362.35). **The question arises why J1 group would not have used their L1 lexical item ‘*~(no) ue*’ in the task, while other groups would have. It is theoretically strange or inexplicable to say that L1 transfer takes place ‘randomly’ or ‘temporally’, or ‘in random stages of L2 development’.** This line of arguments leads us to undermine the claims of the prototypicality hypothesis: in particular, L1 transfer account. Now let us now move onto ‘the differential difficulty account’ that the prototypicality sense (senses) is (are) easier to acquire than less prototypical ones.

3.2 L2A of the Preposition ‘on’ for the Prototypicality Hypothesis: Hayashi (2008)

In Hayashi’s (2008) study, a 3-part paper-and-pencil acceptability judgment task was used: 18 sentences with the preposition ‘*on*’, and 16 with ‘*at*’ and 17 with ‘*in*’. In this paper, I shall focus on the

data from the 18 sentences with ‘on’: of 18, 12 correct instances are illustrated in Table 1. 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. Hayashi (2008) conducted an experiment with 90 JSLs of English, who were grouped into three according to their English proficiency: using TOEIC IP test, and results of their performances on the experimental task of judging correct or incorrect sentences (instances) with the preposition ‘on’.

Table 2. Hayashi’s (2008) Subjects: Proficiency Level based on the TOEIC IP and Overall Mean Scores of ‘on’ acceptability judgment task (calculated proximity-achievement rate %)

Group	Number	Means (TOEIC IP)	SD (TOEIC IP)	Mean-Correct	Mean-Incorrect
J1	30	369.50 (37.3%)	36.70	3.48 (69.6%)	2.61(38.3%)
J2	30	511.00(51.6%)	38.98	3.62(72.4%)	2.30(43.5%)
J3	30	665.33(67.2%)	67.57	4.00(80.0%)	1.91(52.4%)
Total	JNS- 90	(out of 990)			
ENS	ENS-30	990.00 (99.0%)		4.95 (99%)	1.03(97.8%)

(Extracted from Hayashi (2008), but recalculated for the current discussion)

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). Unfortunately, Hayashi (2008) in effect undermines his own claim of L1 transfer account for the variability in L2A, but also this kind of claim per se is neither convincing nor compelling since there is no generalization or some sort, although 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. Please compare Table 2 above and Table 3 below:

Table 3. Breakdown of Mean Scores of ‘on’ in Hayashi (2008)

		Token Sentence	Remark	J1	J2	J3	Comments	NSs (40)
S1	O	On her finger.	Proto-S1	3.70	3.73	4.17	<i>? J1 Difficult</i>	4.93
S2	O	On the Pac. Oce.	Proto-S2	3.63	3.70	3.83	<i>?J1, J2, and J3</i>	4.60
S3	O	On your right.	Proto-S3	4.33	4.33	4.53	Easy,	5.00
S4	O	On the wall.	Proto-S4	4.40	4.57	4.97	Easy,	5.00
S5	O	On the foot.	A-Sense 1	3.73	3.77	3.90	<i>Easy/or Difficulty</i>	4.93
S6	O	On the phone.	A-Sense 2	3.47	4.00	4.53	<i>Easy</i>	5.00
S7	O	On fire.	B-Sense 1	2.70	2.93	3.59		5.00
S8	O	On our arrival.	B-Sense 2	3.03	3.00	3.27		4.97
S9	O	On animal.	C-Sense 1	3.57	2.90	4.10	<i>Easy & Difficult</i>	5.00
S10	O	On business.	C-Sense 2	3.90	4.17	4.33	<i>Easy</i>	5.00

S11	O	On my staff.	C-Sense 3	2.87	2.70	2.77		5.00
S12	O	On defeat	C-sense-4	2.77	3.20	3.63		4.33
		Ave. (O)		3.48	3.62	4.00		4.95

Moreover, there is **no clear indication** of the proto-sense is acquired easier (earlier) than less prototypical ones such as A-sense, B-sense, or C-sense, since the JSLs performed better (or a similar rate) on the B-Sense instances such as S5 and S6, and the C-sense instances such as S9 and S10, than Proto-Sense instance such as S1 and S2. In effect, the results of this kind undermine the differential difficulty claim of the prototypicality hypothesis, resulting in supporting the counterarguments such as the prototypical senses are not always easier than less prototypical ones, or that the prototypicality should be redefined if the theory or the hypothesis is to be remained as a working theory or hypothesis.

Furthermore, as for the L1 transfer account, there is no evidence that indicates that the JSLs use their L1 lexical items like *'de'* or *'ni'* or their L2-L1 (English-Japanese) dictionary-driven **literal or first meaning descriptions** like *'~(no) ueni'* that they must have come across in their institutional learning environment: so called **external factors**. **Note that the literal and fist dictionary meaning given in L1-L2 dictionaries is not of 'L1 transfer', but of external factors that might have caused 'ambiguity and obscurity' in the input, which in turn should affect in great deal in the process of testing hypotheses about selecting and constructing features for particular lexical items of L2.**

3.3. A Study, Not Supporting the Prototypicality Hypothesis: Bong (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 date that are **not consistent with the prototypicality hypothesis, undermining the claims of Prototypicality Hypothesis**. In the Bong's (2010c) experimental study, based on the results of a bridged Oxford Placement Test (OPT) used for measuring the general proficiency in the English grammar, and the participants were given a scaled acceptability judgment task in order to explore their knowledge about the three English prepositions. Their task performances were analyzed in accordance with the research questions mentioned above (I shall focus on the result of the preposition *'on'*).

Table 4. Details of Experimental Japanese, and Mean Scores of *'on'* (Quoted from Bong 2010c)

Subject Group (N)	OPT		Sentence type/ Mean Scores (performance rate)		
	Mean	Score Range	Correct (12)	Incorrect (6)	Sum (on-18)

Japanese JG1 (13)	22.1 (44%)	15-24(30%~49%)			2.26 (56.4%)
Japanese JG2(57)	29.5 (59%)	29-34(50%~69%)			2.42 (60.43)
Japanese JG3(22)	37.4 (75%)	35-44(70%~89%)			2.44 (61.1%)
Total (92 subjects)			2.23 (55.9%)	2.73 (68.3%)	

Overall, Bong (2010c) interprets the data of Table 4 as indicating that there is a trend suggesting that regardless of their L1, with increasing proficiency the JSL subjects show a gradual but extremely moderate development of the uses of the preposition ‘on’. However, the advanced groups of both Japanese 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 (I shall leave this issue aside). Interestingly, the results support the common belief that prepositions are difficult to master. Let us now move onto the topic of ‘prototypicality effects’. The data of ‘at’ shown in Table 5 are extracted from Bong (2010c) for the current discussion.

Table 5. Breakdown of Accuracy Mean Scores of *On*, and degrees of prototypicality, differential difficulty

Instances	Japanese G1 (N13)	Japanese G2(N57)	Japanese G3(22)	Japanese SUM(92)	Degree of Prototypicality	Differential Difficulty	Con- firm
O-on her finger	2.00(50%)	2.07(52)	2.32(58%)	2.12(53%)	Proto	Difficult	X
O-on the Pa. Ocean	1.77(44%9	1.79(45%)	1.77(44%)	1.78(45%)	Proto	Difficult	X
O-on your right	2.92(73%)	3.46(86%)	3.68(92%)	3.43(86%)	Proto	Easy	O
O-on the wall	3.54(88%)	3.72(93%)	3.77(94%)	3.71(93%)	Proto	Easy	O
O-on one foot	2.62(65%)	2.46(61%)	2.36(59%)	2.46(62%)	A-sense		
O-on the phone	1.31(33%)	2.47(62%)	2.36(59%)	2.28(57%)	A-sense		
O-on fire	0.92(23%)	1.54(39%)	1.55(38%)	1.46(36%)	B-sense		
O-on our arrival	2.15(54%)	1.84(46%)	2.05(51%)	1.93(48%)	B-sense		
O-on animal	0.77(19%)	1.11(28%)	1.32(33%)	1.11(28%)	C-sense		
O-on business	2.39(60%)	2.53(63%)	3.09(77%)	2.64(66%)	C-sense		
O-on my staff	1.69(42%)	1.88(47%)	1.36(34%)	1.73(43%)	C-sense		
O-on defeat	2.00(50%)	2.09(52%)	2.46(61%)	2.16(54%)	C-Sense		
Mean Achievement				55.9%			

Interestingly, both data from Hayashi (2008) and from Bong (2010c) show similar pattern in achievement or performance mean scores in the way that the first two instances with ‘on’ that are assumed to be prototypical uses, but both sample populations seem to find more difficult to judge the two sentences (‘on her finger’, and ‘on the Pacific Ocean’) than the other two sentence as ‘on your right’ (and ‘on the wall’). This kind of results in effect casts doubt on the Prototypicality Hypothesis.

Bong (2010c) also interprets the data shown in Table 5 as indicating that JSLs 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**.

In short, the results of Bong’s (2010c) study support neither the claim that the role of prototypicality is crucial in determining the development order/pattern in L2A, nor the claim of L1 transfer, undermining the Prototypicality Hypothesis. Instead, the findings from Bong’s (2010c) study and conclusions drawn from the above discussions and questions raised from reexamining Hayashi’s (2008) studies must be explored and accounted for.

4. Alternative Account and Conclusion

This section attempts to provide an explanatory account for those questions and divergent data that are not consistent with the Prototypicality hypothesis by means of the hypothesis-testing model in selecting features and constructing lexical items that gives rise to the claims of the Economy-Driven Development hypothesis in 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 (Bong 2005, 2009) and the claim of the complex factors for misdevelopment that are inextricably bound up with establishment of L2 lexicon in the L2 acquisition process (Bong 2005, 2009, 2010c).

Let us first consider the senses of the preposition ‘*on*’ at stake. The English word ‘*on*’ in question has a multi-fold nature not only in its function (i.e. semantic properties), but also in its categorical status (i.e. syntactic properties). The preposition syntactically functions as a Preposition, or an Adverb, or an Adjective, or even a Noun. As for semantic properties, any dictionary would spare a couple of at least lines to provide usages or functions of the preposition enumerating multi-related meanings. According to OED (Oxford English Dictionary), the preposition primarily expresses the relation of **contact with** or **proximity to** the surface of anything and so that of being **supported** or **upheld** by it (OED), and there are more than thirty main uses of ‘*on*’ under various classified functions: e.g. local position; of action, position, state, condition, manner; of relative position in a series or scale, degree, rate, value; etc.. Interestingly, note that this general sense, or the main uses, or primary meaning ‘**of things physical**’ seem to be the core meaning of the preposition.

(1) The General Sense (OED):

- a. The preposition primarily expresses the relation of **contact with** or **proximity to**

- the surface of anything and so that of being supported or upheld by it: syntactic [OE, on + dative object]
- b. Also, from the earliest times it expresses **motion to** or **towards** such a position; syntactic [OE, on + accusative object]
- (2) The Main Uses (OED): Of position [OE. On with dative]:
- a. Of local position outside of, but close to or near, any surface.
- b. Primarily of things **physical**, but also of non-physical things treated as having extension. (OED)

Now let us now examine various senses (meanings/uses) of the preposition ‘*on*’ whether the graded categorization of senses into Proto Sense, A-Sense, B-Sense, and C-Sense group proposed in the cognitive linguistic/grammar is a reasonable or plausible account as a generalization of semantic properties of a preposition, and whether the theory of the proto typicality is adaptable and applicable in the field of empirical studies such as L1A, or L2A. Examining various related English-English dictionaries such as Oxford English Dictionary, The New Shorter Oxford English Dictionary, Oxford Advanced learner’s dictionary, The Concise Oxford Dictionary, main functions (semantic properties involved) of ‘*on*’ as a P (preposition) are rearranged in order to discuss **the relations (Spatial, Temporal and Abstract relation) in addition to the nature of its complements** (objects in accusative case), and senses (uses/meanings/senses) of the preposition ‘*on*’:

Table 6. A Feature Model of Meanings of the Preposition ‘*on*’:

Relation	Type	Description	Examples	Features
Spatial Relation (SR) [+DIM] <u>Of Position</u>	SR-I. Of Position	1. Above and in contact with and supported by a surface	a. On the table was a water jug. b. She was lying on the floor. c. He was lying on the floor (see Bong 2011a, b for a.)	+Physical +Contact +Support +Specific Posit
	SR-II	2. A. Forming a distinctive or marked part of the surface ; B. of (engraved); be part of);	a. a smile on her face. b. a scratch on her arm, (S4) paint on the wall (S3) on your right	+Physical +Contact -Support +Specific Posit
	SR-II	3. A. Located somewhere in the general surface area of (a place); B. At or near a place	a. an internment camp on the island b. the house on the corner c. a town on the coast (S2)on Pacific Ocean	+ Physical -Contact -Support -Specific Posit
	SR-IV (ambiguous)	4. In the possession of: A being carried by B	a. She had a few pounds on her (S1) a ring on her finger	+ Physical + Contact? +Possession -Specific Posit

	SR-V (ambiguous)	Others..	On my way home.. (understudied.....other uses..)	
Temporal Relation (TR): [+Time] <u>Of Time</u>	TR-I. Of Time	1. During, or at some time during (a specified day or part of a day)	a. reported on September 25 b. on a very hot evening in July c. on Sunday	+Time +Duration +Specific Time
	TR-II	2. at the time of action; exactly at or just coming up to (a specific time)	a. She was booed on arriving home	+Time -Duration +Specific Time
	TR-III	3. Immediately after something ; just before or after in time	(S8) <i>On arriving home</i> , I discovered they had gone. b. Report to reception on arrival .	+Time -Duration -Specific Time

Table 7. A Feature Model of Meanings (**Abstract Relation and Space-Temporal Relation**) of the Preposition ‘on’: derived from Dictionary Descriptions

Relation	Type	Description	Examples	Features
Abstract Relation (AR): [-PHY] [-Time]	AR-I. Of State	1. Membership/Be part of; engaged in.	a. They serve on committees. b. to be <i>on business</i> / on errands	-Physical
	AR-II Of Theme	2. as a topic, target, aim, or focus.	a. <i>a book on cancers</i> b. five air raids on Schweinfurt,	-Physical
	AR-III Of Method	3. Method	a. We talked <i>on the phone</i> . b. She played a tune on her guitar.	-Physical
	AR-IV Of Medium	4. Medium	a. put your ideas down on paper b. stored on his own computer	-Physical
	AR-V	5. Eating or drinking something	a. He is on morphine to relieve the pain. (drug or medicine)	-Physical
	AR-VI	6. Supported financially by something	a. to live on a pension/on \$50 b. the drinks are on me	-Physical
	AR-VII	7. added to	a. A few pence on the electricity bill is nothing	-Physical
	AR-VIII	8. When giving a telephone number	a. You can get me on 09032594182 b. She’s on extension 7271.	-Physical
	AR-IX	9. Compared with something or somebody	a. Sales are up on last year.	-Physical
	AR-X	10. who or what is affected by something.	a. a ban on smoking, b. He’s hard on his kids.	-Physical
Spatial Temporal Relation (STR)	STR - I Of motion,	1. To or toward (and into a position)	a. He put it on the table.(on to) b. He banged his head on a beam.	-Physical
	STR-II Of direction	2. In the direction of	a. He turned his back on us.	-Physical

Regarding those categorized as ‘Proto-Sense’, S1, S2, S3, and S4, Table 6 shows clearly their different attributes or characteristics among them, and suggests that there must be something else or other than just a simple grouping of ‘Proto-Sense’. Instead, various combinations of semantic features seem to be good candidates in account for the differences between/among the sample sentences. Intuitively, L2 learners must have been performed much better with the sentences like ‘*there is a book on the table*’ than other sentences classified as denoting ‘Spatial Relation’. In addition, as you can see from Table 6, the Hayashi’s sample instances (tested sentences) of B-Sense include not only the temporal use of ‘*on*’ in the (S8) ‘*on our arrival*’ that denotes Temporal Relation (TR-III), but also the use of ‘*on*’ in the (S7) ‘*on fire*’ that can be regarded as denoting either ‘Spatial Relation (not of a location obviously)’ or Abstract Relation (AR-X) as shown in Table 7. It is also very likely that L2 learners, at least JSLs, would have performed much better with the sentences like ‘*I met her on Wednesday.*’ than ‘*They greeted on our arrival.*’, or those A-Sense instances like ‘*We talked on the phone.*’ In short, this line of arguments not only undermines the Prototypicality claim of the Prototypicality Hypothesis that the proto-sense (senses) are easier than the less prototypical ones. In addition, the possibilities like the JSLs, but also cast doubt on the L1 Transfer claim of the hypothesis that L2 learners extend schematic properties based on or through L1.

Alternatively, under the Minimalist Model of Language Acquisition proposed in Bong (2005, 2009), it is argued that a universal lexicon that contains a set of universal phonological features (properties) of natural language are innate (learnable) as other features of syntactic and semantic (lemmatic) are, or of operations (selection, construction, agree/match, etc.), but the language process of a language involves Testing Hypotheses, Selection of features, Construction of lexical items, and Operations (agree/match) at various levels that are governed by the Economy Principles: i.e. the Economy Driven-Development Hypothesis (EDDH). The differences between L1A and L2A lie not in the governing properties such as operations and principles, but in the causal factors (e.g. Input variants, or L1 lexicon in L2A) that might give rise to some Ambiguity or Obscurity in the input (primary linguistic data for language learners). That is, those factors are active or influence in the acquisition process of a language, specifically, in the selection of features to form a particular lexicon, through identifying a set of features that can be assembled/constructed into each lexical item, each complex or compound word or phrase, each independent phrase (phase in the Minimalist program) through testing hypotheses on construction of lexical items in both L1A and L2A.

Under the EDDH: namely, the hypothesis-testing process in L2A, it can be predicted that the traditional claim of L1A development order of prepositions, more specifically the uses (sense) of prepositions is in order of ‘Spatial Relation’ first, then ‘Temporal Relation’, and followed by Abstract Relation may not be plausible in accounting for the Differential Difficulty in L2A, but may be applicable since we can predict that in simply comparing the two types, it is very likely that the use of

Spatial Relation with [+Physical, +Contact, +Support, + Specific Position] as in ‘a book on the table’ could be easier/earlier to acquire than the use of Temporal Relation with [+Temporal, -Specific Time] as in ‘on our arrival’ both L1A and L2A.

In conclusion, all the discussions above lead us to conclude that the prototypicality hypothesis leaves us many unanswered questions and L2A data unaccounted for, but the data remained unaccounted seem to be consistent with the claims of the Economy-Driven Development Hypothesis..

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