

Knowledge of English Prefixes Among Japanese Adult Learners of English

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Abstract

This study investigated the difficulty rankings of English prefixes among Japanese adult learners of English (JLEs) and proposed six graded prefix difficulty rankings for facilitating teaching of vocabulary. The idea of the rankings was originally proposed by Bauer and Nation (B&N) (1993). They worked out a set of seven prefix ‘levels’ based on the criteria of frequency, regularity, productivity, and predictability of the affixes (prefixes and suffixes) for all English language learners. However, since B&N’s (1993) levels have not been demonstratively examined, it is not clear if their difficulty levels are valid. Therefore, this study attempted to find out whether B&N’s (1993) levels of prefixes suitably reflected the prefix difficulty rankings of JLEs. A test designed to assess knowledge of 22 English prefixes was given to 135 JLEs. The results showed that the findings partially overlapped with B&N’s (1993) difficulty rankings, but had some crucial discrepancies as well. The authors thus propose alternative rankings for JLEs based on the results. They also discuss possible factors affecting the rankings, and tentatively conclude that the effect of loanwords from the English language would be a primary factor, as indicated in Daulton (2008, 2009) and Mochizuki and Aizawa (2000).

Keywords: second language acquisition, prefix difficulty rankings,
Japanese adult learners of English

Introduction

The purpose of this study is to assess second language (L2) learners’ knowledge of English prefixes (e.g., *un-*, *re-*). In particular, the authors examine to what extent Japanese adult learners of English (JLEs) have acquired English prefixes since they started learning English in their first year at junior high school. The authors also investigate which English prefixes are more difficult and which ones are easier than others for JLEs to acquire and why these difficulty rankings occur. They hope that these basic research results will lead to an effective teaching method for English prefixes and English words: Teachers do not have to spend much time to teach prefixes which are easy to acquire while they should give enough time and energy to teach those which are difficult to acquire. In order to teach prefixes effectively and efficiently for the learning of English words, the authors would like to establish

difficulty rankings of English prefixes for JLEs. They believe that these difficulty rankings can be a useful guideline for teaching JLEs.

It goes without saying that it is important for L2 learners to have an abundant knowledge of vocabulary. The more words they know, the easier it becomes to express their feelings and ideas suitably and comfortably in the language. Indeed vocabulary learning is an essential part of L2 acquisition. In Japan, the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) decided to increase the total number of English words to be learned from 2200 to 3000 by the end of high school years in its current Course of Study Guidelines revised in 2009 (MEXT, 2011). MEXT is now emphasizing the importance of vocabulary learning. Moreover, MEXT is planning to increase the vocabulary size up to 4,000 to 5,000 for the new Course of Study which starts around 2020.

Several teaching methods for vocabulary learning have been proposed (Mochizuki, Aizawa, & Tono, 2003; Nation, 2013; Noro, 2014; Schmitt, 2000). One of them is to increase vocabulary size through gaining the knowledge of word structures and word parts such as prefixes and suffixes (e.g., *-ness*, *-er*). For instance, if learners have the knowledge of a prefix *un-* and a suffix *-ness*, they may be able to easily understand the derived words such as *unkind* and *kindness* as soon as they acquire the base word *kind*. Therefore, it is possible that knowledge of affixes (both prefixes and suffixes) can play an important role in expanding L2 learners' vocabulary size effectively. Although some people learn foreign words one by one, it is a daunting task. An L2 learner's learning load could be reduced by utilizing the knowledge of prefixes and suffixes.

Now let us consider 'acquisition order' of linguistic items. It has long been proposed that there is a fixed acquisition order, or more precisely, a difficulty order, in language acquisition (Dulay & Burt, 1974, among others). It is said that this hypothesis can be expanded to the case of foreign language learning in the classroom (Dulay, Burt, & Krashen, 1982; Shirahata, 1988; Terauchi, 1994). In particular, L2 researchers have looked for universal difficulty orders of grammatical morphemes. Grammatical morphemes that have been examined the most are inflectional affixes such as progressive verb form (*-ing*), plural noun form (*-s*), and verb past regular and irregular forms (*-ed*). Consequently, the researchers found a similar difficulty order among these inflectional affixes irrespective of L2 learners' different first language (L1) properties (Ellis, 2008; Dulay et al., 1982).

However, derivational affixes, which consist of prefixes and suffixes such as *-ness* and *-er*, have been outside the scope of these studies. Thus, if this natural order hypothesis is also applicable to the area of derivational affixes, we can find a fixed difficulty order (or rankings) for the affixes common among JLEs. Thus, the present study will focus on prefixes and analyze the L2 acquisition data from this point of view. It is also important to find out prefixes which are unfamiliar to JLEs and determine the causes. The authors also examine to what extent the rankings (or difficulty orders) of the prefixes obtained from the present study are consistent with the ones proposed by Bauer and Nation (B&N) (1993) and Mochizuki and Aizawa (M&A) (2000).

The organization of this paper is as follows. First, the background of this study is explained by referring to Nation's (2013) three methods of vocabulary learning. After that, some linguistic backgrounds such as structures of derived words and definitions of prefixes and

suffixes will be provided. Then the authors will review three previous studies: B&N (1993), M&A (2000), and Tamura and Shirahata (T&S) (2016). In the next section, the details of the experiment such as assumptions, participants, materials, and procedures are outlined. Results and discussion follow.

The authors claim that B&N's (1993) difficulty rankings, which were attempted to explain all English as foreign language (EFL) learners' difficulty rankings, may not be applicable to JLEs. Furthermore, the authors claim that there exist some similarities between M&A's (2000) rankings and those of the present study. Then, the authors discuss plausible factors affecting JLEs' difficulty rankings of prefixes and suggest that the semantic influence from loanwords borrowed from English words could be a primary factor, which was also pointed out in Daulton (2008, 2009) and M&A (2000). Finally, conclusions are drawn with some reference to the remaining tasks which should be explored in future research.

Background

L2 Vocabulary Learning

Nation (2013) suggests three learning methods to increase vocabulary size of children speaking English as their L1 as shown in (1):

- (1) a. by being taught or deliberately learning new words
- b. by learning new words by meeting them in context
- c. by recognizing and building new words by gaining control of word parts such as prefixes and suffixes¹

(Adapted from Nation, 2013, p. 389)

These three learning methods could be applicable to teaching in an EFL environment as well. In fact, (1a) and (1b) have already been used quite pervasively in English language classrooms in Japan, while it seems that (1c) has not been so prevalent compared to the other two. Although (1c) is relatively known among English teachers in Japan, in reality, there are few studies examining any effects of it. To the authors' knowledge, teachers in Japan do not practice this method often. One of plausible reasons for this may be that since JLEs' textbooks do not devote much space to the explanation of affixes, as a result, teachers themselves did not learn when they were students and do not teach them to their students either. Thus, most JLEs have no or little experience of learning about what affixes are (Tamura & Shirahata, 2016).

Linguistic Background

Now, let us briefly summarize structures of English words and what prefixes and suffixes are. The word *unthinkable*, for example, can be decomposed into three morphemes *un-*, *think*, and *-able*. The morpheme *un-* is attached before the base *think* as a prefix and *-able* is attached after *think* as a suffix. Since a base is a term for any form to which affixes of any kind can be attached (Bauer, 1983), *thinkable* can also be a base to which the prefix *un-* is attached.²

As shown in (2a), the main function of a prefix is to change the meaning of a base. For example, the prefix *un-* attached to the base *thinkable* gives an opposite meaning to the base

word. On the other hand, as in (2b), the main function of a suffix is to change the word class of a base. For instance, the verb *think* changes to an adjective when the suffix *-able* is added to it (Namiki, 1985; Oishi, 1988: Quirk, Greenbaum, Leech, & Svartvik, 1985).

- (2) a. Examples of prefixes
thinkable → **un**thinkable, kind → **un**kind, appropriate → **in**appropriate
- b. Examples of suffixes
think (V) → think**able** (Adj), kind (Adj) → kind**ness** (N),
appropriate (Adj) → appropri**ately** (Adv)

Previous Studies

In this section, three previous studies closely related to the present study are summarized. They are Bauer and Nation (1993), Mochizuki and Aizawa (2000), and Tamura and Shirahata (2016).

Bauer and Nation (1993). B&N (1993) proposed the idea of affix learnability rankings to guide the teaching and learning of affixes in EFL classrooms. They arranged a set of seven affix 'levels' based on the criteria of frequency, regularity, productivity, and predictability of the affixes which they think is applicable to all EFL learners. In this paper, the focus is on the comparison between B&N's (1993) classification of prefixes and the authors'.

Table 1 shows B&N's (1993) developmental stages of prefixes. They claim that L2 learners acquire prefixes gradually from Level 3 to 7. Thus, the prefixes *non-* (e.g., *nonmetal*) and *un-*^(adj) (e.g., *unconscious*) at Level 3 are the easiest to acquire, followed by *in-* (e.g., *insecure*) at Level 4. Then, prefixes such as *ante-* (e.g., *anteroom*), *bi-* (e.g., *biplane*), *ex-* (e.g., *ex-president*), *mid-* (e.g., *mid-week*), and *mis-* (e.g., *misfit*) are categorized into Level 5, which is the level for the prefixes of medium difficulty. There are two *un-*s; *un-*^(adj) in Level 3 and *un-*^(v) in Level 5. The difference between *un-*^(adj) and *un-*^(v) is that the former is added to adjectives (e.g., *unhappy*), while the latter is added to verbs (e.g., *untie*). The superscripts *adj* and *v* for the prefix *un-* are added by the authors for the purpose of distinction. Level 6 is the group of very difficult prefixes. Prefixes *pre-* (e.g., *preaccept*) and *re-* (e.g., *regenerate*) are placed at this level. Then, Level 7 contains the most difficult prefixes among all. They are the prefixes such as *ab-* (e.g., *abnormal*) and *com-* (e.g., *combine*).

Table 1

B&N's (1993) Seven Affix Levels

Level	Criteria	Prefix
Level 1		(Each form is a different word.)
Level 2		(Inflectional suffixes) plural -s, past tense -ed, -ing, etc.
Level 3	Most frequent and regular derivational affixes	non-, un- ^(adj)
Level 4	Frequent and regular derivational affixes	in-
Level 5	Regular but infrequent derivational affixes	ante-, anti-, arch-, bi-, circum-, counter-, en-, ex-, fore-, hyper-, inter-, mid-, mis-, neo-, post-, pro-, semi-, sub-, un- ^(v)
Level 6	Frequent but irregular affixes	pre-, re-
Level 7	Classical roots and affixes	ab-, ad-, com-, de-, dis-, ex-, etc.

(Adapted from Bauer & Nation, 1993, pp. 258–262 and pp. 270–271)

However, as was pointed out earlier, B&N's (1993) difficulty orders have not been proven demonstratively and thus need to be tested whether they are actually applicable to JLEs. Moreover, the number of prefixes in each of B&N's (1993) levels is not well-balanced: The numbers of the prefixes in Level 5 and 7 are conspicuously large compared to those of Level 3, 4, and 6. This imbalance in the numbers of prefixes needs to be resolved as long as you would like to construct appropriate difficulty orders of prefixes. B&N (1993) designed these levels for all EFL learners. If so, these levels, or the learnability rankings, should be valid for the JLEs in this study. If the difficulty rankings of prefixes obtained from the present study do not match those of B&N (1993), one explanation is that although there is a universal difficulty order of prefixes, the order proposed by B&N (1993) may not be a suitable one and thus should be revised. Another idea is that, after all, there does not exist 'universal difficulty order' of prefixes. The present study will examine this issue.

Mochizuki and Aizawa (2000). M&A (2000) examined JLEs' difficulty rankings of 13 prefixes (*non-*, *semi-*, *pre-*, *re-*, *anti-*, *un-*^(adj), *counter-*, *en-*, *in-*, *inter-*, *ex-*, *post-*, and *ante-*) which were selected from B&N's (1993) prefix list shown in Table 1. Their participants were 403 university and high school JLEs. The test was a multiple choice task asking one question for each prefix. For each question, the participants were given three non-existing words with the same prefix, for example, *anti-* (*antislimad*, *antikiofic*, and *antirachy*). The participants were then asked to choose the most appropriate meaning of the prefix (*anti-*) from a set of four choices, for example, *human*, *of antenna*, *opposed*, and *ancient*, which was actually given in Japanese.

The results of M&A (2000) were as follows: The accuracy rates of the five prefixes *re-*, *un-*, *pre-*, *non-*, and *anti-* were relatively high: All of them were over 70% accurate. On the other hand, the accuracy rates of the four prefixes, *ante-*, *in-*, *counter-*, and *inter-* were relatively low: All of them showed under 40% accuracy rates. From the results, M&A (2000) suggested the possibility that consistent difficulty rankings of prefixes exist among JLEs. They further

explained that the difficulty rankings might be affected by the following four factors: loanwords from English to Japanese, instruction on prefixes, frequency of prefixes, and the polysemous nature of a prefix. The authors discuss plausible reasons of difficulty orders later in this paper.

The issue here, however, is that merits and demerits in the use of non-existing words by M&A's (2000) experiment for the purpose of avoiding positive effects caused by the existing knowledge of prefixed words are still open to question. It is thus desirable to conduct another experiment with a different methodology to see if the results tally with those of M&A (2000). If a new experiment with a different methodology still shows similar results, it is likely that a common prefix order will be strongly confirmed. Thus, the authors will conduct an experiment to resolve the issue (Tamura and Shirahata, 2016).

Tamura and Shirahata (2016). Accordingly, in order to confirm whether M&A's (2000) difficulty rankings of the 13 prefixes were applicable to other JLEs in a different experimental condition, T&S (2016) conducted an experiment with 135 adult JLEs studying at two universities in Japan, and compared the results with those of M&A (2000) (See also Tamura & Shirahata, 2015). The test was a multiple choice task. T&S (2016) used a set of two real words, for example, *slavery* and *antislavery* for the question asking the knowledge of the prefix *anti-*. The participants were given the meaning of the base word in Japanese, for example, *doreisei* 'slavery,' and were then asked to infer the meaning of the prefixed word. They were to choose the most appropriate Japanese translation from a set of five choices given.³

The results indicated that the five prefixes *non-*, *semi-*, *pre-*, *re-*, and *anti-* were easy for the adult JLEs, with accuracy rates of over 80%. On the other hand, the six prefixes *ante-*, *post-*, *ex-*, *inter-*, *in-*, and *en-* were difficult, with accuracy rates below 60%. The similarity between M&A (2000) and T&S (2016) was that in both studies, *ante-* was the most difficult prefix, and *re-*, *pre-*, and *non-* were the easy ones. On the other hand, these studies differed from each other in the accuracy rates of four prefixes: *semi-*, *post-*, *counter-*, and *in-*.

However, overall, the Spearman's Rank Correlation Coefficient between the difficulty rankings of the two studies was highly correlated ($r_s = .7153$) despite the differences in the test methods. Thus, generally speaking, it can be said that the two studies showed similar difficulty rankings of the 13 prefixes. It seems there exists a certain kind of difficulty rankings among JLEs for prefix acquisition. However, as mentioned above, the number of prefixes examined in these studies was limited to 13. This number is not sufficient enough to affirm that there is a fixed prefix difficulty order. More prefixes should be examined to reach a conclusion on prefix difficulty rankings for JLEs. For this reason, in the present study, the authors have decided to increase the number of prefixes to be examined. We will compare the results with those of B&N (1993).

Experiment

Research Assumption

Tamura and Shirahata (2016) claimed that M&A (2000) and T&S (2016), as both groups of participants were JLEs, showed a similar tendency of prefix difficulty orders. A high correlation between the difficulty rankings was found in the two studies. Based on these

results, in the present study, the authors try to a) find out whether B&N's (1993) classification of prefixes for all EFL learners actually reflects the difficulty rankings of JLEs, and b) discuss why some prefixes are more difficult to acquire than the others.

Participants

Two hundred and twelve adult JLEs took part in the experiment. They were university undergraduates studying in Japan. These participants were divided into two groups, which we called Group 1 and Group 2. The participants in Group 1 were expected to take a prefix test. They were 135 JLEs at universities A and B, who were composed of 67 freshmen, 45 sophomores, 22 juniors and 1 senior. Their average TOEIC score was 443, with the lowest 295 and the highest 625 (The maximum score achievable is 990). The participants in Group 2, on the other hand, took a vocabulary test. They were 77 JLEs at universities C and D, who consisted of 29 freshmen, 46 sophomores, and 2 juniors. Their average TOEIC score was 450, with the lowest 305 and the highest 635.

Based on the TOEIC scores, the authors considered that Group 1 (the prefix test group) and Group 2 (the vocabulary test group) had similar intermediate English proficiency levels and also similar vocabulary knowledge. They thus regarded it safe to map the vocabulary test results obtained from Group 2 onto the results of Group 1.

Materials and Procedures

Vocabulary test for Group 2. Let us first explain the vocabulary test conducted for Group 2. This test contained 24 English prefixed words which were used in the prefix test for Group 1. The purpose of this test was to check whether adult JLEs in general had the knowledge of the prefixed words used in this experiment. When over 10% of the participants in Group 2 knew the words, the authors decided to exclude those words from the prefix test items.

Each word included one kind of prefix. The list of those prefixes is given in Table 2. They were the 24 prefixes listed in B&N's (1993) Level 3, 4, 5, and 6. Table 3 shows the prefixed words which were used in the test.

The vocabulary test for Group 2 was a written test. Examples are shown in Table 4. The participants were asked their knowledge of the prefixed words. When they knew the word, they put a checkmark in the column next to the word, and they wrote down its meaning in Japanese. When the participants did not know a prefixed word, they were instructed to leave the column blank. There was no time restriction, but the participants completed the test within 20 to 25 minutes.

Table 2

Twenty-four prefixes examined in the present study

non-, semi-, pre-, re-, anti-, un- ^(adj) , counter-, en-, in-, inter-, ex-, post-, ante-, arch-, bi-, circum-, fore-, hyper-, mid-, mis-, neo-, pro-, sub-, un- ^(v)

Table 3

Prefixed Words Used in the Vocabulary Test for Group 2

Level 3	nonmetal (non-), unconscious (un- ^(adj))
Level 4	insecure (in-)
Level 5	antemortem (ante-), antislavery (anti-), archbishop (arch-), biannual (bi-), circumlunar (circum-), counterargument (counter-), encage (en-), ex-soldier (ex-), forefoot (fore-), hyperaggressive (hyper-), interdependence (inter-), midterm (mid-), misjudge (mis-), neoimperialism (neo-), post-election (post-), pro-American (pro-), semi-diameter (semi-), subaverage (sub-), untie (un- ^(v))
Level 6	preaccept (pre-), regenerate (re-)

Note. 'Level' at the left column indicates B&N's (1993) levels.

Table 4

Examples of the Questions for the Vocabulary Test

	Vocabulary	I know this word	The meaning is:
1	circumlunar	<input type="checkbox"/>	_____
2	archbishop	<input type="checkbox"/>	_____

Prefix test for Group 1. The prefix test for Group 1 was the main test for this experiment. It consisted of the same prefixed words as tested in the vocabulary test. The prefix test adopted a method of multiple choice questions with one question for each prefix. Examples of the test are shown in Table 5. There was no time restriction, but the participants answered all the questions within 25 minutes.

Table 5

Examples of the Questions for the Prefix Test

1. dependence 依存 → interdependence (a) 共依存 (b) 依存心 (c) 依存性 (d) 依存状態 (e) 相互依存
2. slavery 奴隸制 → antislavery (a) 奴隸制度廃止 (b) 奴隸制度反対 (c) 奴隸制度復活 (d) 奴隸制度存続 (e) 奴隸制度防止

Results and Discussion

Results of the Vocabulary Test for Group 2

The results of the vocabulary test for Group 2 found that the two prefixes, *mid-* (37.7%) and *mis-* (44.2%), exceeded 10% in their accuracy rates, while the others were under 10% accuracy rates. Thus the authors decided to exclude the two prefixes from the analysis. The remaining 22 prefixes became the items to be investigated.

Results of the Prefix Test for Group 1

Table 6 shows the results of the prefix test for Group 1. They represent difficulty orders and accuracy rates for the 22 prefixes examined. From the table, we see that the prefixes which reach the highest accuracy level with over 90% are *non-*, *hyper-*, and *semi-*. They are

followed by 80%: *pre-*, *re-*, and *anti-*, 70%: *un-*^(adj), *neo-*, and *un-*^(v), 60%: *counter-*, 50%: *en-* and *in-*, 40%: *inter-* and *ex-*, 30%: *fore-*, *pro-*, and *arch-*, and 20%: *bi-* and *post-*. Finally, prefixes *ante-*, *circum-*, and *sub-* are at the 10% level. The results are also graphically presented in Figure 1.

Table 6
Prefixes Classified by Accuracy Levels in the Present Study

Accuracy Level	Prefix
90% level	<i>non-</i> (96.3%), <i>hyper-</i> (90.4%), <i>semi-</i> (90.4%)
80% level	<i>pre-</i> (88.9%), <i>re-</i> (86.7%), <i>anti-</i> (86.7%)
70% level	<i>un-</i> ^(adj) (74.1%), <i>neo-</i> (72.6%), <i>un-</i> ^(v) (71.9%)
60% level	<i>counter-</i> (68.1%)
50% level	<i>en-</i> (55.6%), <i>in-</i> (54.8%)
40% level	<i>inter-</i> (48.9%), <i>ex-</i> (45.9%)
30% level	<i>fore-</i> (37.0%), <i>pro-</i> (34.1%), <i>arch-</i> (31.1%)
20% level	<i>bi-</i> (24.4%), <i>post-</i> (23.0%)
10% level	<i>ante-</i> (18.5%), <i>circum-</i> (17.8%), <i>sub-</i> (14.8%)

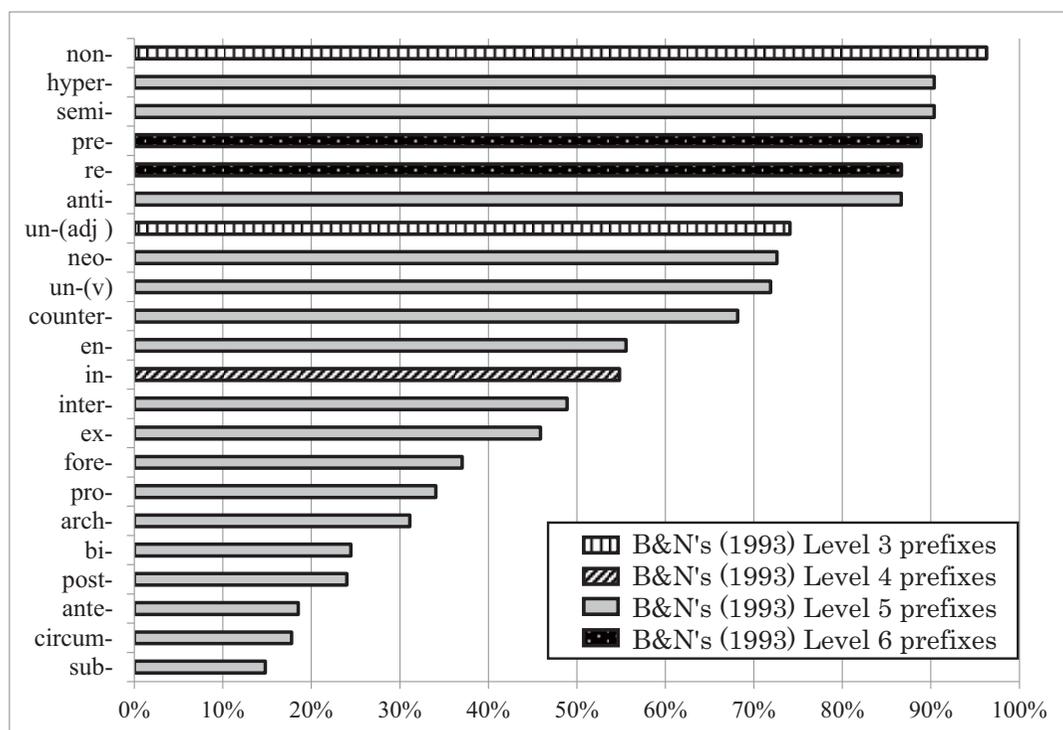


Figure 1. The prefix difficulty rankings obtained from the present study.

Table 7
The Results of Friedman Test of the 22 Prefixes

Chi-square value	Degree of freedom	<i>p</i> -value
884.9581	21	.0000**

** *p* < .01.

To see whether the differences among the correct responses for the prefixes are statistically significant or not, the authors conducted a Friedman test.⁴ The results reveal that there is a statistically significant difference among the numbers of correct answers for the prefixes (*p*<.01) (See Table 7).

Scheffe's multiple comparison was subsequently conducted to determine between which pair of prefixes the differences lie. Table 8 indicates that the differences between *non-* and the 12 prefixes (*en-*, *in-*, *inter-*, *ex-*, *fore-*, *pro-*, *arch-*, *bi-*, *post-*, *ante-*, *circum-*, and *sub-*) are statistically significant. Table 8 also shows that the differences between *hyper-* and 12 prefixes (*en-*, *in-*, *inter-*, *ex-*, *fore-*, *pro-*, *arch-*, *bi-*, *post-*, *ante-*, *circum-*, and *sub-*) are significant. Based on these statistical results, the authors have divided the 22 prefixes into six groups. Again, see Table 8. The numbers 1 to 6 on the top of the table indicate the six groupings of the prefixes.

As is shown, *non-*, *hyper-*, and *semi-* are ranked as the easiest prefixes. The second easiest are *pre-*, *re-*, and *anti-*. *Un*^(adj), *neo-*, and *un*^(v) are in the third group. Then, *counter-* (the fourth group) and *en-* and *in-* (the fifth group) follow. Finally, *inter-*, *ex-*, *fore-*, *pro-*, *arch-*, *bi-*, *post-*, *ante-*, *circum-*, and *sub-* belong to the sixth group, which is regarded as the most difficult prefix group.

One of the purposes of this study is to certify whether the difficulty rankings obtained from the present study correspond to those of B&N's (1993). In Table 9, the results of the comparison between the two studies are shown. It tells us that the difficulty rankings of the present study do not coincide with those of the B&N's (1993). There are some remarkable differences between the two studies. That is to say, the prefixes *hyper-*, *semi-*, *pre-*, and *re-* were regarded as difficult prefixes in B&N (1993), while they are the easiest ones in the present study. On the other hand, the prefix *in-* is categorized as a rather easy one in B&N (1993), while it is regarded as a difficult one in the present study. Therefore, from these results, the authors have concluded that B&N's (1993) prefix difficulty rankings do not necessarily apply to those of the present study.

Table 8

Groupings of the Prefix Difficulty Rankings Based on the Present Experiment

	1			2			3			4	5		6										
Prefix	non-	hyper-	semi-	pre-	re-	anti-	un-(adj)	neo-	un-(v)	counter-	en-	in-	inter-	ex-	fore-	pro-	arch-	bi-	post-	ante-	circum-	sub-	
non-																							
hyper-	ns																						
semi-	ns	ns																					
pre-	ns	ns	ns																				
re-	ns	ns	ns	ns																			
anti-	ns	ns	ns	ns	ns																		
un-(adj)	ns	ns	ns	ns	ns	ns																	
neo-	ns	ns	ns	ns	ns	ns	ns																
un-(v)	ns	ns	ns	ns	ns	ns	ns	ns															
counter-	ns	ns	ns	ns	ns	ns	ns	ns	ns														
en-	**	*	*	ns	ns	ns	ns	ns	ns	ns													
in-	**	*	*	ns	ns	ns	ns	ns	ns	ns	ns												
inter-	**	**	**	**	**	**	ns	ns	ns	ns	ns	ns											
ex-	**	**	**	**	**	**	ns	ns	ns	ns	ns	ns	ns										
fore-	**	**	**	**	**	**	*	*	*	ns	ns	ns	ns	ns									
pro-	**	**	**	**	**	**	**	*	*	ns	ns	ns	ns	ns	ns								
arch-	**	**	**	**	**	**	**	**	**	*	ns	ns	ns	ns	ns	ns							
bi-	**	**	**	**	**	**	**	**	**	**	ns	ns	ns	ns	ns	ns	ns						
post-	**	**	**	**	**	**	**	**	**	**	ns	ns	ns	ns	ns	ns	ns	ns					
ante-	**	**	**	**	**	**	**	**	**	**	*	*	ns	ns	ns	ns	ns	ns	ns				
circum-	**	**	**	**	**	**	**	**	**	**	**	*	*	ns	ns	ns	ns	ns	ns	ns			
sub-	**	**	**	**	**	**	**	**	**	**	**	**	**	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

* $p < .05$. ** $p < .01$.

‘counterattack’) respectively.⁵ On the other hand, among the twelve prefixes in Rank 5 and Rank 6 (*en-*, *in-*, *inter-*, *ex-*, *fore-*, *pro-*, *arch-*, *bi-*, *post-*, *ante-*, *circum-*, and *sub-*), which are relatively difficult to learn, seven do not have their Japanese counterparts. The counterparts only exist for the five remaining prefixes *intaa-* (e.g., *intaanashonaru* ‘international’), *foa-* (e.g., *foahando* ‘forehand’), *bai-* (e.g., *bairingaruru* ‘bilingual’), *posuto-* (e.g., *posutomodan* ‘post-modern’), and *sabu-* (e.g., *sabukaruchaa* ‘subculture’).

Table 10
Japanese Counterparts for the 22 English Prefixes in This Study

Ranking	English	Japanese Counterpart	
	Prefix	<i>Katakana</i> -type	Examples
1 (easy)	non-	ノン- (non-)	nonarukooru ‘non-alcohol’, nonkyariaa ‘noncareer’, nonsutoppu ‘nonstop’
	hyper-	ハイパー- (haipaa-)	haipaaifure ‘hyperinflation’, haipaatekisuto ‘hypertext’
	semi-	セミ- (semi-)	semifainaru ‘semifinal’, semioodaa ‘semi-custom’, semipuro ‘semi-
2	pre-	プレ- (pure-)	puregorin ‘Pre-Olympic’, puretesuto ‘pretest’, purebyuu ‘preview’
	re-	リ- (ri-)	rinyuuaru ‘renewal’, risaikuru ‘recycle’, rimeeku ‘remake’
	anti-	アンチ- (anchi-)	anchiwuirusu ‘antivirus’, anchipirin ‘antipyrene’, anchitokishin ‘antitoxine’
3	un ^(adj)	アン- (an-)	anfea ‘unfair’, anbaransu ‘unbalance’, anrakkii ‘unlucky’
	neo-	ネオ- (neo-)	neonachizumu ‘neo-Nazism’, neohyuumanizumu ‘neo-humanism’
4	un ^(v)		
	counter-	カウンター- (kauntaa-)	kauntaataaku ‘counterattack’, kauntaapanchi ‘counterpunch’
5	en-		
	in-		
6 (difficult)	inter-	インター (intaa-)	intaanashonaru ‘international’, intaahon ‘interphone’, intaachenji
	ex-		
	fore-	フォア (foa-)	foahando ‘forehand’
	pro-		
	arch-		
	bi-	バイ (bai-)	bairingaruru ‘bilingual’, baisekushuaru ‘bisexual’, baimetaru ‘bimetal’
6 (difficult)	post-	ポスト- (posuto-)	posutomodan ‘post-modern’, posutokouzoushugi ‘post-structuralism’
	ante-		
	circum-		
	sub-	サブ- (sabu-)	sabukaruchaa ‘subculture’, sabutaitoru (subtitle), sabugamen (subscreen)

The authors thus believe that *katakana* loanwords can play an important role and are a significant factor affecting the rankings of the 22 English prefixes.⁶ However, the loanwords may not be the exclusive determinants because not every ranking of the 22 prefixes can be accounted for. For example, the low accuracy rate of the prefix *sub-*, with its Japanese counterpart, cannot be explained by the positive influence from *katakana* words. Rather, this may be attributed to the polysemy of English *sub-* and Japanese *sabu-* respectively. For example, English *sub-* has the following meanings: *At, to, or from a lower level or position; somewhat; nearly; more or less; denoting subsequent or secondary action of the same kind; denoting support* (Marchand, 1960). Japanese *sabu-* also has the following meanings: i) *hoketsu, hojuuin* (a substitute; a spare; a deputy), ii) *kai-no, hojo-no, fuku-no* (lower, subordinate, supplementary, substitute, secondary, deputy) (Kitahara, 2010). These multiple meanings in both L1 and L2 could be the reason of difficulty for *sub-*.

Moreover, there are differences in familiarity with the meanings of loaned prefixes. The authors do not expect, for example, many Japanese people to know the original meanings of *foa-* ‘*fore-*’ and *posuto-* ‘*post-*’. On the other hand, quite a few people will know the meanings of *non-* ‘*non-*’ and *anchi-* ‘*anti-*’. This could be another reason which causes the difference.

Now let us look at the second possibility: the influence from the linguistic properties of the prefixes (See also T&S, 2016).⁷ Among the prefixes investigated in this study, at least the following three prefixes, *non-*, *un-*, and *in-* with a negative meaning seem to have a link between their linguistic properties and their difficulty rankings. According to Kageyama (1999), these prefixes all differ in their degree of phonological and morphological independence. *In-* as in (4a) sometimes attaches to a bound (i.e., non-independent) morpheme (e.g., *inert*) and changes its form to *im-* (e.g., *impossible*), *ir-* (e.g., *irregular*), or *il-* (e.g., *illegal*) being influenced by the first sound of the base word. The prefix, *in-*, thus is either not morphologically independent or the degree of its independence is low. *Un-* as in (4b) attaches to a free (i.e., independent) morpheme (e.g., *unhappy*), does not change its form, and is stressed. *Non-* as in (4c) attaches to a free morpheme (e.g., *nonalcoholic*), does not change its form, and is even more strongly stressed in pronunciation.

- (4) a. *incorrect, impossible, irregular, illegal / indolent, insipid, inert*
 b. *unhappy, unkind, unpleasant, unlucky, unacceptable*
 c. *nonalcoholic, non-christian, nonconformist, nonessential*

(Adapted from Kageyama, 1999, p. 165)

Kageyama (1999) claims that such phonological and morphological differences are reflected in the meanings of the prefixes. That is, *non-* affixed to *Christian* only gives the objective meaning of “not Christian”. On the other hand, *un-* affixed to *kind* gives the subjective meaning of “unkind, unfair, or morally wrong”. Moreover, the prefix *in-* attached to *famous* brings about an even more subjective meaning of “notorious”. These differences in the objectivity of the meanings are illustrated in (5).

Conclusion

To summarize, among the four possible factors mentioned above, the authors have concluded that L1 transfer from *katakana*-type prefixes in Japanese could be the most influential factor affecting JLEs' difficulty rankings. This study found that there is an overall tendency that the majority of English prefixes ranked in the upper half have their *katakana* counterparts while the ones ranked in the lower half do not. This can provide a hint to the instruction of English prefixes in EFL classrooms in Japan: Teachers can promote students' understanding of the English prefixes by utilizing their knowledge of *katakana* counterparts. The secondary factor may be the linguistic properties of the prefixes. We have indicated that the rankings for the negative prefixes *non-*, *un-*, and *in-* seem to be related to the morphological independence and the semantic objectivity of the prefixes. It is also plausible that the rankings for other prefixes sharing similar meanings (e.g., *pre-*, *ex-*, *fore-*, and *ante-*) are also influenced by their linguistic properties.

This study has also examined the difficulty rankings of the 22 English prefixes among adult JLEs. The results show that B&N's (1993) affix levels do not necessarily match the findings of this study. The authors thus have concluded that B&N's (1993) rankings for the prefixes may not be applicable to JLEs. The comparison seems to suggest that the difficulty of *ante-* and *inter-* is universal but that of *pre-*, *re-*, *anti-*, and *in-* may be affected by other three factors mentioned above. Based on this conclusion, the alternative rankings of the prefixes among JLEs have been proposed.

The remaining tasks are as follows. First of all, the difficulty rankings proposed in this research need to be refined by further study. The reasons for JLEs' prefix difficulty rankings should also be substantiated with additional data. Thirdly, it is necessary to confirm the results of this study by conducting some other tests with different participants. Lastly, the effects of explicit instruction on prefixes should be studied because there is a possibility that the instruction can promote the understanding of prefixes. The results of these subsequent studies are expected to shed more light on the acquisition of prefixes among JLEs. The authors believe that elucidation of the mechanism of prefix learning can lead to a suitable teaching method of vocabulary learning.

Notes

1. The idea behind this method is the notion of a *word family*. According to B&N (1993), a base word plus its derived and inflected forms constitute a *word family*. For example, the word family of *watch* consists of the base word *watch* and its derived and inflected forms such as *watches*, *watched*, and *watching*. B&N (1993) claimed that if learners acquire a base word or even a derived word, it would be much easier for them to recognize other members of the same word family. It implies that a certain knowledge of inflectional and derivational affixes would be necessary to facilitate the recognition.

The notion of *word family* resembles that of *lemma*. However, the latter is broader than the former one in that it covers not only morphological but also syntactic and semantic information such as argument structure of a verb (Kempen & Hoenkamp, 1987; Shirahata, Muranoi, Wakabayashi, & Tomita, 2009).

2. There are also the terms called a *root* and a *stem* in addition to a *base*. A *root* is a

morpheme which forms the core of a word, with nothing else attached to it (Katamba, 1993, 1994). Thus in the word *unthinkable*, *think* is the *root* of the word as well as a *base*. A *stem*, on the other hand, is a form to which any inflectional affixes are added (Katamba, 1993). For instance, in the word *thinkers*, *thinker* is the stem of the word to which inflectional -s is attached. Since these terms are not relevant to the purpose of this study, the authors will not discuss them further.

3. As mentioned in T&S (2016), the authors provided five choices to lower the chance level instead of three or four choices. As for the polysemous prefixes, the authors selected only one meaning.

4. The authors used a nonparametric Friedman test instead of an ANOVA because the values in their data were not average values and did not have a normal distribution.

5. The *katakana* prefix *ri-*, the counterpart of English *re-*, does not appear as a headword in Japanese language dictionaries. However, it is often used in loanwords from English such as *risaikuru* ‘recycle’. The authors thus judged it to be a familiar prefix for JLEs and included it in Table 10.

6. One of the anonymous reviewers mentioned that “The idea that *katakana* loanwords can play an important role and be a significant factor in determining prefix rankings is interesting.” The authors agree with this comment. They would also like to answer that they think that the influence of *katakana* loan words may be stronger for the rankings of prefixes than for those of suffixes. This is because suffixes have less Japanese *katakana* equivalents than prefixes. There could be some other factors, such as linguistic properties, which play a crucial role in determining the rankings of suffixes. The authors consider that prefixes and suffixes may have their own set of influential factors respectively and the two sets may be partially or completely different.

7. Since the linguistic properties of English prefixes affect all EFL learners, this factor might be related to the universality of acquisition. Further research involving EFL learners with different L1 may enable us to clarify this relation.

8. One of the anonymous reviewers pointed out that most of the base words of low-ranked prefixes are adjectives (e.g., *mortem* in *ante-mortem*, *annual* in *biannual*, *lunar* in *circumlunar*, *American* in *pro-American*, *average* in *sub-average*), and this fact may affect the difficulty of the prefixes examined. The authors agree with the reviewer. They think that grammatical properties of prefixes (in this case, a part of speech) should be taken into consideration in addition to morphological/phonological independence and semantic objectivity. That is, there is a possibility that the difficulty order is determined by the grammatical class of the base to which the prefixes attach (i.e., subcategorization). However, this issue might be beyond the scope of this paper since most of the prefixes are attached to more than two grammatical classes (e.g., *non-* is attached to nouns, adjectives, verbs, and adverbs; *sub-* is attached to nouns, adjectives, and verbs). The present experiment used one class for each prefix (e.g., noun-attaching *non-* as in *nonmetal*; adjective-attaching *sub-* as in *subaverage*). Another experiment would be necessary to clarify whether or not subcategorization is relevant to the difficulty order of the prefixes.

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