The Effect of Known-and-Unknown Two-Word Combinations
on Intentional Vocabulary Learning

A Dissertation Submitted to the University of Tsukuba
in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy in Linguistics

Kiwamu KASAHARA

2 0 2 0

The Effect of Known-and-Unknown Two-Word Combinations
on Intentional Vocabulary Learning

A Dissertation Submitted to the University of Tsukuba
in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy in Linguistics

Kiwamu KASAHARA

2 0 2 0

Abstract of the Dissertation

The Effect of Known-and-Unknown Two-Word Combination

on Intentional Vocabulary Learning

by

Kiwamu KASAHARA

Vocabulary acquisition is indispensable in learning another language. A great number of English teachers and vocabulary researchers have agreed that several thousand high-frequency words should be taught in English classrooms (Nation, 2013, Schmitt, 2010) but the problem is how to teach them. Effective vocabulary instructions vary in different teaching environments: how English vocabulary should be taught is different between English as a second language (ESL) and English as a foreign language (EFL). This study focused on exploring an effective way of teaching/learning basic English vocabulary in an EFL environment like in Japan.

In EFL situations, intentional vocabulary learning can play a crucial role, because EFL learners had difficulty learning English through incidental learning. They are not exposed to a large amount of English input in their daily life. They need to expand their English vocabulary through their conscious effort.

i

A paired-associate learning such as learning with word cards or word lists have been proved to be greatly beneficial for novice and intermediate EFL learners (Prince, 1996; Laufer & Shumueli, 1997; Webb, 2007). However, they need to know countless number of formulaic sequences (Wray, 2002) before they can make use of the benefit of incidental learning. These multiple combinations of words exist in English so diversely that this study proposes that EFL learners should focus on two-word combinations as a first step in learning myriads of formulaic sequences. What is more, putting a known word in a two-word combination would be more beneficial for learners, because connecting known things to unknown things can facilitate retention of the newly learned items (Barcroft, 2002; Schmitt, 2010). The main purpose of study is to examine known-and-unknown two-word combinations can help facilitate learning receptive knowledge of English vocabulary.

The first sets of experiments examined whether two-word combination learning could be more effective than single-word learning. Experiment 1 adopted a within-subject research design, and Experiment 2 employed a between-subject research design. Both experiments showed that known-and-unknown two-word combination learning was more effective for retention and retrieval of target-word meanings as long as the following two conditions are satisfied: the encoding and decoding phases should be identical and learners should know the meanings of

known cues. Known cue words can help learners retain target words because of the newly established connections between the cues and the target words. The cues also can be a great help for learners to retrieve the meanings of the targets by limiting the scope of the meaning search and enhancing the imageability of the target words.

The second sets of experiments probed into what types of known-and-unknown two-word combinations were effective for vocabulary learning. In Experiment 3, I compared effects of known adjectives and known verbs as cues when they are attached to the same unknown nouns. In Experiment 4, I compared effects of known nouns and known adverbs as cues when they are attached to the same unknown verbs. The results revealed that both known adjectives and known verbs functioned as effective cues to remember target nouns, and that known nouns were better cues to learn target verbs than adverbs. A possible reason can be attributed to a fact that nouns have high imageability whereas adverbs do not. Combinations including nouns have clearer images on their meanings and concepts than combinations without nouns. Clear images created by noun-related combinations can lead to higher success rates in retaining and retrieving the meanings of the target words.

The next experiment, Experiment 5, investigated whether known-and-unknown two-word combination learning was effective for novice learners of English. The results found that it

was effective for them to retrieve but not to retain target words. They could use known cues to limit the range of meaning search with the help of their L1 collocations. However, they could not use the known cues to retain the target words in their mental lexicons because of their sparse networks of English vocabulary.

The last sets of experiments tried to examine an effective presentation of known-and-unknown two-word combinations. Using COCA, I created lists of known-and-unknown combinations and a list of unknown-and-known combinations for lower-intermediate learners of English. I carried out Experiment 6 and 7 to investigate which presentation, a spaced presentation or a massed presentation, would be more effective for two-word combination learning. Due to the defects of the research design, there was no significant difference between the two presentations. Further studies are necessary to find an effective way of presenting two-word combinations.

Pedagogically speaking, this study has succeeded in showing one effective way for lower-intermediate learners of English. If they know a number of high-frequency word, it is worth trying known-and-unknown two-word learning, because the possibility of retaining and retrieving the meaning of a new word in a combination is higher than that of the new word remembered as a single word. The lists of two-word combinations created in this study would be recommendable if they already know 1,000 high frequency English words.

Acknowledgements

I am grateful from the bottom of my heart to all the people who have helped me to complete this thesis. Without their valuable assistance, the present study would not have been completed.

First of all, I would like to express my sincere gratitude to my chief advisor, Professor Yuji Ushiro, who spent a large amount of time discussing various aspects of this study. His thoughtful advice supported by his deep insight and academic experiences always shed light on the problems of this study.

I would like to thank Professor Hirosada Iwasaki, who gave me thoughtful suggestions on the whole design of the present study. His advice on construction of the thesis greatly helped me to revise the manuscript.

I also wish to express my heartfelt gratitude to Professor Akira Kubota for giving me objective advice, which helped me to think about the study from a different perspective.

I would like to show my deepest gratitude to Professor Kazumi Aizawa, who is one of the top scholars among the vocabulary researchers in Japan. His appropriate and insightful advice backed up with his expertise shed light on some hidden defects of the thesis.

My thankfulness also goes to Hokkaido University of Education for granting me the ideal research environments,

which enabled me to proceed the research till the end.

I am indebted to my fellow colleagues at English Education Course, who always encouraged me to make a progress in my study. I cannot express my gratitude too much for their kindness.

In addition, I am grateful to all the participants in all the participants in the experiments conducted in this study. My special thanks go to the students at Hokkaido University of Education. Their advice was helpful to improve the construction of this thesis.

Finally, I have to say that I owed it to my family members, Yukari, Yuna, Taku Aina, and my dog *Mint,* that I have completed my thesis. Especially, without the great understanding and help of my wife, Yukari, I could not have finished writing my thesis.

Of course, the responsibility for any possible mistakes is mine alone.

Table of Contents

Chapter 1 Introduction

Chapter 2 Theoretical Background of the Study

Chapter 3 Effectiveness of Known-and-Unknown Two-Word Combinations: A Within-Subject Experiment (Experiment 1)

Chapter 4 Effectiveness of Known-and-Unknown Two-Word Combinations: A Between-Subject Ezperiment (Experiment 2)

Chapter 5 Which Cues, Adjectives or Verbs, Provide the Most Assistance for Remembering New Nouns? (Experiment 3)

List of Tables

Chapter 7

Chapter 8

Chapter 9

Chapter 10

<div align="center">

List of Figures

</div>

List of Appendices

Chapter 1

Introduction

The main purpose of the present study is to find an effective way of vocabulary teaching/learning in English as a foreign-language (EFL) situation, where learners need not use English in their daily life. In particular, this study focuses on English vocabulary acquisition for lower-intermediate learners at junior high schools (JHS), senior high schools (SHS) and universities in Japan, because the students at these schools are expected to expand their knowledge of English vocabulary greatly through these school periods. This chapter deals with how the author has found that learning known-and-unknown two-word combinations can be a more effective way than learning single target words for these lower-intermediate learners in EFL situations.

1.1 The Importance of Intentional Vocabulary Learning in English as a Foreign-Language Environments

Nobody denies the importance of vocabulary acquisition[1] in learning another language. Wilkins (1972) skillfully illustrates the crucial role of vocabulary in second language acquisition: "Without grammar, little can be conveyed, without vocabulary, nothing can be conveyed" (p. 111). In fact, lexical errors tend to cause more serious communication problems than grammatical errors (Qian & Lin, 2020). Llach (2011) identified lexical errors as a major factor to cause misunderstanding and communication breakdown in second language

(L2) learners' language production. Santos (1998) asked tertiary teachers about mistakes made by their L2 students in academic writing. He reported that lexical errors were the most severe hindrance to the understanding of the students' text. Appropriate use of vocabulary is a crucial factor for L2 learners to make themselves understood in the target language.

Quin and Lin (2020) argues that more communication problems can be seen in the language production of L2 learners than in the language production of first language (L1) learners. This is partly because of difference in the lexical development of L2 and L1 learners. L1 children are exposed to a large amount of contextual L1 input, which enables them to acquire the semantic, syntactic, and morphological knowledge of a word. This abundant exposure to L1 input leads to their automatic and appropriate use of L1 vocabulary. On the other hand, L2 learners usually lack abundant natural L2 input. They do not have sufficient contextual exposure to the target language unlike L1 learners. Another reason why L2 learners have difficulty in appropriate use of L2 vocabulary is that they have already established a conceptual and semantic system in their mental lexicons. The established L1 system sometimes can facilitate L2 vocabulary acquisition but sometimes can hinder it. Therefore, L2 vocabulary learning and teaching need to implement careful methods to match L2 learners' situations.

Although there was a time when the study of vocabulary was a neglected area of language learning (Meara, 1980), the past three decades have seen an enormous increase in the number of vocabulary

studies. According to Nation (2013), 30 percent of all vocabulary studies were published in the previous 10 years. The Course of Study published in 2017 (MEXT, 2017) also seems to reflect the importance of vocabulary in communication by announcing a great increase in the number of English words that should be taught in each school level[2]. In elementary school, English has become a compulsory subject for fifth and sixth graders, and 500 to 600 words are to be introduced. Another 1,600 to 1,800 words in junior high school and 1,800 to 2,500 words at senior high school are to be taught. In total, 4,000 and 5,000 words could be instructed for eight school years. This is a great increase in number because the previous Course of Study stipulated that at most 3,000 words could be taught for six years at junior and senior high schools.

A large number of language teachers and researchers believe in the importance of vocabulary, and the view they have in common is that basic high-frequency words should be dealt with in language courses because a relatively small number of words account for a large proportion of spoken and written texts (Nation & Waring, 1997; Milton, 2009). However, how to teach or learn these high-frequency words has been a controversial issue.

It is well known that there are two kinds of vocabulary learning: incidental learning and intentional learning (Hatch & Brown, 1995). Incidental vocabulary learning is a type of learning where learners obtain some vocabulary knowledge incidentally as a by-product of comprehending messages in spoken or written texts. On the other hand, the main purpose of intentional vocabulary learning is to acquire

vocabulary knowledge itself: learners try to memorize new words with some intentional effort, using such strategies as rote learning, rehearsal, or mnemonic techniques.

These two types of learning are mutually complementary, and can be combined (Kasahara, 2015; Laufer, 2017; Nation, 2013). They are not dichotomous concepts, but "they can be viewed on a continuum because attention is not a dichotomous entity" (Barcroft, 2012, p. 6). In vocabulary acquisition, learners go back and forth between the two ends of this continuum. In some cases, they can pick up some vocabulary knowledge naturally through simple exposure to the target language. On other occasions, they establish form-and-meaning connections by intentionally working on word lists or word cards.

The extent to which these two types of learning are used, however, is greatly affected by the learning environment. In L1 acquisition, children learn their vocabulary mainly in an incidental way. They naturally obtain vocabulary knowledge through the L1 input they get. When young, they hear a large amount of talk from caregivers, which is modified and simplified input by adults that is comprehensible for them (Ellis, 2008; Shirahata, et al., 2010). Through this adjusted input and abundant contextual cues, they soon acquire the spoken form of words and then gradually establish form-and-meaning connections (Cameron, 2001).

In English-as-a-second-language (ESL) situations, where learners acquire English as a second language, they can learn English vocabulary not only in an incidental way but in an intentional way. Imagine how

immigrants to the United States learn English. They obtain a large amount of English input from native speakers of English around them. Adults experience incidental vocabulary learning at their workplaces and children are exposed to this type of learning in their playgrounds. At the same time, the incidental vocabulary learning of these adults and children is often supplemented with intentional vocabulary learning, where the main focus is to acquire vocabulary knowledge, because their intentionally acquired vocabulary knowledge can help them benefit more through incidental learning settings in their daily life.

In EFL situations, where learners acquire English as a foreign language, intentional vocabulary learning plays a crucial role because students have little chance to use English in their daily life. Imagine secondary school students in East Asian countries like Japan, Korea or China. They need to understand a certain number of high-frequency words in English before they are able to gain vocabulary knowledge in an incidental way. In addition, most of them start to learn English after they reach adolescence, when they can make use of various cognitive strategies. Intentional vocabulary learning with word lists or word cards is really efficient and effective for EFL learners because they can allocate their cognitive resources to new words themselves (Folse, 2004; Peters, 2012, 2014) so they can establish form-and-meaning connections more rapidly. Therefore, this study deals with intentional vocabulary learning in EFL situations. Its primary goal is to present an effective way of intentional vocabulary learning for intermediate English learners in Japan, and to examine the effectiveness of this approach.

1.2 Incremental Nature of Vocabulary Learning

Vocabulary learning is an incremental process that requires a large amount of time (Nation, 2001, 2013; Schmitt, 2010). Even if EFL learners focus on acquiring basic high-frequency English words, they need to understand various aspects of these words before using them fluently in communication. Nation (2001) describes what is involved in knowing a word by using three main categories of vocabulary knowledge, namely *Form*, *Meaning* and *Use*. *Form* includes three subcategories, *spoken*, *written* and *word parts*; *Meaning* consists of *form-and-meaning*, *concept and referents*, and *associations*; *Use* comprises *grammatical functions*, *collocations*, and *constraints on use*. Each of the nine subcategories has receptive and productive dimensions.

It is impossible for EFL learners to master every aspect of word knowledge described above in just one encounter. They gradually expand their word knowledge through repeated encounters with the same word in different contexts. Teaching several aspects of a word at the same time is not effective for novice EFL learners because it imposes a cognitive burden that is too great for them to deal with. An incremental step-by-step approach should be taken in EFL environments. The first thing that novice EFL learners have to do is to learn the meanings of high-frequency words intentionally, so that they can gradually take advantage of incidental learning (Kasahara, 2015). In other words, they should establish a large number of form-and-meaning connections of high-frequency words through decontextualization or paired-associate learning by using word cards or word lists.

6

There was a time when semantically elaborated tasks were recommended to facilitate L2 vocabulary learning after Craik and Lockhart (1972) proposed *levels of processing* theory. They insisted that the deeper cognitive burden in a task could lead to longer retention of the target items in the task. A deeper burden can leave a deeper trace in the learner's memory, which leads to longer retention of the target items. This theory was applied to L2 vocabulary learning, and several elaborate tasks that require heavy cognitive processing such as semantic-mapping or producing example sentences were used in L2 classrooms.

However, it has been found that giving too heavy a burden in a task can be ineffective for novice L2 learners. They cannot deal with complicated tasks because their ability to process L2 structure and instant use of L2 lexical items is still inadequate. Basic manipulations such as retrieving necessary words or putting the words syntactically in order take up a large part of their working memory, and therefore they cannot allocate their cognitive resources to more advanced activities such as grouping semantically-related words or producing novel combinations of words.

What types of vocabulary tasks are effective depends on what aspects of vocabulary knowledge are to be improved. According to *transfer appropriate processing* (Morris, et al., 1977), semantically oriented tasks can develop semantic knowledge of target words, whereas structurally oriented tasks can develop structural knowledge of target words. Hence, semantic vocabulary tasks can facilitate learners' performance in semantically related tests, while structural vocabulary

tasks can improve their performance in structurally related tests.

Figure 1.1

Components of Vocabulary Learning: Semantic, Formal, and Mapping
(Barcroft, 2015)

Semantic Processing	Form Processing	Processing for Mapping
Semantic Learning	**Form Learning**	**Mapping**
(e.g., memory for known words)	(e.g., memory for new L2 word forms)	(e.g., ability to connect form to meaning)
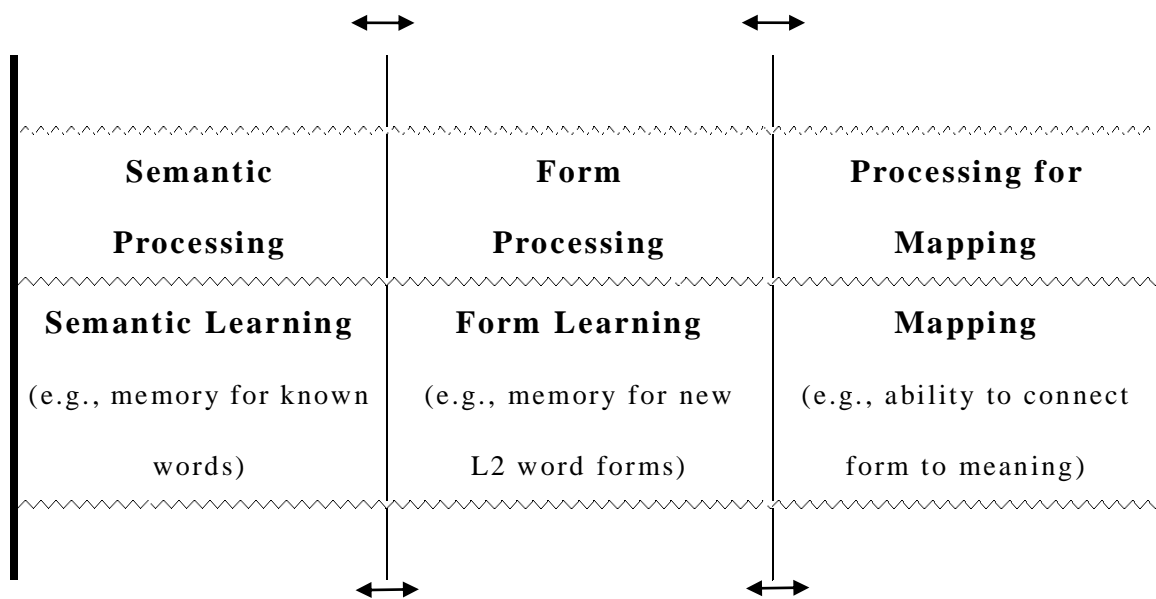
The idea of *transfer appropriate processing* is supported by the
type of processing – resource allocation (TOPRA) model (Barcroft, 2002,
2007, 2009, 2012, 2015). Barcroft put forward the idea that different
types of processing can produce different types of learning outcomes. He
described the relationship among three components of
processing/learning: semantic, form and mapping (connecting form to
meaning). See Figure 1.1. The TOPRA model assumes that the
processing resources available to a learner are limited. These limited
resources are represented by the overall distance between the two thicker
outer lines. Though the distance changes according to the learner's

8

growth in L2 proficiency, the distance for any given learner in any given learning situation is fixed. However, the inside lines between the three components do move. If a learner distributes a large amount of his/her cognitive resources to one of the three components, the other two components will receive less attention and less cognitive effort. There is a trade-off between the cognitive resources allocated to the three components.

In sum, "learners cannot handle the three components at the same time or learn all of them all at once" (Barcroft, 2015, p. 58). This is especially the case with novice EFL learners. Learning vocabulary is a time-consuming cumulative process, and "[n]ot all aspects of word knowledge are equally important" (Nation, 2020, p.15). What is important for novice EFL learners is to establish form-and-meaning connections of high-frequency English words. These connections include not only sound-and-meaning but also spelling-and-meaning links. Of course, it is possible for EFL learners just to learn spoken English without learning to read or write English, but most EFL learners in Japan already have cognitive abilities to read and write. Moreover, being able to read English enables them to have access to large amount of graded reading materials in English (Nation, 2020). Having connections between spoken forms, written forms and meanings of basic English words would give them a great benefit. Rather than letting them work on some elaborate tasks focusing on other various aspects of vocabulary knowledge, English teachers should let them concentrate on the mapping component. If learners have form-and-meaning connections of

high-frequency English words, they gradually begin to take advantage of various types of incidental learning. Therefore, decontextualization can be an effective approach to vocabulary learning for novice EFL learners because it allows them to concentrate on mapping. The effectiveness of decontextualization will be considered more closely in Chapter 2.

1.3 The Next Step After Mapping in EFL Vocabulary Learning

Though it is beneficial for novice EFL learners to make use of decontextualization, they need to be exposed to natural contextualized input, too. Natural contexts provide them with various information on how to use lexical items. However, in order to take advantage of contextualization, they need to expand their knowledge of the basic target vocabulary, until they understand 95-98 % of most spoken/written texts of the target language (Liu & Nation, 1985). EFL situations usually do not give learners sufficient comprehensible input for this to happen. Most authentic spoken/written input is beyond their understanding, and this is especially the case with most JHS and SHS students and quite a few university students in Japan. They need to comprehend basic English grammar, constructions, and various types of formulaic sequences before they make use of incidental vocabulary learning from authentic materials. A certain level of lexical proficiency is needed for EFL learners to take advantage of contextualization (Hasegawa, 2014; Laufer & Rozouski-Roitblat, 2011).

One way to help them to learn lexical items from context is to give them typological salience when they read English texts (Peters, 2012).

10

Presenting target lexical items in bold type or underlining them can help learners pay more attention to these lexical items. Another way is to give them post-reading word-focused activities (Yang, et al., 2017). Letting them engage in vocabulary tasks such as answering vocabulary quizzes and making example sentences with the target words has been found to be effective for helping novice or lower-intermediate EFL learners to retain the target items.

Another way for intermediate English learners to fill the gap between decontextualization and contextualization is to help them learn chunks or formulaic sequences that are often used in daily spoken and written communication. It is widely known that there are a large number of combinations of words in English that function like one word, and "they make up a large proportion of any discourse" (Schmitt & Carter, 2004, p.1). Learning these word combinations can help learners to improve their fluency in comprehending long discourses. This can lead to their better use of context when learning new lexical items.

However, it is not easy to teach these word combinations systematically in EFL classrooms. The time EFL teachers /learners can use in EFL courses is really limited and these word combinations are remarkably diverse and exist in many forms (Schmitt, 2004; Wray, 2002, 2008). Though learning these chunks in English can speed up learners' understanding and producing message in English, it would be a tough job for EFL teachers to select beneficial chunks and to use them in EFL courses.

Limiting the types of word combinations could help solve the

problem of selecting beneficial combinations for learners. This study suggests using two-word combinations such as adjective + noun or verb + noun because they are basic cores of English sentences. They are very frequent (Simpson-Valch & Ellis, 2010) and it is easier to find them than to find long phrases made of three or four words. Learning these two-word combinations is extremely beneficial for EFL learners as it helps them to construct basic English sentences.

1.4 Known-and-Unknown Two-Word Combinations

Among the various types of two-word combinations, this study aims at examining the effectiveness of known-and-unknown two-word combinations. A known-and-unknown word combination consists of a word that is already known to a learner and a target word that is new to the learner (The order of the combination can sometimes be the opposite: it can be an unknown-and-known two-word combination). Attaching a known word to a new word is thought to be effective for remembering the meaning of the new word because the connection between the known word and the new word can facilitate incorporation of the new word into a learner's mental lexicon (Boers & Lindstormberg, 2008; Sökmen, 1997). In the decoding phase, when the learner tries to establish the form-and-meaning connection, the known word makes it easier for the new word to be transferred to the learner's long-term memory. In the decoding phase, when the learner tries to retrieve the meaning of the new word, the known word helps to limit the scope of the meaning search.

Human beings often make use of something they already know

when they would like to remember something new. This is also the case with vocabulary learning (Schmitt, 2010). Some studies in psychology have proved the effectiveness of cued recall (Higham, 2002; Higham & Tam, 2005; Thomson & Tulving, 1970). In cued recall, learners remember a new word together with another word that is familiar to them. The successful recall rate rises if the target word is presented with the familiar word in the decoding phase. The familiar word works as a cue to encode and decode the meaning of the target word. The effectiveness of cued recall is also supported by some studies in second language acquisition (Ishizuka, 2005; Nakagawa, 2008). These studies have shown the superiority of combination learning between an old word and a new word.

The previous studies above lead us to the assumption that learning a new word in a two-word combination that includes a familiar word is more effective than learning a new word on its own. In other words, attaching a familiar word to a word to be remembered in the decoding phase helps learners to retain and retrieve the meaning of the target word. The main purpose of the present paper is to investigate the effectiveness of known-and-unknown (or unknown-and-known) two-word combination learning for EFL learners who have already mastered a certain number of high-frequency English words. In addition, this study considers what types of combination are effective and whether this type of learning is effective for lower-intermediate EFL learners. This paper also aims to create a list of known-and-unknown (and unknown-and-known) combinations for intermediate EFL learners. Moreover, the present study

seeks for effective presentations of the two-word combinations items to learners.

1.5 Organization of the Paper

The rough organization of this paper is as follows (The organization is also illustrated in Figure 1.1). Chapter 2 will deal with the theoretical background of this study in detail. First, it will review the importance of decontextualization in EFL situations. Then, it will discuss the necessity of learning collocations. Next, approaches to promoting collocation learning, cued recall and known-and-unknown combination learning will be introduced. The mechanism of their effectiveness will also be mentioned. Chapter 2 will also refer to what types of known-and-unknown (or unknown-and-known) two-word combinations are to be handled in this paper.

Chapters 3 and 4 will examine whether learning a known-and-unknown two-word combination is more effective in terms of retention and retrieval of meaning than learning a single unknown word. In other words, these chapters will investigate whether attaching a known word to a new target word to be remembered is superior for meaning retention and retrieval of the target word as compared to learning the target in isolation. Chapter 3 will report on a within-subject experiment, where the same participants will learn both single target words and known-and-unknown two-word combinations with different target words. Chapter 4 will describe a between-subject experiment, employing two groups with the same vocabulary size. One group will

14

learn target words in isolation; the other group will learn the known-and-unknown two-word combinations with the same target words in them.

Chapters 5 and 6 will examine what types of two-word combinations are effective for vocabulary learning of EFL learners. Chapter 5 will compare verb (known) + noun (unknown) combinations with adjective (known) + noun (unknown) combinations, using the same target nouns. It will examine which cues, verbs or adjectives provide most assistance for remembering new nouns. Chapter 6 will set unknown verbs as target words to remember. It will compare verb (unknown) + noun (known) combinations with verb (unknown) + adverb (unknown) combinations. It will reveal which cues, verbs or adverbs, are more helpful for remembering new verbs.

Chapter 7 will examine whether this known-and-unknown two-word combination learning is effective for novice EFL learners. It will employ first-year students in a junior high school in Japan, who start to learn English as one of the main official subjects. This two-word combination learning requires some vocabulary knowledge of high-frequency English words. Therefore, this approach can be effective for intermediate learners who already know the meanings of a certain number of English words. Chapter 7 will examine how this approach works for novice EFL learners.

Chapter 8 will show the process of making a list of known-and-unknown two-word combinations, and a list of unknown-and-known two-word combinations. Based on the results of the

previous chapters and with the help of a reliable large-scale corpus, the Corpus of Contemporary American English (COCA), the author will make two lists of two-word combinations which can be useful for intermediate EFL learners such as high school students in Japan.

Chapter 9 will deal with effective presentations of two-word combinations chosen in the lists of two-word combinations. Previous studies have shown that a spaced presentation of target words can be more effective for long-term retention than a crammed presentation of target words (Coxhead, 2006; Kornell, 2009; Nation, 2013). In a spaced condition, learners learn the same target word again some period after they learned it previously. On the other hand, in a crammed condition, learners learn the same target words consecutively without any interval. Chapter 9 will examine which type of presentation would be more effective in learning known-and-unknown (or unknown-and-known) two-word combinations.

The final part of this paper will deal with a general discussion, conclusions and pedagogical implications drawn from the whole study. Chapter 10 will summarize the general discussion, and then Chapter 11 will conclude the whole study and explore several pedagogical implications.

Notes to Chapter 1

1. Once Krashen (1982, 1985) clearly distinguished acquisition from learning: "'Acquisition' is a subconscious process identical in all important ways to the process children utilize in acquiring their first language, while 'learning' is a conscious process that results in 'knowing about' language" (1985, p. 1). However, Ellis (1985) did not support this distinction and used the two terms interchangeably. This study is based on the viewpoint of the latter.

2. This Course of Study was announced in March, 2017. It was decided that English would be introduced as a compulsory subject into elementary school. About 500 to 600 words are to be taught at elementary school level. Another 1,600 to 1,800 words are to be introduced at junior high school. The current Course of Study stipulates that about 1,200 words should be taught at junior high school.

Chapter 2

Theoretical Background of the Study

This chapter provides the theoretical background of this dissertation in the following manner. First, the author clarifies what aspect of vocabulary knowledge this study deals with: receptive connections between L2 forms and L1 meanings. Second, he mentions the importance of decontextualization in these form-and-meaning connections and introduces the importance of learning formulaic sequences. Then, as the first step to learn formulaic sequences, he proposes learning known-and-unknown two-word combinations. Theoretical support for learning these combinations will be described from psychological, neuroscience, and second language acquisition fields. After the summary of the background, the author shows general research questions and how these questions are treated in the following chapters.

2.1 The Importance of Decontextualization for Novice EFL Learners

2.1.1 Vocabulary Knowledge that the Present Study Focuses on

Vocabulary knowledge has been regarded not as a solitary concept but a complex composite with various dimensions. Different vocabulary scholars have used different classifications to define these various aspects of vocabulary knowledge (Daller et al., 2007; Henriksen, 1999; Nation, 1990, 2001, 2013; Read, 2000; Richards, 1976). Since Anderson and Freebody (1981), two fundamental aspects, *breath* (or size) and

depth, have been discussed in several studies (Nagy & Herman, 1987; Noro; 2002; Shimamoto, 2005; Qian, 1999, 2002). Besides these two dimensions, Daller et al. (2007) added one more dimension, *fluency*, and explained each of them with a figure (see Figure 2.1).

Figure 2.1

The Lexical Space: Dimensions of Word Knowledge and Ability (Daller et al., 2007, p. 8)

fluenc

breadth
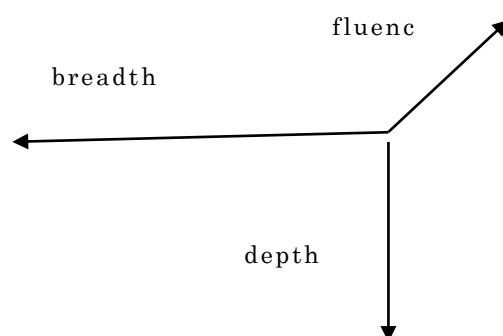
depth

The horizontal axis represents the dimension of *breath* or *size,* which means how many words a learner knows regardless of how much knowledge he or she has about them. The vertical axis represents the dimension of *depth,* which refers to how well a word is known. As mentioned in Chapter 1, Nation (2001) describes the depth dimension in detail, by dividing it into three subcategories such as *Form*, *Meaning,* and *Use* (see Table 2.1). Each subcategory has both receptive and productive aspects. Receptive knowledge is the knowledge for learners to understand spoken and written input of the target language. In contrast, productive knowledge is necessary for them to use lexical items

in their speech and writing. The final axis shows the dimension of *fluency*, which means how fast and automatically learners can "use the words they know and the information they have on the use of these words" (Daller et al, 2007, p. 8).

Table 2.1

Nation's Classification of Aspects of Vocabulary Knowledge (2001, p.27)

Form	Spoken	R	What does the word sound like?
		R	How is the word pronounced?
	Written	R	What does the word look like?
		P	How is the word written and spelled?
	Word parts	R	What parts are recognized in this word?
		P	What word parts are needed to express this meaning?
Meaning	Form and meaning	R	What meaning does this word form signal?
		P	What word form can be used to express this meaning?
	Concepts and referents	R	What is included in concept?
		P	What items can the concept refer to?
	Associations	R	What other words does this make us think of?
		P	What other words could we use instead of this one?
Use	Grammatical functions	R	In what patterns does the word occur?
		P	In what patterns must we use this word?
	Collocations	R	What words or types of words occur with this one?
		P	What words or types of words must we use with this one?
	Constraints and use	R	Where, when, and how often would we expect to meet this word?
		P	Where, when, and how often can we use this word?

Note. R means receptive and P means productive.

Between these three basic dimensions of vocabulary knowledge, the most

20

important one for novice and lower-intermediate learners of English is *breath* or *size*. Several vocabulary researchers have suggested that breath rather than depth can be of crucial importance to these learners, because vocabulary size is a good predictor of their English proficiency (Laufer, 1992; Meara, 1996; Milton, 2009). Meara (1996) even insisted that vocabulary size could be the only important dimension in terms of dealing with small lexicon up to 5,000-6,000 words. Moreover, some studies have supported that learners with larger vocabulary sizes can gain more vocabulary knowledge through incidental learning such as extensive reading (Horst, Cobb, & Meara, 1998; Webb & Chan, 2015). The first important job for novice learners is to increase their vocabulary sizes.

These studies measured vocabulary sizes by using L2 recognition or L2 recall tests. In other words, they measured receptive dimension of form-and-meaning connections, because establishing receptive form-and-meaning connections is the crucial first step of vocabulary learning, and because this aspect can be measured quickly (Henriksen, 1999; Read, 2000). Novice or intermediate learners of English need to increase this receptive knowledge of form-and-meaning connections. Understanding the meanings of basic English words is the key to understand the messages in spoken and written discourse. Without this knowledge, learners cannot take advantage of incidental learning, which is especially true of EFL learners who have only limited English input outside their English classrooms. Intentional learning to establish form-and-meaning connections of high-frequency English words is

21

indispensable. The present study focuses on this dimension of receptive vocabulary knowledge: understanding equivalent L1 meanings from L2 forms. Hereafter, the term *known* in this study means that learners know L1 meanings of L2 target forms.

2.1.2 Criticism Against Decontextualization

To expand learners' vocabulary sizes, paired-associate learning, where L2 target words are presented with their L1 meanings (or L2 synonyms), has been often used. However, as mentioned in the previous chapter, whether words should be taught in context (contextualization) or out of context (decontextualization) has created a heated debate in L2 vocabulary teaching. Contextualization means presenting new L2 target words in natural contexts such as in an example sentence or in texts; decontextualization means taking L2 target words out of context, and letting learners engage in learning target words by bilingual word pairs. In the latter learning condition, learners often use a word card with an L2 target word on one side and its L1 equivalent on the other side, or a word list where a certain number of target words and their equivalent L1 meanings are presented side by side. Nowadays, decontextualization, such as word card learning or word list learning, is unpopular because just remembering many words without context can be boring. Therefore, it may be a challenge to make it a pleasant activity for learners (Folse, 2004). On the other hand, it is possible to assume that contextualization can allow learners to use context to understand several aspects of lexical knowledge, such as grammatical functions, collocations, and constraints

in use, which are helpful for productive use of newly learned words.

In fact, decontextualization was severely criticized during the heyday of communicative language teaching (CLT) in the 1980s. The goal of CLT is to "enable students to communicate in the target language" (Larsen-Freeman & Anderson, 2011, p. 122), and it emphasizes the importance of natural meaning context as input. CLT supporters insisted that decontextualization cannot help learners to understand the communicative functions of lexical items. One of the most influential supporters of this idea was Stephen Krashen, who argued that intentionally learned knowledge cannot be turned into acquired knowledge that is useful in real communication (Krashen, 1982, 1985). Krashen (1993) insisted that free voluntary reading, which is a large amount of reading for pleasure, can help learners increase their vocabulary automatically. Oxford and Crookall (1990) described decontextualizing techniques as inadequate because they remove "any communicative context that might help the learner remember and that might provide some notion as to how the word is actually used as a part of language" (pp. 9-10). They criticized decontextualization because it does not lead to learners' productive use of vocabulary.

2.1.3 Empirical Studies to Support Decontextualization

In terms of mastering L2 form-and-L1 meaning connection only, however, several studies have shown that learning words out of context is more effective than learning words in context. Prince (1996) revealed the superiority of L1-L2 paired-associate learning over guessing the

meanings of words from context. He compared L1-L2 paired-associate learning and learning an L2 word in one or two sentences. French learners of English (n = 48) were divided into either of the two conditions to learn 44 English target words. In the paired-associate learning condition, the participants were given a list of the 44 English words with their French equivalents. In the context learning condition, each target word was shown in one or two sentences, and the participants had to guess the meanings of the target words. One week after the learning session, they took two types of recall test: one was a translation test, where they had to write down the French translations of the targets; the other was a fill-in-the-blank test, where they had to write down a target English word in the blank of the example sentence. The results showed that the paired-associate learning group outperformed the context learning group. Mondria (2003) conducted a similar experiment and found that the meaning-inferred method (guessing a meaning from context) led to a similar level of retention as the meaning-given method (L1-L2 paired-associate learning), though the former took a longer time. He concluded that paired-associate learning is much less time-consuming and much more efficient.

Qian (1996) had 63 Chinese EFL learners learn the same 15 new words in either a decontextualized situation (Group D) or a contextualized situation (Group C). In a 30-minute learning period, Group D (n = 31) learned the target words on a word list which included the target words with their definitions or synonyms in English. Group C (n = 32) was given a text that included the target words highlighted in

Italic type. In the same 30-minute period, they were instructed to guess the meanings of the target words as well as to answer some general comprehension questions. Twenty minutes after the learning session, both groups took a recall test that asked the participants to write down the Chinese equivalents of the target words. The same recall test was repeated one week and two weeks after the first recall test. Throughout the three recall tests, Group D consistently achieved significantly higher scores than Group C.

Laufer and Shmueli (1997) compared the following four conditions: (a) learning an L2 word with L1 or L2 glosses, (b) learning an L2 word with L1 or L2 glosses and a sentence embedded with the target word, (c) learning all the target words in one long text with L1 or L2 glosses in the left-hand margin, and (d) learning all the target words in an "elaborated" text with the same glosses as in (c). The elaborated text had a synonym or a brief explanation just after each of the target words. In a delayed recall test, conditions (a) and (b) showed better results than (c) and (d). The results of this study also indicate the superiority of decontextualization over contextualization.

Laufer and Rozovski-Roitblat (2011) examined how these two conditions affected the long-term retention of new words in an incidental learning condition.[1] They had 20 participants learn 60 words incidentally in a 13-week English course. The participants encountered the target words through their coursebook, which had 17 units. Half of the 60 target words were assigned to the text and occasional FonF (hereafter T+F) condition; the rest of them were assigned to the text and FonFs

(hereafter T+Fs) condition. In the T+F condition, the participants read a text and could use a dictionary whenever they felt they needed to understand a word. In the T+Fs condition, they read a text and was given the decontextualized practice of the target words (i.e., definition-matching) and incorporated the target words into example sentences. The 30 target words in each condition appeared with three different frequencies: 10 words out of the 30 occurred two or three times, another 10 appeared four or five times, and the rest 10 were shown six or seven times. At the end of the course, the participants took two tests on passive word knowledge: one asked them to write down an L1 equivalent of the target words and the other had them choose the correct translation of the target from four options. The results showed that the effect of an increase in word occurrence was found only in the T+Fs condition. Only in this condition, the more encounters with a target word the participants had, the longer their retention of the word. This was not the case with the T+F condition. This indicates that decontextualization can enhance the effect of repeated exposure to words on their retention, but contextualization cannot.

These better results of decontextualization may be explained by a theory called *transfer appropriateness*. The gist of this theory is that learners achieve high retention scores if a recall task is identical to a learning task (Brasford et al., 1979). The previous studies above employed an L1 meaning recall test, which was parallel to the paired-associate learning that the participants had worked on. Webb (2007) assumed that learners "may learn much more about the meaning

26

of a word from context than they can from a translation or synonym" (pp. 63-64). He used 20 artificial target words and compared learning word pairs (target words and L1 glosses) with learning an L2 word with an L1 gloss and a sentence embedded with the target word. After the learning phase, he conducted 10 different receptive and productive tests to identify differences in vocabulary knowledge the participants received from these two conditions. The results showed that there was no significant difference in any of the 10 tests between the two conditions. This study did not prove that learners can obtain more vocabulary knowledge from contextualization than from decontextualization.

In sum, these previous studies have proved the superiority of decontextualization over contextualization in terms of establishing form-and-meaning connections, which is thought to be the first important step of vocabulary learning. A possible reason for this superiority is that learners can pay more attention to new words in decontextualization than in contextualization. Broader contexts do not enable learners to focus exclusively on target words (Folse, 2004). It is not effective for novice EFL learners to deal with elaborative vocabulary activities such as learning multiple aspects of vocabulary knowledge (Barcroft, 2002). According to Barcroft's type of processing-resource allocation (TOPRA) model, such elaborative tasks demand that learners allocate their limited cognitive sources to several aspects of vocabulary knowledge, which leads them to pay less attention to connecting forms and meanings of target words. In EFL situations, where learners are not constantly exposed to English input, they are encouraged to deal with

tasks that give them a light cognitive burden. In the case of vocabulary learning, decontextualized paired-associate learning should be recommended because they can use their existing L1 knowledge to understand the core meanings of L2 words. This is an efficient and effective first step in L2 vocabulary learning. Accumulating the form-and-meaning connections of basic L2 words through intentional decontextualization can pave the way to making use of incidental contextualization.

It is true that there are some teachers and scholars who are worried that form-and-meaning connections acquired through decontextualization will soon be forgotten (Judd, 1978). However, there is an "enormous amount of evidence that shows that even without a sentence context a large number of words can be learned in a short time and can be retained for a long time" (Nation, 2013, pp. 438-439). Thorndike (1908) and Webb (1962) revealed that the learners remembered the meanings of a large number of words in a short period and retained the gained knowledge for a long time. De Groot (2006) confirmed the long retention of quickly learned items and found that factors such as the concreteness or imageability of the word pronounceability, and cognate or loanword status affected the period of retention.

Moreover, intentionally acquired knowledge can be turned into knowledge that is quickly used in real communicative situations, which has already been mentioned in the previous chapter. Elgort (2011) has given us evidence that vocabulary knowledge that is deliberately learned

through decontextualization can be turned into knowledge used quickly enough for real communication.[2] She had the participants remember the meanings of 48 pseudowords through word cards. After a week of learning sessions, she conducted three priming experiments by using the 48 pseudowords as the primes. It was found that deliberately acquired knowledge of the pseudowords was accessed automatically and incorporated into the network of the existing vocabulary items. Contrary to the assumption of Krashen (1982, 1985), her study has proved that intentionally learned knowledge is useful for quick use in real communication.

In conclusion, decontextualization should be accepted as an indispensable part of L2 vocabulary acquisition. This is especially true of EFL situations, where learners hardly ever get natural exposure to English outside English classrooms. EFL learners should take advantage of decontextualized learning such as word lists or word cards especially at an early stage of English acquisition. Decontextualization can be of great benefit to novice and intermediate learners of English in Japan because it helps them to expand their vocabulary size in a short period of time. Form-and-meaning connections of basic English words acquired through decontextualization can help them make use of contextualization, which often takes the form of incidental learning. Though it is true that both types of learning, decontextualization, and contextualization, can be beneficial to L2 learners (File & Adams, 2010; Spada & Lightbown, 2008), EFL learners need to increase their form-and-meaning connections of frequent English words by decontextualization before

they can make use of contextualization.

2.2 Learning Word Combinations

2.2.1 The Importance of Learning Formulaic Sequences

Decontextualization can be an effective and efficient way to help EFL learners master basic high-frequency English words. However, they need to acquire other vocabulary knowledge before they start to make use of learning vocabulary through authentic materials. In addition to understanding English grammar and structures, one thing they have to achieve is to acquire a large number of word combinations. It is widely known that there are a countless number of combinations of words in English that are prefabricated and behave like one word, and that "they make up a large proportion of any discourse" (Schmitt & Carter, 2004, p. 1). These combinations have various names such as *chunks, collocations, multiword units, lexical units, or formulaic sequences.* Wray (2002) used the term 'formulaic sequences' and defined them as follows:

a sequence, continuous or discontinuous, of words or other elements, which is, or appears to be, prefabricated: that is, stored and retrieved whole from memory at the time of use, rather than being subject to generation or analysis by the language grammar. (p. 9)

Since the 1990s, a fair number of vocabulary researchers have shed light on the importance of formulaic sequences or collocations, and

have insisted that teaching them should be integrated into L2 language courses (Lewis, 1993, 2000; McCarthy, 1990; Nattinger & DeCarrio, 1992; Schmitt, 2004, Simpson-Vlach & Ellis, 2010, Sinclair, 1991). Some studies have revealed that mastery of formulaic sequences can distinguish not only native and non-native speakers (Durrant & Schmitt, 2009; Siyanova & Schmitt, 2007) but also lower and higher L2 learners (Hsu, 2007; Schmitt, 2010). This is because native speakers and advanced L2 learners can process formulaic sequences quicker than non-formulaic sequences (Schmitt, 2010; Underwood, Schmitt & Galpin, 2004). Native speakers and advanced learners have stored a large number of these chunks as one word, and they deal with these chunks as fast as they deal with one word. There is no doubt that mastering these formulaic sequences is a crucial aspect of L2 learning, and that it could be of great help to EFL learners for filling the gap between intentional one-to-one paired-associate vocabulary learning and incidental vocabulary learning with authentic materials.

2.2.2 Difficulty in Teaching and Learning Formulaic Sequences

Though mastering formulaic sequences is indispensable for learners of English to improve their fluency and general proficiency, teaching and learning these multiword items is often neglected in ESL/EFL courses. Wolter (2020) mentions two main reasons for this. One is that many language teachers stick to a traditional way of focusing on teaching grammar and individual words. The other one is that there are so many terms to mean formulaic sequences that teachers and

31

learners have difficulty to grasp the existence and importance of these expressions.

Wolter (2020) picks up three typical types of formulaic sequences: phrasal verbs, collocations, and idioms. Each type has its own characteristics that make it difficult for L2 learners to acquire. For instance, a phrasal verb, which is usually made up of two or three words such as verb + adverb or verb + adverb + preposition, is "massively polysemous" (p. 495). The phrasal verb *make out* has several meanings like *discern, insist, succeed*, and *survive*. Collocations are challenging to learn, too, because there are no convincing reasons why some combinations of words are preferred than others. Moreover, learners' L1 collocation knowledge often interferes with L2 collocation learning. They sometimes produce L1-like collocations which do not exist in the target L2 (Nesselhauf, 2003). Idioms are another burdensome type of formulaic sequences. The difficulty of acquiring idioms mainly lies in their "semantic opacity" (Wolter, 2020, p. 503). What an idiom means is often not identical to the total meaning of its parts. Learners of English cannot guess the meaning of *kick the bucket* (= die) from each word in the idiom.

There are some studies to deal with how to teach formulaic sequences effectively to L2 learners, though the number of these studies is small. Bishop (2004) suggested that adding typological saliency (using boldface, underlining, using colors, or using asterisks) to target formulaic sequences could lead to more attention and increased comprehension of these items. Durrant and Schmitt (2010) showed that

32

repeated exposure to the same sentential context in which learners learned a new collocation would be more effective than exposures to alternative contexts. Webb and Kagimoto (2011) found that "increasing the number of collocates presented with node words may increase learning" (p.270). Boers (2000) insisted that explicit instructions on core meanings and origins of idioms could help learners to retain the idioms. Eyckmans and Lindstormberg (2017) found that idioms with repetitions with sounds, such as alliteration and assonance, were easier to be acquired. In sum, all these studies dealt with some specific types of formulaic sequences in some specific learning environments. As far as the author knows, there are no studies that show a systematic procedure of teaching useful formulaic sequences to L2 learners. Swan (2006) described pedagogical difficulty in dealing with formulaic sequences as emptying the sea with a teaspoon. Therefore, teaching formulaic sequences has often been neglected in ESL/EFL courses.

2.2.3 Focusing on Two-Word Combinations

As seen in the previous section, it is a challenging job for EFL learners to learn new words in formulaic sequences. Kasahara (2011) argues that "formulaic sequences are so diverse and exist in so many forms (Schmitt, 2004; Wray, 2002) that it is difficult to find suitable ones" (p. 492) in EFL learning contexts. He proposes that one solution is to limit the types of formulaic sequences, and that to adopt two-word combinations[3] can be a possible approach. Two-word combinations are so basic and frequent in English (Simpson-Vlach & Ellis, 2010) that they

33

can be found more easily than longer chunks consisting of three or four words. It is true that shorter combinations are more frequent: Shin and Nation (2008) report that two-word collocations make up 77 percent of the total number of collocations. Hence, the present study focuses on the possibility of using a two-word combination in EFL vocabulary learning.

What types of two-word combinations would be worth learning for intermediate English learners in Japan? Combinations that include a noun or a verb can be beneficial because nouns and verbs are basic components of English sentences. Nouns often collocate with adjectives; verbs often associate with adverbs. Nouns, verbs, adjectives, and adverbs are the most frequently learned four parts of speech by language learners (McCrostie, 2007). Learning two-word combinations that consists of these parts of speech can be beneficial to EFL learners in Japan.

Among possible combinations, adjective-and-noun combinations should be the first choice because they are typical and frequent collocations in any language (Aitchison, 2003). Nouns are so essential that they are learned earlier than verbs in L1 acquisition. (Tomasello, 2003). Children tend to acquire nouns before verbs, because nouns refer to more specific, concrete, imageable entities than verbs. In addition, nouns appear in much less different forms than verbs (Peters, 2020). Adjectives can be learned with nouns in the earliest period of L1 acquisition. Adjective + noun collocations are basic combinations not only in L1 acquisition but also in L2 acquisition. Barfield (2009) argues that "adjective + noun collocations are the foundation L2 collocation

34

knowledge" (p. 108). Hence, this study chooses adjective + noun combinations that are beneficial for EFL learners.

Another typical and frequent two-word combination including a noun is a verb-and-noun combination (Lewis, 1997). L2 learners frequently produce adjective + noun combinations and then move on to verb + noun combinations (Barfield, 2009). Mastering verb-and-noun combinations is also crucial for Japanese novice and intermediate learners of English.

In addition to nouns, adjectives and verbs, adverbs are other important content words that convey important information. It is also useful for novice and intermediate learners to master basic verb and adverb combinations because adverbs typically collocate with verbs. Hence, this study mainly deals with adjective + noun combinations, verb + noun combinations, and verb + adverb combinations.

2.3   The   Effectiveness   of   Known-and-Unknown   Two-Word Combinations

2.3.1   Theoretical   Support   for   Known-and-Unknown   Two-Word Combinations

To promote learning two-word combinations mentioned above, this study suggests introducing known-and-unknown two-word combinations. If one word in a two-word combination is already familiar to them, the burden of learning the two-word combination would be reduced. They can make use of "known" or previously acquired knowledge when they try to remember and take in "unknown" or previously unacquired

35

knowledge, which means making links between known words and unknown words. It is natural for learners to establish connections between old and new knowledge because the old knowledge can help them retain the newly acquired knowledge. This can be applied to second language vocabulary acquisition. A link between a new word and an old word can help incorporate the new word into a learner's mental lexicon (Boers & Lindstormberd, 2008; Sökmen, 1997). Linking between old and new words can prevent L2 learners from quickly forgetting the new word (Barcroft, 2002; Pierson, 1989; Sökmen, 1997). Schmitt (2010) explains why attaching old words to new words can help learners to remember and retain the new items:

Since the 'old' words are already fixed in the mind, relating the new words to them provides a 'hook' to remember them by so they will not be forgotten. New words which do not have this connection are much more prone to forgetting (p. 35).

Hence, turning one unknown word in a two-word combination into a known word could be of great value in promoting vocabulary learning for EFL learners. In other words, remembering a known-and-unknown (or an unknown-and-known) two-word combination could be of great help for learners who know a certain number of high-frequency English words. Figure 2.2 explains how beneficial this two-word combination learning could be for learners.

Figure 2.2

Advantages of Known-and-Unknown Two-Word Combinations on Learning Process.

ACQUSITION		RETENTION	RETREIVAL	
In advance of learning	On-going learning	Maintenance of knowledge	Self-directed search	Output of response

RETENTION

1. Elaborative rehearsal
2. Complementary Learning System
3. Enhanced imageability

RETRIEVAL

1. Encoding specificity hypothesis
2. Associative continuity hypothesis

Known-and-Unknown (Unknown-and-Known) Two-Word Combinations

According to the framework of cognitive psychology, the process of learning new things consists of three stages: acquisition, retention, and retrieval[4] (Mori et al. 1995; Nelson & Narens, 1990). The acquisition is a learning stage with two sub-stages, in-advance of learning and on-going learning. On the stage of in-advance of learning, learners design how their learning should be conducted. They select items to learn and decide how much time and effort they should allocate to each item. In on-going learning, they spend time remembering to-be-learned items. The second stage is retention: learners keep the learned items in their long-term memory by occasional reviews or rehearsals. The third stage is retrieval, which means bring the learned items from their

37

long-term memory on necessary occasions (e.g., exams). This stage has two substages: self-directed search and output of response. The former is the process of learners' searching the long-term memory for necessary items. If they succeed in finding the items, they go on to the latter, the output of response (e.g., writing down answers on an answer sheet).

This process can be applied to the initial process of L2 vocabulary learning: obtaining receptive knowledge of form-and-meaning connections. In the stage of acquisition, learners select L2 words to remember, and connect the L2 forms to L1 meaning through paired-associate learning. In the stage of retention, they maintain the learned L2 items by occasional reviews. In the stage of retrieval, they search for the meanings of learned L2 forms, and find the meanings if it is successful.

It can be assumed that the known-and-unknown two-word combination learning can facilitate this vocabulary learning process. If a learner attaches a known word to a word to be remembered and deal with the target word in the known-and-unknown combination, he or she can facilitate the retention and retrieval stages of the learning process. It could be a better way for lower-intermediate EFL learners to establish form-and-meaning connections of target words than learning the target words as single words. The reasons why the combination learning is effective on retention can be explained by the following three concepts: *elaborative rehearsal, complementary learning system,* and *enhanced imageability.* The detailed explanations are shown in Section 2.3.2. On the other hand, the reasons for the effectiveness of the combination

learning on retrieval can be revealed by the following two hypotheses from cued recall studies: *encoding specificity hypothesis* and *associative continuity hypothesis*. The two hypotheses and their application to the two-word combination learning are described in detail in Section 2.3.3.

2.3.2 The Advantage for Retention
2.3.2.1 Elaborative Rehearsal

Elaborative rehearsal is the first concept to support the effectiveness in the retention of the two-word combination learning. It was proposed by a memory psychologist, Baddeley (1997). He supports the idea that combining old and new information can lead to longer retention. He calls the formation of connections between new and old information *elaborative rehearsal* and distinguishes it from *maintenance rehearsal*, which means repeated rehearsal of an existing representation. He argues that elaborative rehearsal is likely to lead to substantial long-term learning, whereas maintenance rehearsal is useful for short-term retention. Human memory of one experience cannot exist independently but interacts with our memory of other experiences. This interaction can leave a deeper trace in our mind, which is likely to lead to long-term retention (Baddeley, 2014).

In a known-and-unknown two-word combination, the old word interacts with the new word and this interaction helps learners to have a deeper memory trace of the combination and to retain the combination for a long period. When a learner tries to remember a new word *janitor* and he or she already knows the word *school*, remembering the

known-and-unknown two-word combination *school janitor* could be a better way for longer retention of the new word. Repeated encounters of the two-word combination can have the learner make a link between *school* and *janitor*. This link can work as a hook for the new word to stay in the learner's mental lexicon. As a result, the learner can have longer retention of the target word when he or she remembers the word by itself.

2.3.2.2 Complementary Learning System

The second concept to shed light on the mechanism of long retention by known-and-unknown two-word combinations is *Complementary Learning System* (CLS; Davis & Gaskell, 2009; Lindsay & Gaskell, 2010; McClelland et al., 1995). CLS assumes that new and old information is processed in different places in the human brain. New information is sent to the part of the brain called the *hippocampus* (See the right side of Figure 2.3)*,* which is equipped with a rapid learning system. Hippocampus process the newly sent information. With repeated stimulation and consolidation, this information is gradually sent to a slow learning network in the neocortex (See the left side of Figure 2.3).

In terms of L2 vocabulary learning, new words are encoded for a short period of time in the hippocampus, and with repeated encounters of the same words or consolidation that can occur during sleep, the new words are gradually transferred to long-term memory in the neocortex. Phonological memory and semantic memory are thought to be stored in different places in the neocortex. Because a known cue in a

40

known-and-unknown combination is already stored in the long-term memory, a connection between the cue and its target word can facilitate the process of the target word moving into the long-term memory.

Figure 2.3

Mechanism of Complementary Learning System (Davis & Gaskell, 2009, p. 3778)
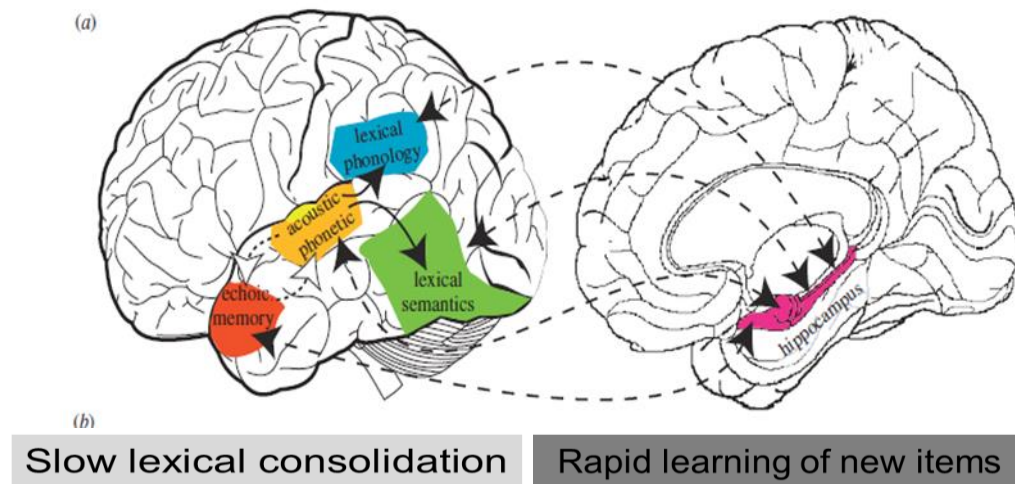
A human mental lexicon has a web-like semantic network of lexical items, in which each lexical item has numerous connections with other items (Aitchison, 2003). A process where a learner incorporates a new word into the semantic network of his/her mental lexicon by establishing connections with existing other items is called an *organization*. A successful organization can create order and consistency between the new and old items (Noro, 2003). This stable relationship can yield long-term retention of new items. It can be assumed that a known-and-unknown combination can facilitate organization because it

41

already includes a connection between the old and new items.

2.3.2.3 Enhanced Imageability

The third concept to explain why the two-word combination learning can facilitate retention is *enhanced imageability*. Imageability means the degree as to how clearly a learner can generate an image of a word when he or she hears or sees the word. Words with higher imageability can be retained better than words with lower imageability (Lindstormberg & Boers, 2008; De Groot & Keijzer, 2000). This could be explained by dual coding theory (Paivio & Desrochers, 1980): a word with a clear image can be processed through two different routes in the mental lexicon. One route is for literal information; the other route is for visual information. This double route processing can promote the retention of words. Usually, concrete words have higher imageability than abstract words (De Groot & Keijzer, 2000), and some studies have shown that concrete words are less susceptible to forgetting than abstract words (Ellis & Beaton, 1993b; Van Hell & Candia Mahn, 1997).

Known-and-unknown combinations can have higher imageability than single words. Adding a known word to a target word can make the image of the target word more specific. For example, imagine a situation where a learner tries to learn a word *fiend* (a person who is addicted to something). If the learner already knows the word *drug,* he or she can make a known-and-unknown combination, *drug fiend*. *Drug fiend* has a clearer and more specific image than *fiend* itself. This enhanced imageability can help the learner retain the target word for a long period

42

of time.

Due to the reasons stated above, the present study assumes that learning a new word in a known-and-unknown two-word combination is more effective for the retention of the new word than learning the new word in isolation. The known word in the combination can work as a hook to remember the new word. The interaction between the old and new words can give a deeper memory trace in a learner's mental lexicon, which leads to long-term retention. The old word can help anchor the new word in the mental lexicon (Daulton, 2008). This combination learning can give novice EFL learners a beneficial way of vocabulary learning after they have acquired a certain number of basic high-frequency words, and they can use these words as hooks to remember new words in the combinations.

2.3.3 The Advantage for Retrieval
2.3.3.1 The Encoding Specificity Hypothesis

The known-and-unknown two-word combinations learning can also be effective for the retrieval of a new target word because an old word attached to the target word in a combination has the potential to work as a cue to retrieve the target from the mental lexicon. This assumption can be supported by the *encoding specificity hypothesis* (ESH), which is originated from cued recall studies in psychology. The gist of the hypothesis is that matching the environments at the encoding (acquisition) phase and the decoding (retrieval) phase can assist in the retrieval of learned items (Tulving & Thomson, 1973). ESH may sound

43

similar to transfer appropriateness (Brasford, et al., 1979) in that the same environments between the learning and the retrieval stages can facilitate the retrieval of learned items. ESH, however, puts emphasis on the principle that something attached to a to-be-learned item can promote the retrieval of the item. Things with to-be-learned items in the encoding phase can help learners to retrieve the items in the decoding phase, as long as the surrounding things also exist in the decoding phase. When learners try to remember something, it is natural that they remember other things that exist close to the target to be remembered. In an encoding phase, something conspicuous about the target can be remembered, and in the decoding phase, this conspicuous thing can help to retrieve the target from memory. It often happens that we can remember a certain incident in life with some specific smell, taste, or touch, which existed with the event. It is reported that even performing an activity while memorizing some information can "make recall far more resistant to the effect of time and aging" (Baddeley, 2014, p. 162).

Baddeley (2014) argues that information attached to a target can function as a key to retrieve the hidden target in memory. The amount of information we can store is always larger than the amount of information we can retrieve. Every piece of information about our experience can be stored and it can remain somewhere in our memory. It waits "for the appropriate key to be turned for it to come flooding back" (p. 115). In the decoding phase, attached memory can work as a retrieval cue that allows "one to locate information that is otherwise inaccessible" (p. 153).

Figure 2.4

Process of Cued Recall

Encoding phase (Acuisition)	RETENTION	Decoding phase (Retrieval)
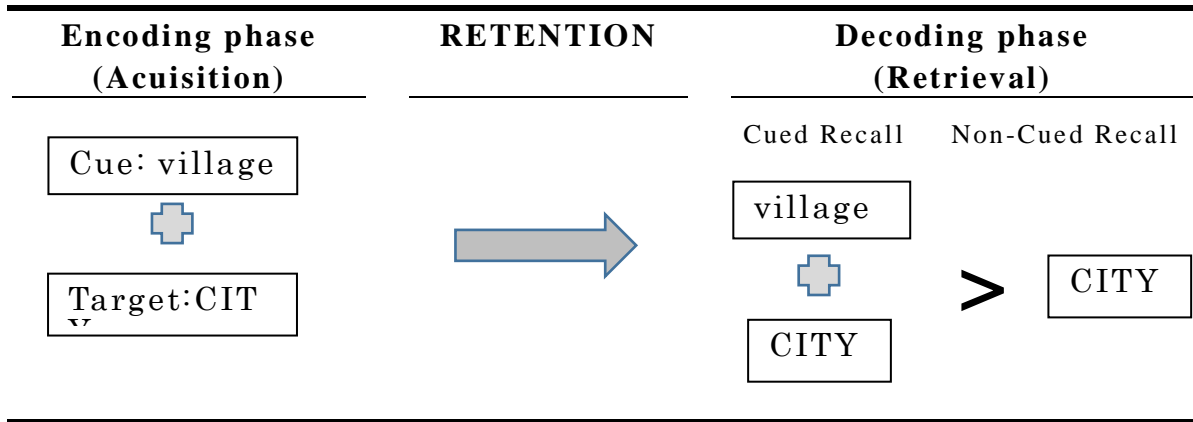
The idea that learning target words with cues is effective in aiding retrieval has been confirmed in several cued recall studies in the psychological field. If a target word is remembered with a cue, and the target is presented with the cue in a retrieval phase, the success rate of retrieval increases. In the framework of cued recall studies, researchers mainly tested semantic relations between cues and target words. They used semantically associated words as cues to help their participants to remember corresponding target words. The process of cued recall studies is shown in Figure 2.4. In the encoding phase, a target word *CITY* is remembered with a semantically related cue *village*. In the decoding phase, participants take two types of recall tests, a cued recall test and a non-cued recall test. In the former test, the participants must recall the target with the presentation of the cue, whereas in the latter, they need to retrieve the target without the cue. Usually, cued recall tests show better results than non-cued recall tests.

A classic study of cued recall is Tulving and Pearlstone (1966).

They had 929 high school students remember target words on nine different lists. The target words were presented under the names of five categories (country in Europe, boy's name, city in U. S., name of a river, and statesman of our day). The nine lists "varied in terms of length (12, 24, and 48 words) and the number of words in category (1, 2, and 4)" (p. 381). The participants were divided into nine groups, each of which was given one of the nine lists. After the learning phase, they took two recall tests, which asked them to retrieve as many target words as possible. There were two types of recall test: one was a non-cued recall (NCR) test, where they had to recall the target words without any cues, and the other was a cued recall (CR) test, where the test-takers were given the category names as cues to remember the targets. In the first recall test, half of the participants were tested under the CR condition and the other half were tested under the NCR condition. In the second recall test, all the participants were tested under the CR condition. Regardless of the word list length or the number of the items per category, the results showed that the CR tests yielded higher scores than the NCR tests. The cues helped the participants retrieve the target words.

Tulving and Osler (1968) conducted another CR experiment by adding four different conditions to Tulving and Pearlstone (1966). First, Tulving and Osler employed two types of cues, strong cues and weak cues. A strong cue had an obvious connection with its target word, e.g., *village-CITY*, whereas a weak cue was weakly associated with its target, e.g., *dirty-CITY*. Second, they tested a condition where cues were presented only in a recall phase, not in a learning phase. Third, they

introduced another condition where participants were given different cues in the encoding and decoding phases. For example, some participants learned target words with strong cues, and recalled the target words with weak cues; others went through the same process in the opposite cue order. Fourth, they examined the effectiveness of double cues: some were given two cues in the learning phase, some in the recall phase, and others in the learning and recall phases.

Tulving and Osler (1968) had 678 high school students, who remembered 24 target words. The participants were put into groups with four different input conditions: the target words without any cues, the target words with strong cues, the target words with weak cues, and the target words with both types of cues. In the recall phase, each input condition group was assigned to five different output groups: recall without any cues, recall with strong cues, recall with weak cues, recall with both types of cue, and free recall of the target and the cues. However, participants who remembered the target word without any cues were not assigned to the free recall group because they had no cues to retrieve. Thus, the participants were put into one of the 19 treatment combinations. Table 2.2 shows the number of participants, the number of words recalled, and the standard deviation in each treatment. As the results show, the recall rates were highest when the same cues were present in both the input phase and the output phase. Regardless of cue type, learners seemed to obtain the greatest benefit in the retrieval of target words, if they learned them with cues and they were provided with the same cues in the retrieval phase.

47

Table 2.2

Number of Participants, Number of Words Recalled, and Standard Deviation (Revised from Tulving and Osler)

Input Condition		Output Condition				
		No	Strong	Weak	Both	Free
No	*n*	37	38	39	37	
	M	10.62	8.39	8.64	8.43	
	SD	2.79	2.97	2.43	2.68	
Strong	*n*	37	36	36	36	33
	M	9.00	14.94	6.94	14.81	8.45
	SD	2.96	3.50	2.68	3.72	2.87
Weak	*n*	36	37	35	37	35
	M	8.44	7.95	14.91	14.84	8.86
	SD	2.94	3.23	4.14	4.76	2.72
Both	*n*	32	34	34	33	32
	M	9.06	11.24	11.79	14.33	8.31
	SD	4.08	3.69	3.86	4.05	3.15

(Notes. No = without any cues, Strong = strong cues, Weak = weak cues, Both = both strong and weak cues, Free = free recall)

2.3.3.2 The Associative Continuity Hypothesis

The two recall studies in the 1960s supported ESP. The other hypothesis to support the known-and-unknown two-word combination learning is the associative continuity hypothesis (ACH). The gist of this hypothesis is that cues can work effectively for retrieval without

48

presenting them with the target words in the encoding phase, provided that the cues have a strong association with their targets (Bahrick, 1969, 1970; Bilodeau & Blick, 1965; Fox, Blick, & Bilodeau, 1964). Some form or meaning association between a cue and a target can help learners to retrieve the target word in the decoding phase. In the known-and-unknown combination learning, the association between the known word (cue) and the unknown word (target) can help learners to retrieve the meaning of the unknown word.

Thomson and Tulving (1970) insisted that ACH contradicted ESH because ESH requires presentation of cues in the decoding phase, but ACH does not. They tested these two hypotheses by conducting three experiments which varied in input and output conditions. They examined different combinations between three input conditions (no cues, with weak cues, and with strong cues) and four output conditions (no cues, with weak cues, with strong cues, and free recall of cues and target words). The overall results favored ESH: the recall rates were much better when the participants were given the same cues in the encoding and decoding phases than when they were given different cues.

However, in the no-cue condition in the encoding phase, strong cues facilitated recall better than weak cues. In addition, the with-cue condition outperformed the non-cue condition. This can support for ACH because the existence of cues in the decoding phase can help promote retrieval of the target words. Associations between cues and targets can help learners limit the scope of the meaning search for the targets. In sum, this study shows that both hypotheses do not contradict each other.

49

Not only ESH but ACH can confirm the strength of the known-and-unknown two-word combination learning in meaning retrieval of target words.

Some scholars revisited cued recall in this century, and their studies confirmed the two hypotheses. Overall, these studies reconfirmed the superiority of CR over NCR (Higham, 2002; Higham & Tam, 2005). In addition, they found that strong cues shown only in the decoding phase could still help learners to retrieve target words because of their strong associative ties to the targets, as long as the learners were forced to show responses to the cues (Higham, 2002). In conclusion, cued recall studies in the psychology field in the past few decades have consistently supported ESH and ACH. If learners are given the same cues to their target words both in the decoding and encoding phases, the cues help them to retrieve the target words.

2.3.3.3 Application of Cued Recall Advantages to Two-Word Combination Learning

One thing that should be noticed here is that cues in these cued recall studies always had L1 semantic associations with target words, such as *village* and *city*. In other words, they had a paradigmatic relationship. On the other hand, the known-and-unknown two-word combination learning takes advantage of syntagmatic relation between the two words. Here arises a question of whether the advantages of cues recall in retrieval can also be applied to the two-word combination learning.

As to the application of cued recall to vocabulary learning, the keyword method (Atkinson & Raugh, 1975) can be considered to be a more elaborative type of cued recall, in which a cue word plays a crucial role in retrieving the meaning of a target word. The keyword method is a well-known mnemonic strategy that includes two steps (Barcroft, 2009). First, a learner finds an L1 word that shares similar orthographic or acoustic properties of a target L2 word to remember. Second, the learner creates a clear, vivid image containing both the L1 word and the L2 target word. For example, to remember the English word *conspicuous,* which means *easy to notice,* a Japanese-speaking learner of English might record the target word as *knonna piasu* for *pierced earrings like these*, and visualize an image of a woman wearing huge pierced earrings to help recall that *conspicuous* means *easy to notice*.

Several studies have shown that the keyword method is an effective way for learners to retrieve the meanings of target words. Brown and Perry (1991) revealed that the keyword method facilitated vocabulary acquisition for lower-proficiency students through the results of the cued recall tests they conducted immediately after treatment. Ellis and Beaton (1993a) is another study to demonstrate the effectiveness of the keyword method for meaning retrieval of L2 target words, though repetition was superior for learning to produce the target words. Jones (1995) described his self-study experience of Hungarian, which has few cognates or borrowings from his native English language. He argued that message-based practice like the keyword method was helpful to increase his Hungarian vocabulary because "it involved considerable

lateral-thinking effort" (p. 105), which could have led to deep processing of the target items. At the same time, Jones mentioned that he used the keyword method only for difficult items to remember; otherwise, he used easier strategies to carry out such as reading it aloud repeatedly.

It is true that the keyword method has some disadvantages: it can be applied to a relatively limited number of items because it is not easy to find keywords that share similar orthographic or acoustic properties with the target words. However, several previous studies have proved its effectiveness for meaning retrieval of target words. Lindstormberg (2020, p. 247) summarizes the reasons why this method is effective for meaning retrieval in the following five points: (a) elaborative imagistic mental processing word meanings, (b) increased distinctiveness of the encoded information, (c) integration of new knowledge with old knowledge, (d) provision of retrieval cues, and encouragement of effortful processing. In sum, the keyword method is a strategy that shows the effectiveness of cued recall for meaning retrieval of L2 target words and that takes advantage of old-and-new connections.

Can this effectiveness of keyword technique be applied to L2 syntagmatic relationships such as adjective + noun, verb + noun, and verb + adverb two-word combinations, which are the focus of the present study? Nakagawa (2008) compared three types of retrieval cues: cues which had a paradigmatic relationship to targets (PARAs), cues which had a syntagmatic relationship to targets (SYNs), and cues which had a phonological relationship to targets (PHONs). For example, a target word *ant* had three cues such as *insect* (PARA), *small* (SYN), and *aunt*

(PHON). She selected 18 target words that consisted of nine high-frequency words and nine low-frequency words. Nakagawa divided 54 undergraduates into three groups. In the encoding phase, Group A learned the 18 target words with the PARAs; Group B learned them with the SYNs; and Group C learned them with the PHONs. In the decoding phase, all the groups were asked to recall the target words with six pairs that comprised a target and a PARA, another six pairs comprising a target and a SYN, and the other six pairs comprising a target and a PHON. The results supported ESH. Regardless of the types of cue or frequency of the target words, the same retrieval cues as shown in the encoding phase assisted the retrieval the most effectively. Nakagawa (2008) showed that syntagmatic cues could work as effectively as paradigmatic cues for retrieval.

The previous cued recall studies have shown that semantically related cues can facilitate retrieval of target words if the cues are shown with the targets both in the decoding and encoding phases. Nakagawa (2008) has also indicated that syntagmatically-related cues can be as effective for retrieval as semantically related cues. These results lead to the possibility that a known word in a known-and-unknown two-word combination can function as a retrieval cue in the decoding phase.

2.3.4 The Single Word Learning vs. the Two-Word Combination Learning

It seems that there is a possibility that attaching a known word to a target word can increase the success rate of retaining and retrieving the

target. However, this assumption leaves a question of whether this two-word learning style is more effective than single word learning. In other words, it is a question of whether L1-L2 paired-associate learning with two-word combinations is more effective than L1-L2 paired-associate learning with single words. It is true that paired-associate learning with single words would be better for novice learners of English who have little knowledge of English vocabulary. As mentioned in Section 2.1, this simple way of learning would impose much less of a burden on novice learners. Moreover, they would not be able to make use of the advantage of known words in two-word combinations. On the other hand, for lower-intermediate learners of English who already know at least about 1,000 high-frequency words, whom this study focuses on, learning with known-and-unknown two-word combinations can be beneficial. They can use known words as cues to store and retrieve target words.

Figure 2.5 shows the merits and demerits of the two types of vocabulary learning. The merit of single-word learning is that it gives learners less learning burden than two-word learning. It can be assumed that this type of learning can be suitable for novice EFL learners. On the other hand, the merit of the known-and-unknown two-word learning is that it can enhance the retention and retrieval of target words. If learners know cue words in two-word combinations, the two-word combination learning can be more effective than the single word learning. Hence, the two-word combination learning can be a better choice for lower-intermediate learners, which is the focus of the present study. It

mainly investigates the possibility of the known-and-unknown two-word combination learning for senior high school and university EFL learners in Japan.

Figure 2.5

Merits and Demerits of the Two Types of Learning

	The Single Word Learning	The Two-Word Combination Learning
Merits	Less learning burden	More effective for retention and retrieval
Demerits	Less effective for retention and retrieval	More learning burden

Good for novice learners	Good for lower-intermediate

There are a limited number of studies that have some relations to examine whether two-word combination learning is more effective for intermediate learners than single-word learning. Laufer and Girsai (2008) investigated the effects of three task conditions on incidental vocabulary learning, using 10 single words and 10 collocations (a verb + a noun). They employed 75 intermediate learners of English, who had already learned English for six years. The participants were assigned to one of the three instructional conditions: meaning-focused instruction (MFI), non-focused form-focused instruction (FFI), and contrastive analysis and translation (CAT). All the groups read an identical English text and answered 13 true-or-false questions. After this, different groups

followed different protocols. The MFI group was given content-oriented tasks where participants were not asked to pay attention to target items. The FFI group had text-based vocabulary tasks which were related to the target items. The CAT group performed a text-based translation task that consisted of L2-to-L1 and L1-to-L2 items. All the participants took active recall tests (L1 to L2) and passive recall tests (L2 to L1) just after the tasks and one week later. The results showed that the CAT group outperformed the other two groups. Another remarkable fact obtained from this study was that all the groups had higher recall rates for collocations than for single words. Though this study was conducted in an incidental learning environment, it suggested a possibility that two-word combination learning could be more effective for intermediate learners than single word learning.

In terms of intentional vocabulary learning, Ishizuka (2005) compared single word L1-and-L2 paired-associate learning with chunk learning that he devised. He had 52 university students learn different 40 low-frequency words (20 nouns and 20 verbs) in total. In the paired-associate learning, the participants were given 20 L1 equivalents next to the 20 target words and asked to connect their meanings and forms. He called this learning condition *word presentation* (WP). In the chunk learning, they were asked to infer the meanings of the other 20 target words, each of which was presented in a two- or three-word chunk. For instance, a target word, *freak,* was shown in the chunk *a car freak.* The participants had to guess the meaning of *freak* with the help of the familiar word *car*, and to choose the correct L1 equivalent from given

choices. He called this condition the *chunk presentation* (CP).

In order to examine the participants' vocabulary gain, Ishizuka (2005) created his own multiple-choice recall test that comprised 30 test items chosen from the 40 target words: half of the test items were nouns and the other half were verbs. Each 15-word set included the same five words presented as a WP in the learning sessions (W→W), five target words presented as a CP in the learning sessions (C→W), and the same five chunks presented as chunks in the learning sessions (C→C). In the recall test, the participants had to choose the L1 equivalent for each test item. They were given 15 choices for the 15 noun items, and another 15 choices for the 15 verb items. Using these three types of test items, Ishizuka conducted four recall tests. Tests 1, 2, and 3 were identical, although he randomized the order of the test items. Test 4 was not the same as the previous ones "in that C→C question items were new and had not been included in the material used in the learning sessions" (p. 113). Test 1 was conducted immediately after the learning sessions, and then, a listening test was conducted for 25 minutes before Test 2. The purpose of this intervention was to deprive the participants of the chance for any additional rehearsal of the target items. Seven weeks later, Test 3 and Test 4 were carried out consecutively.

The results are shown in Table 2.3. Each number shows the percentage of correct answers for each question type in each test. In Tests 1 and 2, the W→W condition showed the highest recall rate, with the C-C condition as the second and the C-W condition as the third. This is not surprising because it follows transfer appropriateness (Brasford, et

57

al., 1979), where the similarity between a testing environment and a learning environment is crucial for success in a test. Remarkable results are seen in Tests 3 and 4: the C→C condition showed the highest recall rate in Test 3. In addition, an almost equal rate to the other two conditions in Test 4, though the chunk items were not identical to those the participants had learned in the learning sessions. These results seem to support the superiority of chunk learning for long-term retention over single word learning. They may show the possibility that attaching a familiar word to a target word to be remembered can facilitate the retention and retrieval of the target in the long run. In terms of lexical types, there was a tendency that target nouns showed higher recall rates in the C→C condition than target verbs in Test 1 (34.9% vs. 24,5%), in Test 2 (36.9% vs. 25.1%), and in Test 3 (24.6% vs. 14.9%). The question of what chunks would be helpful seems to need further investigation.

Table 2.3

Percentage of Correct Answers (%) in Ishizuka (2005)

Item Mode	Test 1	Test 2	Test 3	Test 4
W→W	74.1	71.6	25.1	26.9
C→W	33.1	31.0	18.3	26.3
C→C	59.4	62.0	39.4	26.0

There are some limitations to Ishizuka (2005). First, it is not certain that the participants correctly guessed the meanings of the target

words in the chunks. If they had been given the meanings of the target words in the learning sessions, the results might have been different. Some studies have shown that learners were more successful in recall tests when they were given the meanings of target words rather than when they had to guess the meanings (Prince, 1996; Mondoria, 2003). Second, Ishizuka did not confirm if the words attached to the targets in the chunk learning were familiar to the participants. If they did not know the meaning of *rosy-cheeked* in the chunk *rosy-cheeked lass,* the term *rosy-cheeked* might not have been helpful for retention or retrieval of the target word *lass.* He should have checked whether they knew the attached words in the chunks or should have used only high-frequency words that would have been familiar to the participants.

Therefore, this study aims to investigate the effectiveness of known-and-unknown two-word combination learning over single word learning in a situation where participants were given the meanings of two-word combinations in the learning phase, and familiar words were used as known cues in two-word combinations. In addition, the current study will conduct further examination of what types of combinations could be helpful for the retention and retrieval of target words.

2.4 Research Questions

Considering the previous studies and possible pedagogical implications, the author sets up the following four research questions. Figure 2.6 shows how these questions are handled in the following paragraphs.

59

Figure 2.6

Organization of the Thesis: The Relations of the Research Questions and the Chapters
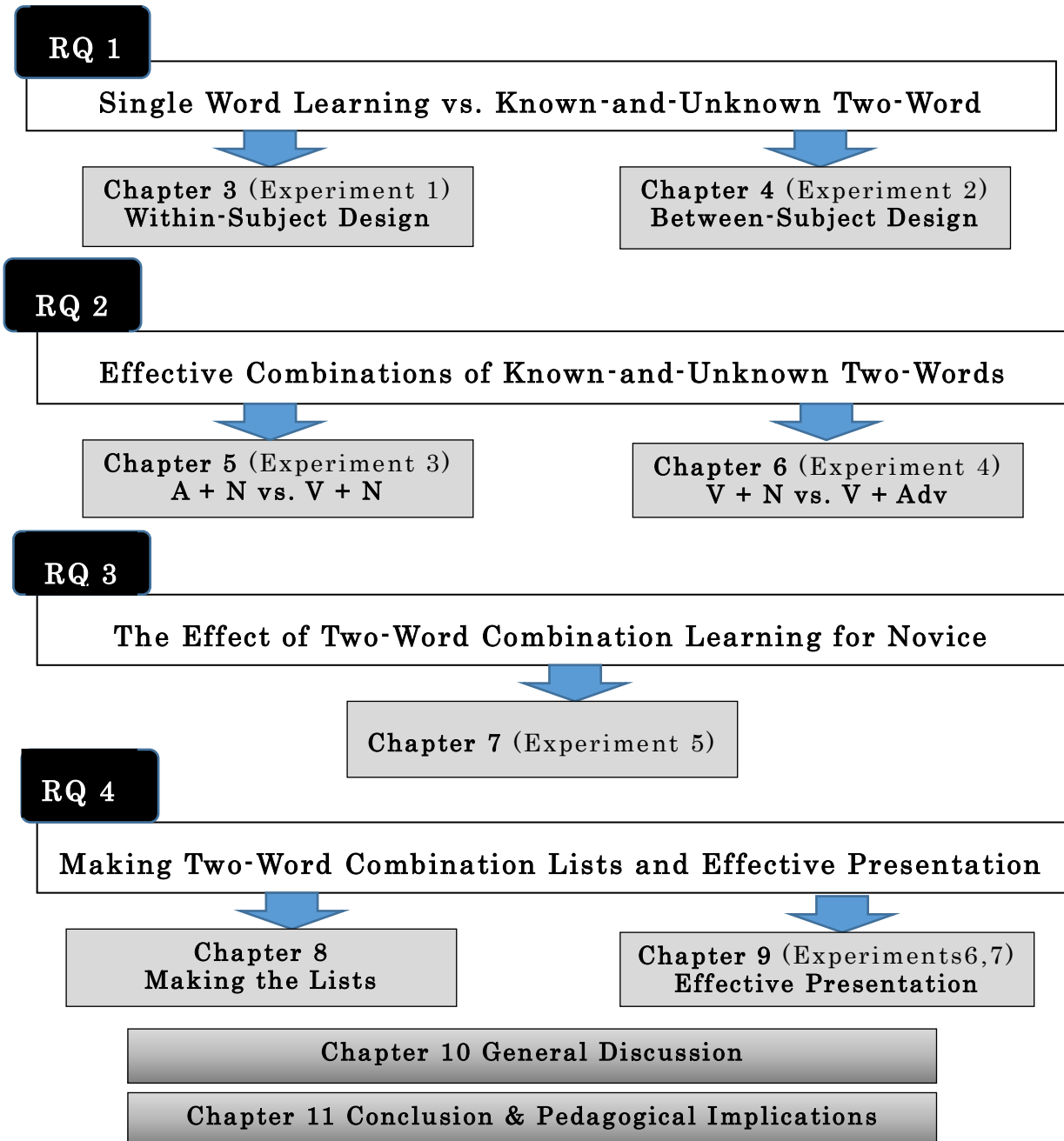
RQ 1

Single Word Learning vs. Known-and-Unknown Two-Word

| Chapter 3 (Experiment 1) Within-Subject Design | Chapter 4 (Experiment 2) Between-Subject Design |

RQ 2

Effective Combinations of Known-and-Unknown Two-Words

| Chapter 5 (Experiment 3) A + N vs. V + N | Chapter 6 (Experiment 4) V + N vs. V + Adv |

RQ 3

The Effect of Two-Word Combination Learning for Novice

Chapter 7 (Experiment 5)

RQ 4

Making Two-Word Combination Lists and Effective Presentation

| Chapter 8 Making the Lists | Chapter 9 (Experiments6,7) Effective Presentation |

Chapter 10 General Discussion

Chapter 11 Conclusion & Pedagogical Implications

RQ1: Is learning a known-and-unknown two-word combination more effective for retention and retrieval of meaning than learning a single unknown word?

60

RQ2: What types of known-and-unknown two-word combinations are effective for vocabulary learning of intermediate EFL learners?

RQ3: Is known-and-unknown two-word combination learning effective for novice EFL learners?

RQ4: What kind of presentation of two-word combinations is effective for learners?

The first question that the present study deals with is whether the known-and-unknown two-word combination learning is more effective for lower-intermediate learners than the single-word learning. This study employs high school students and university students as participants because they already know the most frequent 1,000 English words (Kasahara, 2005). They make use of their knowledge of these words in the two-word combination learning.

Second, this study investigates what combinations are suitable for the known-and-unknown combination learning. As discussed in Section 2.2.3, this study deals with adjective + noun combinations, verb + noun combinations, and verb + adverb combinations. In the framework of known-and-unknown combination, the author decided that nouns and verbs should be target words because they are crucial as core words in English sentences. When nouns are target words, which cues, adjectives or verbs, are more effective for retention and retrieval of the target nouns? When verbs are target words, which cues, nouns or adverbs are more effective for retention and retrieval of the target verbs? These are the second research question in this study.

The third question is to examine whether the two-word combination learning is less effective for novice learners than the single word learning. This study employs the first-year students in Japan, who begin to study English grammar explicitly, but still have small vocabulary sizes.

In addition to the three questions above, this study plans to create lists of know-and-unknown combinations for lower-intermediate EFL learners. Then, effective presentations for the items on the lists will be explored.

As shown in Chapter 1, RQ1 will be dealt with in Chapter 3 and Chapter 4. Though Ishizuka (2005) showed the superiority of his chunk learning to single word learning, he had the participants guess the meaning of the target words in the chunks. The present study will give participants the meanings of the combinations in the learning phase. Another difference is that this study focuses on known-and-unknown two-word combinations, whereas Ishizuka included three-word combinations (*plenty of pebbles*) and four-word combinations (*sprawl on a sofa*). Chapter 3 will conduct a within-subject experiment, and Chapter 4 will conduct a between-subject experiment.

RQ2 will be dealt with in Chapter 5 and Chapter 6. In Chapter 5, the author chooses nouns as unknown target words. He will examine which known cues, adjectives or verbs are more effective for retaining and retrieving the meanings of the target nouns. In other words, Chapter 5 will make a comparison between adjective (known) + noun (unknown) combinations and verb (known) + noun (unknown) combinations. On the

other hand, the author uses verbs as unknown target words in Chapter 6. It will compare verb (unknown) + noun (known) combinations and verb (unknown) + adverb (known) combinations.

RQ3 will be covered in Chapter 7. Employing first-year students at JHS, this chapter will examine whether known-and-unknown two-word learning is effective for this level of novice learners. The participants are thought to be novice learners because they started learning English as a subject after they entered junior high school.

RQ4 will be handled in Chapter 8 and Chapter 9. The former chapter explains the process of making lists of two-word combinations. The latter examines which type of presentation, a spaced presentation or a crammed presentation, is more effective for the retention of target words.

In addition to answering the four research questions, this study provides a general discussion in Chapter 9, and gives conclusions with several pedagogical implications in Chapter 10.

Notes to Chapter 2

1. The incidental learning condition in Laufer and Rozovski-Roitblat (2011) means that the participants had their learning sessions without any advanced notice of the vocabulary tests conducted after the learning sessions. Conventionally, "with or without a pre-warning" is thought to distinguish intentional studies and incidental studies (Hulstijin, 2003, p. 373).

2. Nation (2013) evaluates Elgort (2011) highly in that this study has shown a connection between deliberate learning and implicit knowledge. He argues that "[d]eliberately learned vocabulary becomes both explicit and implicit knowledge" (p. 443). This study avoids using the terms *explicit* and *implicit* because it is hard to define the difference between the two terms (Dekeyser, 2003). The author follows Elgort's idea that deliberately learned words can be "processed with a higher degree of automaticity" (p. 367).

3. The current study consistently uses the word *combination* rather than *collocation* because the term *collocation* limits the range of two-word combinations, though different researchers have different definitions of *collocation*. Li and Schmitt (2010) summarize these various definitions into three types: (a) all word combinations of a particular grammatical form regardless of whether they are idiomatic or not; (b) phrases that have some opacity and fixedness; (c) combinations whose occurrence frequency is greater than other combinations. This study

takes a position similar to (a) and avoids using the word *collocation,* so that it cannot exclude any adjective + noun, verb + noun, and verb + adverb combinations.

Sinclair (1991) classifies collocations into two types: *downward collocations* and *upward collocations*. The former means a collocation consisting of a *node* (= a target word) and a less frequent *collocate* (a word that occurs with the node). The latter means a collocation consisting of a node and a more frequent collocate. According to his classification, this study examined the latter type because known cues are usually more frequent than their unknown target words.

4. Nelson and Narens (1990) explains this process from a physical level called *control* and a metaphysical level called *monitoring*. The author omitted this description from Figure 2.2 because the distinction of the two levels is no relation to the discussion of this study.

Chapter 3

Effectiveness of Known-and-Unknown Two-Word Combinations:

A Within-Subject Experiment (Experiment 1)

3.1   Introduction

This chapter deals with RQ1 by conducting Experiment 1. The question is whether learning a known-and-unknown two-word combination is more effective for the retention and retrieval of meaning than learning a single unknown word. Following the research design of Ishizuka (2005), the author used a within-subject experiment. Experiment 1 had participants engaged in two types of paired-associate learning. In the encoding phase, 10 new English nouns were presented with their Japanese equivalents (single word learning); another 10 new English nouns were presented to the participants in a known-and-unknown two-word combination by attaching familiar adjectives (three of them were nouns that worked like adjectives), and Japanese equivalents of the combinations (two-word combination learning). Unlike Ishizuka (2005), who had the participants guess the meaning of the target words in his chunks, Experiment 1 gave the participants the meanings of all the combinations. The experiment was conducted in an intentional learning environment with a word list including the 10 single words with their translations and the 10 two-word combinations with their translations.

In the decoding phase, the participants took two recall tests: a recall without cues and a recall with cues in terms of the

known-and-unknown combinations. Test 1 asked them for the meanings of the target words in isolation, whereas Test 2 asked them for the meanings of the two-word combinations. Both tests showed the 10 single words as they were and asked the participants to write down the meanings of the single words. Considering the encoding specificity hypothesis, the author assumed that two-word combination learning would show better results in the cued recall than single word learning, but that single word learning would outperform two-word combination learning in the non-cued recall. Therefore, the following hypotheses were set in the present study. Experiment 1 tested these three hypotheses.

H 3.1 Two-word combinations are more effective than single words in aiding the retention of meaning.

H 3.2 Without cues in the retrieval phase, single words show better results in a recall test than two-word combinations.

H 3.3 With cues in the retrieval phase, two-word combinations show better results in a recall test than single words.

Retention means how well learners retain the meanings of target words after a certain interval. In this study, the retention was measured by the difference in score between the immediate and the delayed recall tests. On the other hand, retrieval means how exactly learners retrieve the meanings of target words. In this study, the retrieval was measured using the scores of the immediate and delayed recall tests.

3.2 Method

3.2.1 Participants

The participants in this study were 39 Japanese students at a private high school who were attending three different English-related classes. They all had more than five years of experience of learning English. The experiments with each of the classes were conducted in different places on different dates but used the same procedure.

3.2.2 Materials

The author made a word list of 20 English words that are so low in frequency that they are not found in the list of *JACET 8000* (JACET, 2003), a reliable word list that includes 8,000 words for Japanese learners of English. This list was composed of high-frequency words from the British National Corpus (BNC) plus other sub corpora made from newspapers, magazines, EFL textbooks and English proficiency tests such as TOEFL and TOEIC. All of the 20 target words satisfied the following three conditions:

(a) Each item was a noun but not a loan word.

(b) Each item had no affixes.

(c) The length of each item was limited to 5-7 letters.

The reason why I set the conditions (a) and (b) was to remove the possibility that the participants could use their knowledge of loan words and affixes in the recall tests. The reason for the condition (c) was to reduce the influence of word length on their leaning. Half of the target words were turned into two-word combinations by attaching high-frequency words, all of which belonged to the 1,000- to 3,000-word

range in *JACET 8000* except the word *unlighted*. The author chose frequent two-word combinations by referring to the British National Corpus and some English-Japanese dictionaries for students. Each item had a Japanese translation. A collocation and a single word were shown alternatively in the list. All of the 10 single items and 10 combinations are shown in Table 3.1. The actual list is shown in the Word List for Experiment 1 in Appendix 1. The independent variable was presentation format (single or two-word combination), and the dependent variables were retention and retrieval of the target words.

Table 3.1

The 10 Single Items and 10 Combinations on the List

Single Item	Translation	Combination	Translation
amnesia	*kioku-soushitsu*	business **acumen**	*bizinesuno-saikaku*
myopia	*kinshi*	violent **bandit**	*ranbouna-touzoku*
disdain	*keibetsu*	unlighted **cheroot**	*hinotuiteinai-hamaki*
eczema	*shisshin*	beautiful **damsel**	*utsukushii-otome*
glutton	*ooguino-hito*	drug **fiend**	*mayaku-joushuusha*
knoll	*chiisana-oka*	dirty **hovel**	*kitanai-abaraya*
mason	*ishiya*	school **janitor**	*gakkouno-youmuin*
natter	*oshaberi*	memory **lapse**	*kiokuno-togire*
odium	*zouo*	horrible **rabies**	*osoroshii-kyoukenbyou*
pannier	*nimotsu-kago*	political **savvy**	*seijitekina-jitumunouryoku*

Note. The words in bold letters are the target words shown in Test 1. The words in

italics in the two-word-word combinations are the cues. Both the cues and the target words in the combinations were shown in Test 2.

In the two tests, the participants were asked to write down the Japanese translations of the target words. They were asked to write down a Japanese equivalent in a blank next to a target word, such as *amnesia* (   ). Test 1 presented all the single items as they were on the learning list (e.g., *amnesia*), whereas it presented only the target words in the two-word combinations by removing the cues from the combinations (e.g., *acumen*). Test 2 presented all the items as they were on the list (e.g., *amnesia*, *business acumen*). In terms of the two-word combinations, Test 1 represented non-cued recall (*acumen*) and Test 2 represented cued recall (*business acumen*). The 10 single words were shown as they were in both tests. The order of the items in each test was randomized in order to avoid the order effect in learning.

3.2.3 Pilot Study

A pilot study was carried out to predict whether the participants would know the target words and determine the length of time they would need for the learning and retrieval phases. There were 10 university juniors in the pilot study. It was found that none of them had any knowledge of the target words. First, they were given the lists of the target items and tried to memorize their meanings. Second, they took Tests 1 and 2 consecutively. Watching their performance, the author decided that five minutes was necessary for the learning phase and three

minutes for each test.

3.2.4 Procedure

First, the participants were given the word lists and instructions on how to pronounce each item. Five minutes was given to remember the Japanese meaning of each item. After the learning phase, they took Test 1 and Test 2 in succession. They were asked to write down the Japanese equivalents of the 20 single items in Test 1, and then the 10 single items and the 10 two-word combinations in Test 2. They had three minutes for each test. One week later, the same tests were given to the participants without advance notice.

3.2.5 Scoring

Two points were given for each correct answer, and one for a partially correct answer. For example, in the case of the word "pannier", the correct answer was "*nimotsu-kago*", while "*kago*" was a partially correct answer. Another example of a partially correct answer was "*osoroshii-kyoukenbyou*" for the word *rabies*. In this case, test-takers carelessly wrote the Japanese translation for its two-word collocation, *terrible rabies*, though the item did not have the cue *terrible* in Test 1. On the other hand, an answer *osorosii* for *terrible rabies* in Test 2 received no points because it was a translation of the cue, not the target word. The top score for each test was 20 points.

3.2.6 Data Analysis

71

In order to examine Hypothesis 3.1, two-way (item type $\times$ time) ANOVAs were conducted on the results of each item type (single and collocation) in Test 1 and Test 2 conditions (immediate and delayed). The ANOVAs were expected to show a decrease in scores for the single words compared to the two-word combinations. In order to examine Hypothesis 3.2, paired-sampled t tests were carried out between the scores of the single words and the two-word combinations in the immediate Test 1 and the delayed Test 1, respectively. Finally, in order to examine Hypothesis 3.3, paired-sampled t tests were carried out between the scores of the single words and the two-word combinations in the immediate Test 2 and the delayed Test 2, respectively.

3.3 Results

Table 3.2 shows the means, standard deviations, and minimum and maximum values of the two item types in the immediate Test 1 and the delayed Test 1. Table 3.3 shows those in the immediate Test 2 and the delayed Test 2. Figure 3.1 shows the mean of each test. As can be seen, the single words showed higher scores in Test 1 (without cues), whereas the two-word combinations showed higher scores in Test 2 (with cues). Figure 1 also revealed that the single words showed a sharper decline between the immediate and delayed tests in both Test 1 and Test 2 conditions.

The results of the two-way ANOVAs showed that there was a significant interaction between item type and time in the Test 1 condition, $F(1, 38) = 16.12$, $p < .0001$, and in the Test 2 condition, $F(1, 38) = 9.96$,

$p < .01$. In the Test 1 (without cues) condition, t tests showed that the scores of the single words were significantly higher than those of the two-word combinations both in the immediate test, $t(38) = 6.39$, $p < .0001$ and in the delayed test, $t(38) = 2.48$, $p < .05$. In the Test 2 condition, however, t tests showed the opposite results: the scores of the two-word combinations were significantly higher than those of the single words, both in the immediate test, $t(38) = -4.02$, $p < .0001$ and in the delayed test, $t(38) = -8.73$, $p < .0001$.

Table 3.2

Means, Standard Deviations, Minimum and Maximum Values of the Two Item Types in Immediate Test 1 and Delayed Test1 (recall without the cues; N = 39, Full mark = 20)

Test Type	Mean	SD	Minimum	Maximum
Immediate				
Single	13.72	5.32	2.00	20.00
Combination	8.77	5.00	0.00	19.00
Delayed				
Single	4.79	3.87	0.00	16.00
Combination	3.28	3.06	0.00	12.00

Table 3.3

Means, Standard Deviations, Minimum and Maximum Values of the Two Item Types in Immediate Test 2 and Delayed Test2 (recall with the cues;

N = 39, Full mark = 20)

Test Type	Mean	*SD*	Minimum	Maximum
Immediate				
Single	14.46	5.32	2.00	20.00
Combination	16.90	4.29	0.00	19.00
Delayed				
Single	6.05	4.04	0.00	16.00
Combination	10.74	4.48	0.00	19.00

Figure 3.1

Means of the Immediate and Delayed Tests 1 and Tests 2
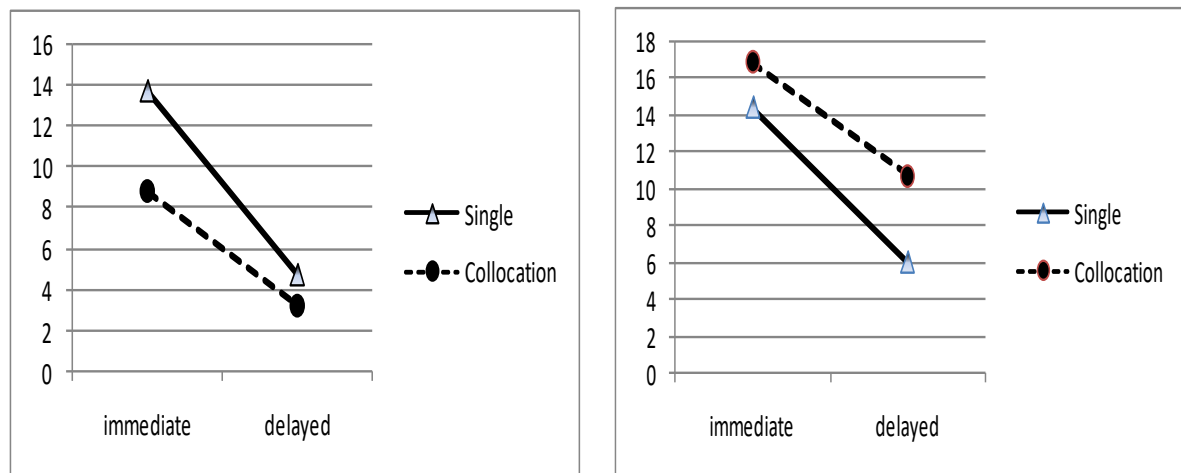
Test 1 (without cues) condition   Test 2 (with cues) condition

3.4. Discussion

Hypothesis 3.1 posits that two-word combinations are superior in aiding retention of meaning compared to single words. This hypothesis was supported because there was a significant interaction in retaining

the scores of the recall tests between item types and time in both the Test 1 and Test 2 conditions. The single words showed a significantly sharper decline in the score, whereas the drop in the two-word combinations was slight. This result can be explained by the three concepts mentioned in Chapter 2: elaborative rehearsal, Complementary Learning System (CLM), and enhanced imageability.

The gist of this idea of elaborative rehearsal is that connecting old and new information can be effective for long-term retention. The cues which already existed in the participants' mental lexicons helped them to fix the target words in their short-term memories. Then the connections between the cues and the target words were formed and these connections facilitated the fixing of the target words into the participants' long-term memories.

CLS can also shed light on why known-and-unknown two-word combinations can promote fixation of target words in the mental lexicon. CLS assumes that new and old items of information are processed and stored in different places in the human brain. The link between a cue and a target word can facilitate the process of the newly learned target's transfer to long-term memory. The link can prevent the target word from slipping away from the mental lexicon. This helps the word stay in the mental lexicon for a long time.

The third reason for the superiority of the two-word combinations in retention can be attributed to their enhanced imageability. Attaching a cue word gives a target word clearer and more specific image. This clear image of a known-and-unknown combination enables learners to retain

the combination by using two routes in mind: a route for literal information and a route for visual information (dual-coding theory: Paivio & Desrochers, 1980). These double routes can strengthen the retention of the combination. For instance, think about a situation where a learner tries to remember a word *acumen* (= the ability to understand and decide things quickly and well) in paired-associate learning. The learner might have difficulty creating a specific image of this word, because it represents abstract ability. However, if the learner remembers this word in a known-and-unknown combination, *business acumen*, he or she can easily have an image of an efficient businessperson in an office. This enhanced imageability could help the learner retain the target word in mind. Considering the powerful role of image in retention (Baddley, 2014; Lindstormberg & Boers, 2005; Steinel et al., 2007), the author assumes that enhanced imageability could be the greatest contribution to long-term retention of known-and-unknown two-word combinations.

Hypothesis 3.2 predicts the superiority of single words over two-word combinations in recall tests if there are no cues in the recall phase. This hypothesis was confirmed because the scores of the single words were significantly higher than those of the two-word combinations, both in the immediate Test 1 and the delayed Test 1 (without cues). Without the help of the cues in the retrieval phase, the meanings of the target words in the two-word combinations were harder for the participants to retrieve than the meanings of the single words. In Test 1, these 10 items were deprived of the familiar words that had accompanied them in the learning phase. On the other hand, the single words were

76

presented in the tests as they had been in the learning phase. According to transfer appropriateness (Brasford, et al, 1979), test-takers get high scores if test items are the same as items they have learned. Incompatibility between learning and testing tasks negatively affects testing task performance (Steinel et al, 2007). In the Test 1 condition, the incompatibility of the two-word combinations between the learning and testing phases was probably the main cause of the poor performance of the participants.

Hypothesis 3.3 expects the two-word combinations to be superior to single words in recall tests if there are cues in the recall phase. This hypothesis was also verified because the scores of the two-word combinations were significantly higher than those of the single words, both in the immediate Test 2 and the delayed Test 2 (with cues). In the Test 2 condition, both the single words and the two-word combinations were shown as they had been presented in the list. There was no difference in presentation between the two types. Therefore, it could be said that the 10 familiar words attached to the 10 target words facilitated the retention and retrieval of the meanings of the target words.

The higher scores of the combinations in the post-tests can be explained by the encoding specificity hypothesis (ESH). The existence of a familiar cue both in the encoding phase and in the decoding phase can contribute to a high success rate in retrieval. This mechanism is illustrated in Figure 3.2. In the encoding phase, first, a learner sees the two-word combination, "school janitor," and the cue "school" activates the equivalent "school" that is already stored in his/her mental lexicon

(①). Second, the learner tries to remember the new word "janitor. (②)"
Finally, the connection between "school" and "janitor" is formed in the
mental lexicon (③). In the decoding phase, the learner sees the same
two-word combination. Again, the familiar word "school" activates the
word "school" in the mental lexicon (④), and then, the word "school" in
the mental lexicon activates the connection to the word "janitor (⑤)."
In the end, the learner successfully retrieves the meaning of "janitor
(⑥)." In this way, the connection between a familiar word and a new
word is formed, and this connection can strengthen retention and
expedite the retrieval of the target word. In sum, the results of this
experiment support ESH: the same cues presented in the learning and
retrieval phases can facilitate recall of the target words.

Figure 3.2

The Mechanism of How Cues Facilitate Retention and Retrieval of Target
Words
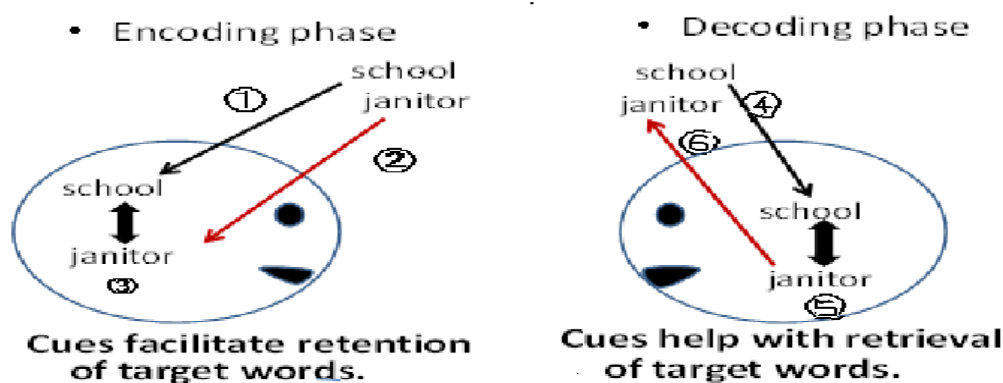
In addition, the better results of the combinations can be explained
by the associative continuity hypothesis (ACH). Associations that a cue

word can help learners to retrieve the meaning of target words. In other words, the cue can help limit the scope of meaning search. In the case of *school janitor,* the cue word *school* can narrow down the choices of words that follow the cue. The participants might have expected some things or persons that are related to school, which could raise the possibility of successful retrieval of the target word *janitor.*

Finally, the author would like to mention the limitations of Experiment 1. First, there is the small number of participants. In order to consolidate the results of the present study, a larger population is needed. Second, the difference in quality between the two types of target words might have affected the results. Although the author tried to make the conditions of the target words, such as length and frequency, similar to each other, other aspects of the target words might have influenced the test performance. One of the possible aspects is concreteness. It is said that concrete words are easier to learn and are less susceptible to being forgotten than abstract words (De Groot & Keijzer, 2000). In this study, concrete words such as *damsel* or *hovel* may have been easier for the participants than abstract words such as *disdain* or *odium*. Experiment 2 was designed in order to resolve this problem. In Experiment 2, which is described in the next chapter, the target words in two-word combinations should be the same as single words, and one of the two groups with the same English proficiency should be assigned to each of the conditions. Third, another study should be carried out to investigate the relationship between the effectiveness of two-word combinations and the vocabulary size of learners. The present study showed the effectiveness of two-word

combinations in retention and cued recall by employing high school students who already knew high-frequency English words. However, is this also the case with learners with small vocabulary sizes, say, first graders at junior high school? The same experiment should be conducted with novice learners of English who have small vocabulary sizes. This issue will be dealt with in Chapter 7.

3.5 Conclusion

Experiment 1 revealed the effectiveness of two-word combinations for intentional vocabulary learning. Remembering a two-word collocation that consists of a familiar word and a new word leads to better retention of the meaning of the new word than remembering it on its own. In addition, the retrieval of the new word can be easier if the new word is shown with the familiar word attached to it in the encoding phase. The familiar word works as a cue in the decoding phase.

Therefore, presenting new words combined with familiar words can be an effective way of vocabulary learning for learners who already know basic high-frequency English words. Another advantage of teaching combinations is that it can show a productive use of words: learners can acquire basic collocations with target words. This learning of combinations can help learners to develop better communicative skills.

Chapter 4

Effectiveness of Known-and-Unknown Two-Word Combinations:

A Between-Subject Experiment (Experiment 2)

4.1 Introduction

This chapter reports on Experiment 2, which addressed RQ1, adopting a between-subject design in order to resolve the limitation of Experiment 1. In Experiment 1, the participants learned 10 different target words in two different learning conditions: the single word learning condition and the known-and-unknown two-word learning condition. Experiment 1 showed favorable results for the two-word learning condition as long as the cues were present both in the encoding and decoding phases. However, there was a possibility that the different target words, not the different learning conditions, might have affected the results. As mentioned in the previous chapter, the difference in quality between the two groups of target words might have been a decisive factor. Therefore, Experiment 2 examined whether learning known-and-unknown two-word combinations was really more effective for the retention and retrieval of word meaning than learning single words, using the same target words in both conditions. In addition, this experiment employed two groups of participants with the same vocabulary size, and each of the groups was assigned to one of the two conditions: remembering single words or two-word combinations.

The following two hypotheses were addressed in the present experiment.

H 4.1 Learning a new target word together with a known collocate will improve the target word retention better than learning the target word in isolation.

H 4.2 Learning a new target word together with a known collocate will enhance the target retrieval better than learning the target word in isolation.

The definitions of retention and retrieval follow those used in Experiment 1. The retention was measured using the difference between the immediate and the delayed recall tests; the retrieval was measured by the score of the immediate and delayed recall tests.

4.2 Method

4.2.1 Participants

The participants in the present study were 66 Japanese first-grade university students, half of whom ($n = 33$) belonged to the Department of Educational Development (Group 1), and the rest ($n = 33$) to the Department of Social Studies Education (Group 2). They all had more than six years of experience of learning English. At first, there were 54 participants in Group 1 and 40 in Group 2. The experiment was conducted over four weeks in part of the regular English classes, and there were 37 students in the former group and 33 in the latter who completed the whole procedure. The author excluded four students from Group 1, who were the top four in a vocabulary size test, so that the two groups could be equivalent to each other in vocabulary size. Finally, each of the groups had 33 participants.

4.2.2 Materials

In order to examine the participants' vocabulary sizes, the present study used a revised version of the Mochizuki Vocabulary Size Test (Kasahara, 2006). One reason why this test was employed was that it adapted lemma counting (in which a base word and its inflected forms are counted as one word), which is thought to be the most reliable unit of word counting (Milton, 2009; Vermeer, 2004). Another reason is that by replacing several misfit items with the help of Item Response Theory software, the test showed the same reliability and higher validity than the widely used original version, whose high validity had already been proved (Mochizuki, 1998; Katagiri, 2007).

In terms of selecting target words, the present study followed Experiment 1. The author selected 20 low-frequency target words that are not found in *JACET 8000* (JACET, 2003). All the target words met the following three standards, as in Experiment 1: (a) each item was a noun but not a loan word; (b) the length of each item was limited to five to seven letters; (c) each item had no affixes that could help the participants to guess its meaning. Then, the author selected 20 high-frequency familiar words that were to be attached to the target words in order to make 20 two-word combinations. In the selection of the frequent two-word combinations, the author referred to BNC and some English-Japanese dictionaries for students. All the cues in the combinations turned out to belong to the 1,000- to 3,000-word range in JACET 8000 except the words *unlighted* and *lavender*. The author judged that those two words were familiar to the participants because the

meaning of the word *unlighted* could be easily guessed from the word form, and *lavender* is the name of a familiar flower in the district where the participants lived.

Based on the 20 target words and the 20 cues, two-word lists were made. One consisted of the 20 two-word combinations and their Japanese equivalents; this was given to Group 1 members. The other consisted of the 20 single target words and their Japanese equivalents; this was given to Group 2 members. Finally, two types of recall test were made: one for Group 1 and the other for Group 2. The participants in Group 1 were asked to write down the Japanese translations of the 20 two-word combinations, and those in Group 2 were asked to write down the Japanese translations of the 20 single words. The order of the items in each test was randomized in order to avoid the order effect in learning.

4.2.3 Pilot study

A pilot study was carried out to predict whether the participants would have any knowledge of the target words, and to decide the length of time they would need for the learning and retrieval phases. There were two graduate students majoring in English Education in the pilot study. They were given only the list of the two-word combinations because the target words in the combinations were the same as the single words. As a result, four of the original target words that they already knew were replaced by four other words that were unknown to them. The final 20 single words and two-word combinations are shown in Table 4.1. Then, they took the recall test of the 20 two-word combinations. From their

84

performance, the author found that a period of five minutes was necessary for the learning phase and four minutes for the recall test. The same periods of time were applied to the learning and retrieval phases of the single words respectively.

Table 4.1

The 20 Single Items and 20 Combinations in Each of the Lists

Single (Target)	Translation	Combination (Cue + Target)	Translation
acumen	*saikaku*	*business* **acumen**	*bizinesuno-saikaku*
arrears	*mibaraikin*	*heavy* **arrears**	*tagakuno-mibaraikin*
bandit	*touzoku*	*violent* **bandit**	*ranbouna-touzoku*
bastion	*toride*	*last* **bastion**	*saigono-toride*
cheroot	*hamaki*	*unlighted* **cheroot**	*hinotsuiteinai-hamaki*
chasm	*mizo*	*deep* **chasm**	*fukai-mizo*
heist	*goutou*	*diamond* **heist**	*daiamondo-goutou*
sachet	*nioibukuro*	*lavender* **sachet**	*ravendano-nioibukuro*
fiend	*joushusha*	*drug* **fiend**	*mayaku-joushusha*
recluse	*yosutebito*	*lonely* **recluse**	*kodokuna-yoshutebito*
hovel	*abaraya*	*dirty* **hovel**	*kitanai-abaraya*
pariah	*nokemono*	*social* **pariah**	*shakaino-nokemono*
morsel	*hitokuchi*	*delicious* **morsel**	*oishii-hitokuchi*
quirk	*kuse*	*strange* **quirk**	*kawatta-kuse*
lapse	*togire*	*memory* **lapse**	*kiokuno-togire*

decree	*hanketsu*	*divorce* **decree**	*rikon-hanketsu*
rabies	*kyoukenbyou*	*terrible* **rabies**	*osoroshii-kyoukenbyou*
contour	*rinkaku*	*smooth* **contour**	*namerakana-rinkaku*
splotch	*shimi*	*red* **splotch**	*akai-shimi*
brawl	*kenka*	*street* **brawl**	*rojouno-kenka*

4.2.4 Procedure

Because of the time constraints affecting this experiment, the whole process was divided into four sessions during weekly English lessons. In the first session, the participants in each group took three parts of the vocabulary size test (from the 2,000- to the 4,000-word level). In the second session, they took the rest of the vocabulary size test (from the 5,000- to the 7,000-word level). Each of the sessions lasted 15 minutes. Referring to Kasahara (2005), the author judged that there was no need to conduct the 1,000-word level test and gave them all full marks for this part. The average vocabulary size of Group 1 was 4178, while for Group 2 it was 4013. These results suggested that the participants were familiar with the 4,000 most frequent words, but not with the other 4,000 infrequent words in *JACET 8000* (JACET, 2003), and were much less familiar with the words not in the list because all the items of each word level in the vocabulary size test were selected from the items in the equivalent word level of *JACET 8000*. This meant that they were familiar with the cues in the two-word colocations but not with the target words. There was no significant difference between the groups, $t(65) = 1.02$, $p = .31$, *n.s.* The author judged that the two groups

were equivalent in vocabulary size.

The third session included an encoding phase and an immediate recall test. First, the participants of Group 1 were given the lists of the 20 known-and-unknown word combinations, while those in Group 2 were given the lists of the 20 single words. Both groups received instructions, lasting three minutes, on how to pronounce each item, and were given five minutes to remember the Japanese meaning of each item. After the lists were collected, Group 1 took a recall test on the combinations while Group 2 had a recall test of the single words. They were asked to write down the Japanese equivalents of each item within four minutes. A week later, they took the same recall tests again without any advance notice.

4.2.5 Scoring

Two points were given for each correct answer, and one for a partially correct answer. In the case of the single words, one point was given for a close translation that was not the Japanese equivalent on the list, such as *joshuhan*, not *joshusha* for the word 'fiend'. This was done for the target words in the two-word combinations. Moreover, in the case of the combinations, one point was given for the correct translation of the target word only, not vice-versa. For instance, *abaraya* (= hovel) received one point but *kitanai* (= dirty) did not receive a point as a translation of *dirty hovel*.

4.2.6 Data analysis

In order to examine Hypothesis 4.1, a two-way ANOVA (Time $\times$

87

Learning Conditions) was conducted. The difference in score decline between the groups would tell whether there was any difference in retention of the target words. In order to examine Hypothesis 4.2, a one-way ANOVA and post hoc tests (Turkey HSD) were conducted between the groups for the immediate and delayed tests respectively.

4.3 Results

Table 4.2 shows the means and standard deviations of each group in the immediate and the delayed tests. Fig. 4.1 shows the means of each group in the two tests. As can be seen, Group 1, whose members remembered the two-word combinations, achieved higher scores in both of the tests than Group 2, whose members remembered the single words. The variation in the scores of Group 1 was smaller than that in Group 2. The figures revealed that the single words showed a sharper decline between the immediate and the delayed tests, which was in accordance with the results of Experiment 1. The result of the two-way ANOVA showed that there was a significant interaction between Learning Conditions and Time, $F(1,64) = 9.05$, $p = .01$, $\eta^2 = .12$, with a medium effect size. The main effects of Time were significant: the post hoc Turkey tests showed that the immediate test was significantly better than the delayed test in Group 1, $F(1, 64) = 36.20$, $p = .0001$, $\eta^2 = .36$, as well as in Group 2, $F(1, 64) = 81.21$, $p = .0001$, $\eta^2 = .56$. The main effects of learning conditions were also significant: As confirmed by the post hoc Turkey tests, Group 1 obtained significantly higher scores both in the immediate test, $F(1, 64) = 11.27$, $p = .001$, $\eta^2 = .15$, and in the delayed

test, $F(1, 64) = 64.82$, $p = .0001$, $\eta^2 = .50$.

Table 4.2

Means and Standard Deviations of the Two Groups in the Immediate and Delayed Tests (Full mark = 40)

	Group 1 (TWC, $n = 33$)		Group 2 (S, $n = 33$)	
	Mean	*SD*	Mean	*SD*
Immediate Test	31.97	7.24	23.97	11.61
Delayed Test	19.33	9.65	4.79	3.82

Note: TWC = two-word combinations; S = single words.

Figure 4.1

Means of the Two Groups in the Immediate and Delayed Tests
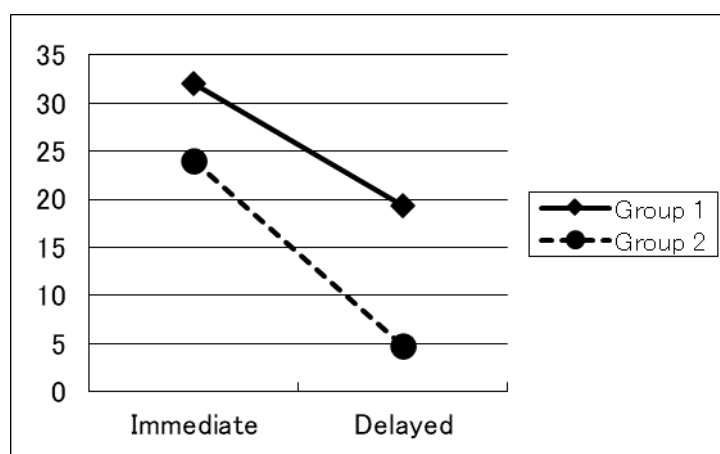
4.4 Discussion

Hypothesis 4.1 postulates that learning a new word along with a known collocate is more effective for retaining meanings of words than single words in isolation. This was supported because there was a

significant interaction between Time and Learning Conditions. The participants in both of the groups got significantly reduced scores in the delayed test than in the immediate test. However, the participants who learned the target words in the two-word combinations showed significantly less decline between the immediate and delayed tests than those who learned the target words alone.

The superiority of the two-word combinations in retention could be explained with the three concepts, elaborative rehearsal, CLS, and enhanced imageability. Group 1 participants had the advantage of elaborative rehearsal during the learning phase. The familiar words attached to the target words helped the participants to fix the target words into their mental lexicons (Kasahara, 2010). As CLS suggests, these connections between the cues and the targets facilitated the fixation of the targets in the participants' long-term memories. Moreover, Enhanced imageability of the two-word combinations helped the participants to have a gradual formation of connections between the targets and the cues.

Hypothesis 4.2 posits that known-and-unknown word combinations are superior in aiding retrieval of meaning over single words. This was also confirmed because Group 1, the two-word collocation learning group, showed significantly better scores in the immediate and delayed recall tests than Group 2, the single word learning group. These results could be explained by ESH, as shown in Experiment 1. Something remembered with a target item can help retrieve the target in the decoding phase. When a learner sees the two-word collocation, "business

acumen," the cue "business" activates the same word already stored in his/her mental lexicon. Then the learner tries to memorize the new word "acumen." Finally, the connection between the familiar cue and the new word is formed in the mental lexicon. In retrieval of the meaning, the learner sees the same two-word combination. Again, the familiar cue "business" activates the equivalent in the mental lexicon. Soon the word "business" in the mental lexicon activates the connection to the word "acumen." Eventually the learner succeeds in retrieving the meaning of the target "acumen." In this way, a newly built connection between a familiar cue and a new target can strengthen the retention and promote the retrieval of the target word.

In addition, ACH can also explain the superiority of the two-word combinations in retrieval. It seems that a familiar word in a two-word combination has an effect of narrowing the scope of the search for the meaning of a target in the decoding phase. If learners still have a really vague memory of the word "chasm" (= a crack or opening in the ground) after the encoding phase, it is difficult to grasp its meaning in the decoding phase. They might not think of anything or have difficulty in choosing the correct meaning from many possible candidates. However, if they have a familiar word with a target like "deep chasm," the familiar cue "deep" might point them in the right direction or help them to narrow down the possible candidates. A cue in a two-word collocation can make searching for the meaning of a target much easier.

Though the present study confirmed the results of Experiment 1, it still has some of the limitations mentioned in the previous study. First,

another study should be conducted to examine the relationship between the effect of two-word combinations and vocabulary sizes of learners. This study proved that known-and-unknown word combinations were effective provided that the participants already knew the cues in the combinations. However, it is not certain that this is also the case with learners with a small vocabulary size. Further research is needed to clarify what vocabulary size is necessary to make use of two-word combinations for intentional vocabulary learning. Second, this study employed only one type of collocation, an adjective (or a noun) + a noun. Other types of combination, such as a verb with a noun or a verb with an adverb, should be investigated to provide more support for the effectiveness of known-and-unknown word combinations in assisting intentional vocabulary learning.

4.5 Conclusion

Experiment 2 proved that known-and-unknown word combinations are effective for aiding intentional vocabulary learning. This study added strong support for their effectiveness in this regard because it employed the same target words both in single word learning and combination learning conditions. Attaching a familiar word to a word to be remembered can help learners to retain and retrieve the meaning of the target word, provided that the target is presented with the familiar cue in the decoding phase.

An important implication of the present study and related previous studies is that we can change the ways of presenting new words

92

according to the learner's level of vocabulary acquisition. The more words learners remember, the more links they build between those lexical items, leading to better retrieval (Lado, 1990). They naturally build a complicated web-like structure consisting of countless associations between words (Aitchison, 2003). Therefore, teachers can let them draw on their background knowledge to facilitate their vocabulary learning (Sökmen, 1997). When learners have acquired very basic high-frequency words, they can be encouraged to use those words as cues attached to new words. In other words, the combination of a familiar and a new word facilitates the enlargement of students' vocabulary size and their knowledge of productive use of vocabulary. Learning two-word combinations of this type can be an effective method of intentional vocabulary learning for early intermediate learners.

Chapter 5

Which Cues, Adjectives or Verbs, Provide the Most Assistance for Remembering New Nouns (Experiment 3)?

5.1 Introduction

The previous two experiments have shown the superiority of old and new two-word combination learning over single word learning in order to retain and retrieve the meaning of the new target word. However, these studies mainly dealt with one type of combination: a known adjective and an unknown noun. It is reasonable for studies to use nouns as targets because they are basic components of longer phrases and sentences. Nouns are so essential that they are learned earlier than verbs (Tomasello, 2003), and adjective-and-noun combinations are typical and frequent collocations in any language. Another typical and frequent two-word combination including a noun is a verb-and-noun combination (Lewis, 1997). Barfield (2009) suggests that L2 learners frequently produce adjective + noun collocations and then move on to verb + noun collocations. Mastering these two types of typical collocations is crucial in L2 acquisition. Attaching a known verb to a new target noun seems to be another beneficial way of learning the target noun. It is worthwhile to investigate whether verb + noun combinations are as effective as adjective + noun combinations. The purpose of Experiment 3 is to compare the effectiveness of the two different cues for target nouns.

Experiment 3 has two research questions. The first question is whether known verb + unknown noun combination learning is better for

the retention and retrieval of the target nouns than single unknown word learning. The second question is which known cues in two-word combinations, adjectives or verbs, are more effective for helping learners retrieve and retain the meanings of target nouns. Considering the results of the previous two experiments, Experiment 3 assumed that learning verb (known) and noun (unknown) two-word combinations would be more effective for the retention and retrieval of the target words than learning the single targets only. Therefore, the present study built the first two hypotheses by assuming the superiority of the verb-and-noun combination learning over single word learning. However, there are no previous studies to show which type of combination is superior as far as the author knows. This study set two null hypotheses predicting that there would be no difference between the two types of combination.

H 5.1 Learning an unknown noun with a known verb will improve retention of the noun better than learning the target noun in isolation.

H 5.2 Learning an unknown noun with a known verb will improve retrieval of the noun better than learning the target noun in isolation.

H 5.3 Known verb + unknown noun combinations are as effective for the retention of the target nouns as known adjective + unknown noun combinations.

95

H 5.4 Known verb + unknown noun combinations are as effective for the retrieval of the target nouns as known adjective + unknown noun combinations.

Retention is defined as how well learners remember the meanings of target words after a certain period. In Experiment 3, retention was measured by the difference between the immediate and delayed recall tests. Retrieval means how exactly learners recall the meanings of the target words. It was measured by the score of the immediate and delayed recall tests.

5.2 Method

5.2.1 Participants

The participants were 62 Japanese university students, each of whom had learned English for six or more years. At first, there were 97 students who joined the experiment. In order to divide the participants into two groups with the same vocabulary size, the author had them take the 2,000- and 3,000-word levels of the Vocabulary Levels Test (Nation, 1990; 2001; 2008). The reason for using this test was its high reliability as a vocabulary size test (Schmitt et al., 2001) and its less time-consuming nature. According to the results of the tests, the participants were assigned to Group 1 ($n = 49$) or Group 2 ($n = 48$). The experiment was conducted over three weeks in part of the students' weekly regular university classes, and there were 35 students in Group 1 and 27 students in Group 2 who completed the whole procedure; thus

96

there were 62 participants in this study. The author compared the results of the Vocabulary Levels Test between the groups again, and confirmed that there was no significant difference in vocabulary size between them, $t(60) = -.90$, $p = .37$, $r = .11$.

5.2.2 Materials

Experiment 3 adopted 20 pseudowords as the target words for all the participants to remember. This excluded the possibility that they already had some knowledge of the targets. Another reason for employing pseudowords was that it was difficult to make two types of collocations out of low-frequency words, which were used in Experiments 1 and 2. All the target words were taken from the website called *the AKC Nonword Database*, which automatically produces pseudowords according to orthographical rules in English (Rastle et al., 2002). The length of each word was set at between five to seven letters. Each pseudoword was supposed to replace one real English word such as *plique* for money, or *queale* for problem.

Then, 20 known adjectives and 20 verbs that could be collocated with the target words were selected. All these cue words belonged to the 1000-word level or 2,000-word level of *JACET 8000* (JACET, 2003), and were thought to be already known to university learners of English (Kasahara, 2005). The existence of each two-word combination consisting of one cue and one target was confirmed in the BNC, *Genius English-Japanese Dictionary* (Konishi & Minamide, 2006) or *The Wisdom English-Japanese Dictionary* (Inoue, Akano, 2008). All the 20

target words, the 20 adjective + target combinations, and the 20 verb + target combinations are shown in Table 5.1.

Next, two types of learning list were made. Both lists included two types of presentation: a single word presentation and a two-word combination presentation. The reason these lists had the two kinds of presentation (the targets + their translations and the combinations + their translations) was to confirm the superiority of combination learning over single word learning. The order of the target words was the same for the two lists. List 1 was made for Group 1, with the 20 target nouns and their Japanese equivalents on the left and the 20 adjective + target combinations and their Japanese equivalents on the right. List 2 was made for Group 2, with the same arrangement as for Group 1. Appendix A shows the items in List 1 and Appendix B shows the items in List 2.

Finally, two types of test were produced. Test 1, which was given to both of the groups, had the 20 target nouns and asked the participants to write down their meanings in Japanese. Test 2 had the participant write down the Japanese meanings of the 20 two-word combinations that they had learned. Group 1 participants had to write down the meanings of the 20 adjective + noun combinations, while their Group 2 counterparts wrote the meanings of the 20 verb + noun combinations. To avoid the learning order effect, all the targets and the combinations were shown in a different order to the order in the lists. The details of the tests are shown in Table 5.2.

Table 5.1

The 20 Target Words and the Two Types of Combination

Target	Replaced Word	Adjective + Target (G1)	Verb + Target (G2)
plique	money	*much* **plique**	*waste* **plique**
queale	problem	a *difficult* **queale**	*cause* a **queale**
krirk	letter	a *long* **krirk**	*write* a **krirk**
chaumb	milk	*white* **chaumb**	*drink* **chaumb**
zighnd	grass	*green* **zighnd**	*cut* **zighnd**
rouve	door	a *back* **rouve**	*open* a **rourve**
tauff	shower	a *hot* **tauff**	*take* a **tauff**
stilch	whale	a *big* **stilch**	*catch* a **stilch**
welbb	song	a *new* **weibb**	*sing* a **weibb**
urnth	river	a *deep* **urnth**	*cross* an **urnth**
dwoughk	company	an *international* **dwoughk**	*start* a **dwoughk**
jyled	dish	a *dirty* **jyled**	*wash* a **jyled**
crell	hand	a *left* **crell**	*wave* a **crell**
woadge	love	*true* **woadge**	*need* **woadge**
dryzz	man	a *famous* **dryzz**	*meet* a **dryzz**
spleth	meal	a *cold* **spleth**	*eat* a **spleth**
yeabb	room	a *private* **yeabb**	*clean* a **yeabb**
blife	car	a *foreign* **blife**	*drive* a **blife**
gnalp	meeting	a *special* **gnalp**	*attend* a **gnalp**
fighd	tower	a *tall* **fighd**	*build* a **fighd**

Table 5.2

Test 1 and Test 2 (Full Mark = 20)

	Test Items	Time
Test 1	20 target nouns	3 minutes
Test 2 for G1	20 adjective + target combinations	4 minutes
Test 2 for G2	20 verb + target combinations	4 minutes

Note. Test 1 was common to both groups. G1 = Group 1; G2 = Group 2.

5.2.3 Pilot Study

A pilot study was carried out to predict how many minutes would be needed for the encoding and decoding phases. The study employed 20 university students who were majoring in English Education and found that the experiment would need five minutes for the learning session, three minutes for Test 1 and four minutes for Test 2.

5.2.4 Procedure

Experiment 3 had three sessions held in weekly English lessons. In the first session, the participants in each group took the 2,000-word level and the 3,000-word level of the Vocabulary Levels Test. The second session included an encoding phase and immediate recall tests. Each participant in Group 1 was given List 1 (the adjective + noun combinations), whereas each participant in Group 2 was given List 2 (the verb + noun combinations). They were instructed to remember the meanings of the target nouns and the combinations for five minutes. They were also told that they would have to write down the meanings of

100

the targets in Test 1 and the meanings of the combinations in Test 2 after the learning session. After the lists were collected, the participants took Test 1 within three minutes and then Test 2 within four minutes. In the third session, a week later, they took the same recall tests again without any advance notice.

5.2.5 Scoring

One point was given for each correct answer and zero for a wrong one. In the case of Test 1, the participants got one point if they wrote down the exact Japanese equivalent to the word in the list; otherwise they got zero points. In the case of Test 2, only the target nouns were subject to the scoring. They got a point if they produced the correct translation for the target. They got zero if they produced the correct translation for the known cue but a wrong translation for the target.

5.2.6 Data analysis

In order to test Hypothesis 5.1, a two-way ANOVA (Learning Condition $\times$ Time) was conducted for the test scores of Group 2. This would reveal the difference in declining pattern between the single word learning condition (Test 1) and the known verb and the unknown noun combination learning condition (Test 2). To resolve Hypothesis 5.2, a paired-sample t test was conducted between the two immediate tests and the two delayed tests.

In order to examine Hypothesis 5.3, a three-way ANOVA (Cue Type $\times$ Learning Condition $\times$ Time) was conducted for the test

101

scores of the two groups. This would reveal the difference in declining score patterns of the single learning condition and the combination learning condition between the groups. In other words, it would show which cues, the known adjectives or the known verbs, could help the participants retain the meanings of the targets better over the period from the immediate tests to the delayed tests. In order to examine Hypothesis 5.4, the author checked whether there was a significant difference between the groups in each test. Necessary post hoc tests were carried out in accordance with the results of the three-way ANOVA.

5.3 Results

Table 5.3 shows the means and the standard deviations of each group in the immediate Test 1 and Test 2 as well as in the delayed Test 1 and Test 2. Figure 5.1 shows the declining patterns in scores between the immediate tests and the delayed tests in terms of each group. First, a two-way ANOVA was conducted on the test results of Group 2. There was a significant interaction between the two factors, Learning Condition and Time, $F(1, 26) = 23.15$, $p = .045$, $\eta_p^2 = .15$. This means that the verb + noun combination learning resulted in better retention than the single word learning. The results of the post hoc paired-sample t tests showed that the combination learning yielded significantly higher scores than the single word learning, not only in the immediate tests, $t(26) = -8.46$, $p = .0001$, $r = .86$, but also in the delayed tests, $t(26) = -.14.45$, $p = .0001$, $r = .94$.

Then, the author went on to check whether there was any difference in score decline patterns between the groups. Table 5.3 shows that there was no great difference between them for any of the test scores. The declining patterns in the scores of Test 1 and Test 2 shown in Figure 1 seem identical between the groups. The result of the three-way ANOVA showed that there was no significant three-way interaction, $F(1, 60) = .001$, $p = .98$, $\eta_p^2 = .00$. This means that there was no significant difference in declining score patterns between the groups.

Having found that there was no significant difference in retention (Time) between the groups, the author combined the scores of the immediate and delayed tests of each group in order to see if there was a significant two-way interaction between the cue types and the learning conditions. Table 5.4 shows the means and the standard deviations of each group's Test 1 and Test 2 after the immediate test scores were added to the delayed test scores. Figure 5.2 shows the scores for Test 1 and Test 2 between the groups. A two-way ANOVA (Cue Type $\times$ Learning Condition) was conducted and there was no significant two-way interaction, $F(1, 60) = 71.87$, $p = .002$, $\eta_p^2 = .15$. Post Hoc paired-sample t tests revealed that there was no significant difference between the groups in terms of Test 1, $t(60) = .07$, $p = .95$, $r = .01$, and in terms of Test 2, $t(60) = -1.47$, $p = .15$, $r = 26$.

Table 5.3

Means and Standard Deviations of the Two Groups in the Immediate and Delayed Tests 1 and 2

(Full Mark = 20)

	Group 1 (A + N, $n = 35$)		Group 2 (V + N, $n = 27$)	
	Mean	*SD*	Mean	*SD*
Immediate test				
Test 1	8.03	5.06	8.37	4.49
Test 2	14.14	4.27	16.04	3.06
Delayed test				
Test 1	3.29	3.58	2.81	3.45
Test 2	11.29	5.15	12.33	3.53

Figure 5.1 *Means of the Two Groups in the Immediate Tests 1 & 2 and the Delayed Tests 1 & 2*
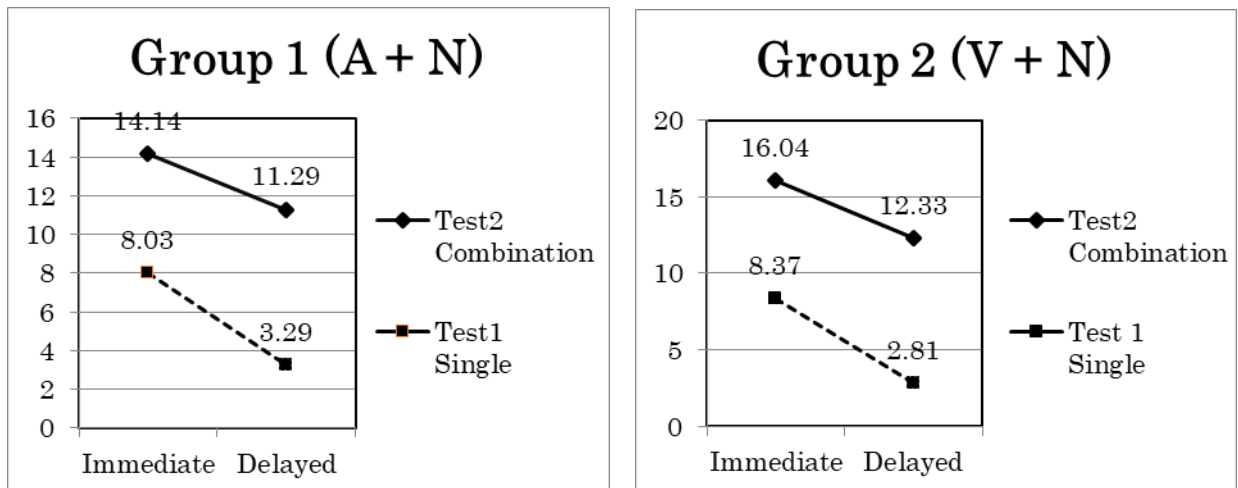
Table 5.4

Means and Standard Deviations of the Two Groups in Tests 1 and 2   (the immediate and delayed test scores combined)

(Full Mark = 20)

	Group1 (A + N, $n = 35$)		Group 2 (V + N, $n = 27$)	
	Mean	*SD*	Mean	*SD*
Test 1 (Single)	11.31	7.98	11.19	6.98
Test 2 (Combination)	25.43	9.08	28.37	5.79

Figure 5.2

Means of the Two Groups in the Combined Tests 1 & 2
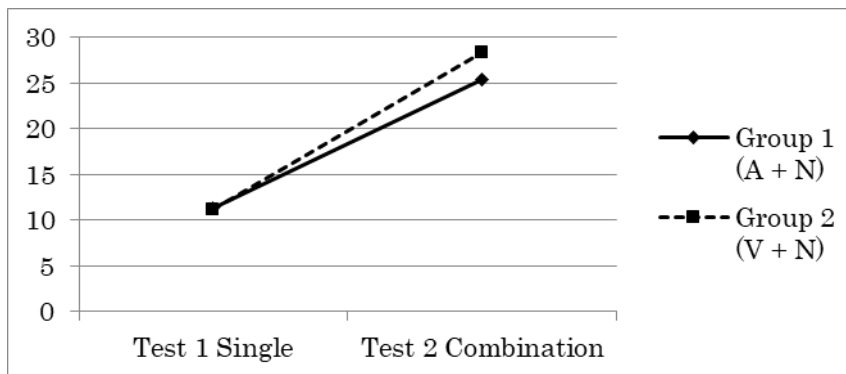
5.4 Discussion

Hypothesis 5.1 posits that learning a new noun with a known verb will improve retention of the noun better than learning the target noun in isolation. This was supported because there was a significant interaction between Learning Condition and Time in Group 2. The result is consistent with the previous two experiments. The known verbs seemed

105

to help the participants keep the meanings of the target nouns locked in their mental lexicons.

Hypothesis 5.2 postulates that learning a new noun with a known verb will improve its retrieval better than learning the target noun in isolation. This was also confirmed because the scores of the combination learning (Test 2) were significantly higher than those of the single word learning (Test 1). This result corresponds with the findings of the previous experiments. The known verbs seemed to be useful in helping the participants to limit the scope of searching and to retrieve the meanings of the target nouns.

Hypothesis 5.3 assumes that known verb + unknown noun combinations are as effective for retention of the target nouns as known adjective + unknown noun combinations. This null hypothesis was not rejected because the three-way ANOVA did not show any difference in score decline over a week between the two types of combination. At the same time, the effectiveness of known verb + unknown noun combinations in retention was proved through examining Hypothesis 1 above, whereas the effectiveness of known adjective + unknown noun combinations in retention was proved in the previous experiments. Known verbs can function as cues to retain the meanings of new nouns as effectively as known adjectives.

Like adjective + noun combinations, verb + noun combinations may have led the participants to elaborative rehearsal in the learning phase. Making links between familiar verbs and new nouns functioned effectively for long retention of the target nouns. Besides,

106

Verb-and-noun collocations as well as adjective-and-noun collocations are so frequent in the target language and so familiar to learners that these verb + noun combinations can be easy for L2 learners to retain in their mental lexicons.

The effectiveness of verb-and-noun combinations in retention could also be explained by CLS (Davis & Gaskell, 2009; Lindsay & Gaskell, 2010; McCleland et al., 1995). According to this theory, new and old information are dealt with in separate places in the brain. New information is processed in a rapid learning system in the hippocampus, and gradually moves into a slow learning network in the neocortex. New words are encoded in a short time in the hippocampus, and then, via offline consolidation as can occur during sleep, they are transferred to a stable long-term memory in the neocortex. A connection established between a known verb and a new noun can help facilitate this transfer process.

Verb-and-noun combinations may have created enhanced imageability to the same degree as adjective-and-noun combinations do. Attaching a verb to a target noun can help learners to create a specific image of the combination. For example, imagine the case where a learner adds the verb *write* to the target noun *krirk* (= letter), and obtains a combination, *write a krirk*. This combination can evoke a specific image of someone writing something in a letter on a desk. This specific image can help L2 learners retain the meaning of the new target word, *krirk*. Attaching a known verb to a target noun means providing some action related to the target noun. This can create a more informative and more

specific image than an image that learners can get from a target noun itself. The abundance of information can lead to better retention of the target word. This enhanced imageability could be the most crucial reason for long retention of verb-and-noun combinations.

The other null hypothesis, Hypothesis 5.4, predicts that known verb + unknown noun combinations are as effective for retrieval of the target nouns as known adjective + unknown noun combinations. This hypothesis was not discarded either, because the paired-sample t tests revealed that there was no significant difference between the two types of combination in the total scores of either Test 1 or Test 2. Again, the retrieval superiority of both combinations over singles was proved in the examination of Hypothesis 2 and the previous experiments. Known verbs can serve as cues to retrieve the meanings of target nouns as effectively as known adjectives.

ESH can explain the superiority of verb + noun combinations in retrieval. The existence of known verbs attached to target nouns both in the encoding and decoding phases might have helped the participants to retrieve the meanings of the target nouns. It seemed that the participants took advantage of the newly established links between cues and targets. In the encoding phase, the participants tried to connect the new target noun to the known verbs which already existed in their mental lexicons. Then a link between them was formed. Seeing the same two-word combination again in the decoding phase, they recalled the meaning of the cue first, which activated the link to the target. Finally, the link led them to the meaning of the target in their mental lexicons.

Another possible reason for verb + noun combinations' superiority in retrieval over singles comes from ACH. A known verb in a combination can narrow the scope of the meaning search of a following target noun. For instance, if you see the verb *wash* before the target word *jyled*, you can guess that *jyled* is something dirty. An action represented by a verb can limit the meaning of a following noun, which can increase the possibility of successful retrieval.

There are two limitations to be mentioned in this study. The small number of participants may make it hard to generalize the results. Replication studies with a larger population are needed. The other limitation is that the present study used 20 pseudowords which replaced high-frequency English words. This means that the participants learned the combinations of two high-frequency words. The original intention of the study was to find a way to learn low-frequency words with the help of known words. In this respect, this study did not reflect a real learning situation. It did not guarantee ecological validity (Nation & Webb, 2011).

5.5 Conclusion

Experiment 3 has shown that known verbs can be as effective as known adjectives when used as cues for learning new nouns. Attaching a known verb to a new noun can be useful for helping L2 learners to retain and retrieve the meaning of the noun. Moreover, remembering verb-and-noun combinations will help them improve their productive

skills because a verb-and-noun combination is a core part of an English sentence. If L2 learners have already learned high-frequency verbs in the target language, they can be encouraged to use these verbs as cues in the known-and-unknown combinations to master new nouns.

Chapter 6

Which Cues, Nouns or Adverbs, Provide the Most Assistance for

Remembering New Verbs? (Experiment 4)

6.1 Introduction

Experiment 3 used verbs as known cues for target nouns. It investigated whether verb (known) + noun (unknown) combinations would be as effective as adjective (known) + noun (unknown) combinations, employing the same target nouns (20 pseudowords) and two groups with the same vocabulary size. The results showed that both types of combination were more effective for retention and retrieval of the meanings of the targets than single word learning. The cue verbs worked as effectively as the cue adjectives to help the participants retain and retrieve the target meanings.

The next step to confirm the effectiveness of combination learning should be to use verbs as target words to remember because a verb with a noun is an essential component of a minimal English sentence. Novice and intermediate learners of English tend to focus on acquiring nouns and verbs in their vocabulary learning. McCrostie (2007) investigated words in the vocabulary notebooks of 124 English major university students in Japan, and found that 28% of the words were verbs, while 43 % were nouns. Therefore, it would be beneficial for learners of English to know effective cues to remember new verbs. Experiment 3 has shown that verbs can be effective cues to remember new nouns in known-and-unknown two-word combinations. Experiment 4 examines

the two-word combinations in the opposite way: new target words are verbs and known cues are nouns. In addition, verbs often appear with adverbs.[1] It is worthwhile to investigate whether adverbs can work as effective cues to remember target verbs. The purpose of the present study is to find which cues, nouns or adverbs, can provide the most assistance for remembering new verbs. In other words, the aim is to compare the effectiveness of verb + noun combinations and verb + adverb combinations for intentional vocabulary learning.

Experiment 4 has three research questions. The first question is whether unknown verb + known noun combination learning is better for the retention and retrieval of the target verbs than single unknown word learning. The second question is whether unknown verb + known adverb combination learning is better for the retention and retrieval of the target verbs than single unknown word learning. The last question is to examine which known cues in two-word combinations, nouns or adverbs, are more effective for retaining and retrieving the meanings of target verbs. Considering the previous experiments, this study predicted that learning verb (unknown) + noun (known) two-word combinations and verb (unknown) + adverb (known) combinations would be more effective for the retention and retrieval of the target words than learning the single targets only. Therefore, the present study set up the first four hypotheses by assuming the superiority of the verb + noun combination learning and the verb + adverb combination learning over single word learning. However, as far as the author knows, no previous studies have shown which type of combination is superior. Following the method of

Experiment 3, the author adopted two null hypotheses predicting that there would be no difference between the two types of combination.

H 6.1 Learning an unknown verb with a known noun will improve the verb's retention more than learning the target verb in isolation.

H 6.2 Learning an unknown verb with a known noun will improve the verb's retrieval more than learning the target verb in isolation.

H 6.3 Learning an unknown verb with a known adverb will improve the verb's retention more than learning the target verb in isolation.

H 6.4 Learning an unknown verb with a known adverb will improve the verb's retrieval more than learning the target verb in isolation.

H 6.5 Unknown verb + known noun combinations are as effective for the retention of the target verbs as unknown verb + known adverb combinations.

H 6.6 Unknown verb + known noun combinations are as effective for the retrieval of the target verbs as unknown verb + known adverb combinations.

This study uses the definitions of retention and retrieval in the previous experiments. Retention is defined as how well learners keep the meanings of target words in their memory after a certain period of time. In this study, retention was measured by the decline in score between the immediate and delayed recall tests. Retrieval means how exactly learners recall the meanings of the target words in each test. It was measured by the score of the immediate and delayed recall tests.

6.2 Method

6.2.1 Participants

The present study employed 82 Japanese university students, every one of whom had completed at least six years of English learning. The original participants were 107 students who took one of the two English classes regularly held once a week in the university: 50 belonged to Class A and 57 belonged to Class B. In order to check that the participants in each class had the same receptive vocabulary knowledge, the author had them take the 2,000- and 3,000-word levels of the Vocabulary Levels Test (Nation, 1990; 2001; 2008). The reason for choosing this test was the same as that mentioned in the previous chapter: its high reliability (Schmitt et al., 2001) and its less time-consuming nature. The tests revealed that there was no significant difference in score but a significant different tendency between the groups, $t(105) = 1.89$, $p = .06$, $r = .03$. In order to confirm equality in vocabulary size, the author excluded seven students who showed the smallest vocabulary sizes from Class B, whose average score was lower than that of Class A. As a result, there was no significant difference in vocabulary size between the groups, $t(98) = .56$, $p = .58$, $r = .003$. Then, Class A was assigned to Group 1, where the participants learned the target verbs in the verb + noun combinations, whereas Class B was assigned to Group 2, where the participants learned the target verbs in the verb + adverb combinations.

The experiment was carried out over three weeks in part of the students' weekly regular English classes. The students who missed one of the three experimental sessions were excluded from the analyses,

which left 41 participants in each group. There was no significant difference in vocabulary size, according to the same Vocabulary Levels Test, $t(80) = .95$, $p = .35$, $r = .01$. The equality in vocabulary size between the groups remained intact.

6.2.2 Materials

The author decided to use 20 pseudowords as the target verbs for all the participants to remember, following Experiment 3. The present study made its priority removing the possibility that the participants had some knowledge of the target words, though using pseudowords could damage the ecological validity of the experiment (Nation & Webb, 2011). All the pseudowords were taken from *the AKC Nonword Database*, a website that automatically provides pseudowords following the basic orthographical rules in English (Rastle, Harrigton, & Coltheart, 2002). Each pseudoword replaced an English verb such as *blunged* for *study*, or *doost* for *write*. The length of each word was set at between five to seven letters.

The known cue words that could be collocated with the target verbs, 20 nouns and 20 adverbs, were selected from the 1,000-word level or 2,000-word level in *JACET 8000* (JACET, 2003), which is one of the most reliable vocabulary lists for Japanese learners of English, because these high-frequency words have been proved to be already familiar to university students in Japan (Kasahara, 2005). The existence of the 20 verb + noun combinations and the 20 verb + adverb combinations was checked with the British National Corpus, *Genius English-Japanese*

Dictionary (Konishi & Minamide, 2006) and *The Wisdom English-Japanese Dictionary* (Inoue, Akano, 2008). The author had one native speaker of English check whether the combinations really existed. As a result, two of the verb + adverb combinations were discarded, and accordingly, two of the verb + noun combinations with the same target verbs in them were excluded. The final 18 target words, the 18 verb + noun combinations, and the 18 verb + adverb combinations are shown in Table 6.1.

Next, the author made two types of learning list: List 1 for Group 1 and List 2 for Group 2. List 1 consisted of the 18 target words and their Japanese equivalents on the left and the 18 verb + noun combinations and their Japanese equivalents on the right. List 2 included the 18 target words and their Japanese equivalents on the left and the 18 verb + adverb combinations and their Japanese equivalents on the right. This presentation style (the targets + their translations and the combinations + their translations) followed Experiment 3 because one of the purposes of this study was to confirm the superiority of combination learning over single word learning. The target words were arranged in the same order between the two lists (See Appendix 4).

This study adopted the same two types of test as used in Experiment 3. Test 1 asked the participants to write down the Japanese equivalents of the 18 target words. The same test was given to each participant in each group. Test 2 asked them to produce the Japanese equivalents of the combinations they had learned: Group 1 participants had to write down the meanings of the 18 verb + noun combinations,

while their Group 2 counterparts wrote the meanings of the 18 verb + adverb combinations. The orders of the target words and the combinations were randomized in order to avoid the learning order effect. Detailed information on each test is shown in Table 6.2. The allotted time for each test was the same as in Experiment 3 because the research design was the same.

Table 6.1

The 18 Target Verbs and the Two Types of Combination

Target	Replaced Word	Verb + Noun (G1)	Verb + Adverb (G2)
blunged	study	**blunged** *English*	**blunged** *abroad*
cuised	speak	**cuised** *Japanese*	**cuised** *fast*
doost	write	**doost** a *letter*	**doost** *well*
erves	eat	**erves** *breakfast*	**erves** *outside*
fleed	select	**fleed** a *gift*	**fleed** *carefully*
himps	throw	**himps** a *ball*	**himps** *forward*
knide	stop	**knide** *smoking*	**knide** *suddenly*
luibs	love	**luibs** *peace*	**luibs** *forever*
marves	understand	**marves** the *situation*	**marves** *clearly*
niffed	inhale	**niffed** *air*	**niffed** *deeply*
oamed	drive	**oamed** a *car*	**oamed** *slowly*
psurled	answer	**psurled** the *question*	**psurled** *quietly*
rhigned	grow	**rhined** *vegetables*	**rhined** *rapidly*

swoars	read	**swoars** a *book*	**swoars** *widely*
thrints	move	**thrints** a *machine*	**thrints** *quickly*
ushed	forget	**ushed** *names*	**ushed** *completely*
wralled	dry	**wralled** *hands*	**wralled** *naturally*
ziped	kiss	**ziped** *a friend*	**ziped** *gently*

Note. G1 = Group 1; G2 = Group 2.

Table 6.2

Test 1 and Test 2 (Total Marks = 18)

	Test Items	Time
Test 1	18 target verbs	3 minutes
Test 2 for G1	18 target + noun combinations	4 minutes
Test 2 for G2	18 target + adverb combinations	4 minutes

Note. Test 1 was common to both groups. G1 = Group 1; G2 = Group 2.

6.2.3 Procedure

This study had three sessions held in weekly English lessons with the same procedure and time allotments as Experiment 3. In the first session, the participants in each group took the 2,000-word level and the 3,000-word level of the Vocabulary Levels Test. The second session included an encoding phase and immediate recall tests. Each participant in Group 1 was given List 1 (the verb + noun combinations), whereas each participant in Group 2 was given List 2 (the verb + adverb combinations). They were instructed to memorize the meanings of the target nouns and the combinations for five minutes. They were also told

118

that they would have to write down the meanings of the targets in Test 1 and the meanings of the combinations in Test 2 after the learning session. After the lists were collected, the participants took Test 1 for three minutes and then Test 2 for four minutes. In the third session, a week later, they took the same recall tests again without any advance notice.

6.2.4 Scoring

In the case of Test 1, the participants got one point if they produced the exact Japanese equivalent of the target word in the list; otherwise they got zero points. In the case of Test 2, the subject of the scoring was only the target verbs. The participants were given one point if they wrote down the correct translation for the target. They got zero for a wrong translation for the target even if they produced the correct translation for the known cue.

6.2.5 Data Analysis

First, a three-way ANOVA (Cue Type $\times$ Learning Condition $\times$ Time) was conducted to test Hypothesis 6.5. This meant examining how different cues affected the retention of the meanings of the target words. If a significant three-way interaction was found, necessary two-way ANOVAs (Learning Condition $\times$ Time) would be conducted to investigate whether there was a significant two-way interaction in each group. This entailed checking Hypotheses 6.1 and 6.3 to see whether each cue learning was more effective for retaining the meanings of the target words than the single word learning Then, post hoc tests were

119

conducted to see whether there was a significant difference in retrieval of the meanings of the targets between single word learning and combination learning (Hypotheses 6.2 and 6.4), and to see whether there was a significant difference between the groups in terms of the immediate Test 2 and the delayed Test 2 (Hypothesis 6.6). When there was no significant three-way interaction, the author planned to carry out post hoc tests, combining the data of each group together to see the differences in the tests between the single word learning and the combination learning.

6.3. Results

The means and the standard deviations of each group in the immediate Test 1 and Test 2 as well as in the delayed Test 1 and Test 2 are presented in Table 6.3. Figure 6.1 shows the declining patterns in scores between the immediate tests and the delayed tests in terms of each group. In the immediate and delayed forms of Test 1, which asked for the meanings of the targets without the cues, there was no great difference between the groups. However, in terms of the immediate and delayed forms of Test 2, which asked for the meanings of the combinations, Group 1 (the verb + noun combinations) showed higher scores than Group 2 (the verb + adverb combinations). The score gap became larger in delayed Test 2.

The three-way ANOVA revealed that there was a significant three-way interaction between the three variables, $F(1, 80) = 9.25$, $p = .003$, $\eta_p^2 = .10$. This indicates a possibility that there was a significant

120

difference in declining score patterns between the groups, as Figure 6.1 shows. Consequently, the author went on to perform a two-way ANOVA on the scores of the four tests of each group. The results showed that there was a significant two-way interaction between the Time and Learning Condition in Group 1, $F(1, 39) = 18.50$, $p = .0001$, $\eta_p^2 = .31$, but that there was no significant interaction in Group 2, $F(1, 39) = 1.36$, $p = .25$, $\eta_p^2 = .03$. These results indicate that the verb + noun combination learning was more effective for retaining the target word meanings than the single word learning, but that this superiority was not seen in the verb + adverb combination learning.

Then, a MANOVA was performed in order to see whether each type of combination learning (Test 2) was more effective in retrieval of the target word meanings than single word learning (Test 1) in the immediate and the delayed test stages. A simple-simple main effect of the combination learning was observed. The results in Table 6.4 and Figure 6.1 show that both types of combination learning yielded significantly better scores in the immediate tests as well as the delayed tests than single word learning. One notable point about these results is that the effect sizes of the verb + noun combination learning (Group 1) were much larger than those of the verb + adverb combination learning (Group 2).

Finally, another MANOVA was conducted to examine whether there was any difference in the score of each test between the two cue types (nouns vs. adverbs). The results are presented in Table 6.5 and Figure 6.2. In the case of the combination learning (Test 2), the verb +

121

noun combinations produced significantly better scores than the verb + adverb combinations, though there was no significant difference between the two groups in the case of the single word learning (Test 1). The effect size of the delayed Test 2 was larger than that of the immediate Test 2.

Table 6.3

Means and Standard Deviations of the Two Groups in the Immediate and Delayed Tests 1 and 2

	Group1 (Verb + Noun, $n = 41$)		Group 2 (Verb + Adverb, $n = 41$)	
	Mean	*SD*	Mean	*SD*
Immediate test				
Test 1	6.59	4.24	6.56	4.06
Test 2	12.73	3.82	7.66	4.04
Delayed test				
Test 1	2.12	1.98	2.41	2.40
Test 2	10.88	4.01	3.95	2.77

Figure 6.1

Means of the Two Groups in the Immediate Tests 1 & 2 and the Delayed

Tests 1 & 2
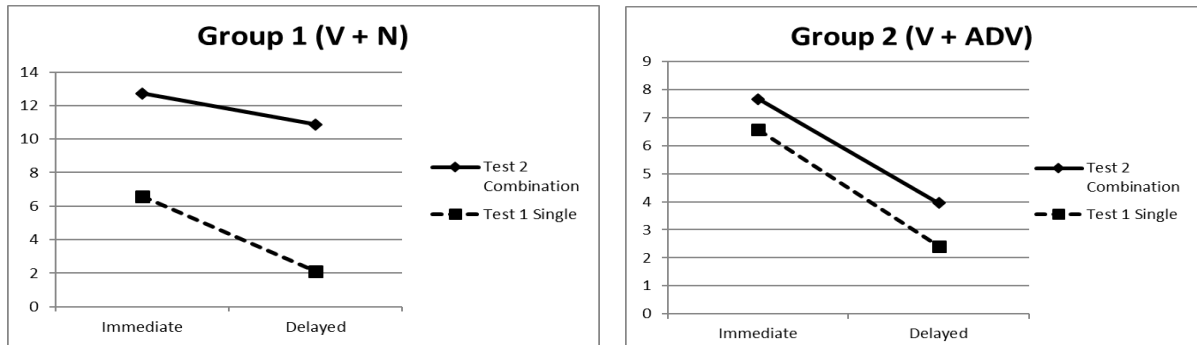
Table 6.4

Results of the MANOVA for Difference Between the Learning Conditions

(Test 1 vs. Test 2)

Test	Group 1 ($n = 41$)				Group 2 ($n = 41$)		
($df = 1, 80$)	F	p	$\eta_p{}^2$		F	p	$\eta_p{}^2$
Immediate	151.71	.0001	.65		4.84	.03	.06
Delayed	444.49	.0001	.85		13.69	.0001	.15

Table 6.5

Results of the MANOVA for Difference Between the Cue Types (Noun vs.

Adverb)

Test	Test 1 (Without the Cues)				Test 2 (With the Cues)		
($df = 1, 80$)	F	p	$\eta_p{}^2$		F	p	$\eta_p{}^2$
Immediate	0.001	.98	.00		34.17	.0001	.30
Delayed	0.36	.55	.00		82.63,0001		.51

Figure 6.2

Means of the Two Tests of Each Group in the Immediate Stage and the Delayed Stage
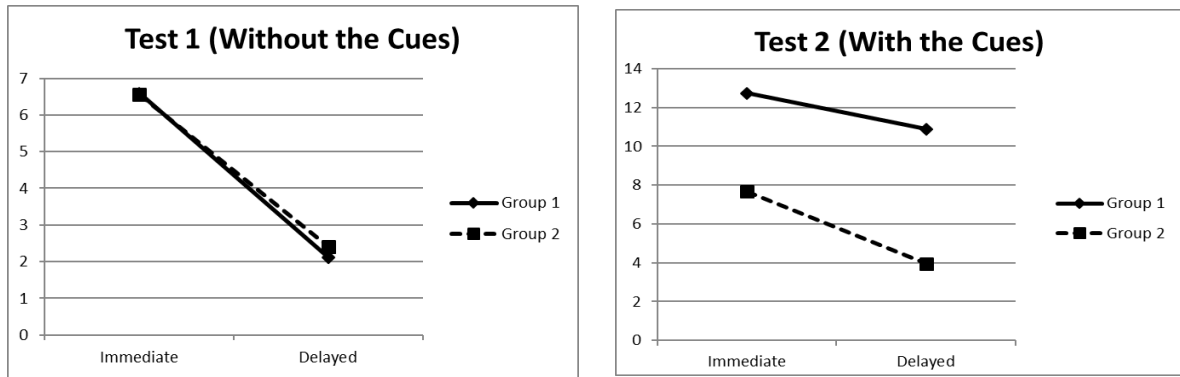
6.4 Discussion

Hypothesis 6.1 assumes that learning a new verb with a known noun will improve retention of the verb more than learning the target verb in isolation. This was supported because there was a significant two-way interaction between Learning Condition and Time in Group 1. The combination learning showed less decline in score between the immediate and the delayed tests than the single word learning. Experiment 3 used a combination of a known verb and a target noun, while Experiment 4 employed the opposite order: a target verb and a known noun. Both studies showed the effectiveness of combination learning over single word learning.

As the previous chapters have shown, this superiority of combinations can be explained by elaborative rehearsal and CLS. Elaborative rehearsal in this experiment means the participants' effort to remember the known-and-unknown two-word combinations. Connecting

familiar cues and new targets in the encoding phase could leave a deeper trace in learners' mental lexicons than remembering the targets alone. This deeper trace might lead to long-term retention. Moreover, during the period between the immediate and the delayed tests, the link between the target and the known cue seemed to help the participants maintain the meanings of the target. According to CLS, a place where new information is processed lies in the hippocampus, whereas a place where the processed information is stored is located in the neocortex. The transfer of the target word from the hippocampus to the neocortex can be facilitated by the link between the cue and the target.

Above all, enhanced imageability could explain why verb + noun combinations are more effective in retention than single words. Whichever word is the target, a verb-and-noun combination can help the learners create a specific image of the combination in their mental lexicons. For example, *doost* (= write) a letter or write a *krirk* (= a letter) can provide learners with an image of someone writing or reading a letter or something on a desk. This clear image can help them keep the meaning of the target locked into their mental lexicons. According to the dual-coding theory (Paivio & Desrochers, 1980), a verbal representation of a lexical item in one's mental lexicon can be supplemented with its nonverbal visual representation. This strong support of visual representation helped the participants retain the meanings of the target words. On the other hand, just learning the target word alone, whether it may be *doost* or *krirk,* would make it harder for learners to create such a clear and specific image.

Hypothesis 6.2 posits that learning a new verb with a known noun will result in better retrieval of the verb compared to learning the target verb in isolation. This was also supported because the results of the post hoc MANOVA revealed that the scores of the immediate and delayed tests of the combination learning (Test 2) were significantly higher than those of the single word learning (Test 1) in terms of Group 1. These results could be explained by ESH. Something attached to target items in the learning phase can help learners to retrieve the targets if it is also attached to the targets in the retrieval phase.

In addition, ACH provides another possible reason: known cues are helpful for learners to limit the scope of the search for meanings of the targets. In the decoding phase where learners try to retrieve the meaning of a target verb, seeing a known noun can be a great help in limiting the scope of the actions the verb denotes. If you see a combination such as *oamed a car*, your knowledge of the cue word *car* can lead you to imagine what actions *oarmed* denotes: drive, get on, or get off.

Hypothesis 6.3 predicts the superiority of a new verb + known adverb combination learning over single target verb learning in the retention of verb meaning. This was not supported because there was no significant two-way interaction between Learning Condition and Time in Group 2. This means that there was no significant difference in score decline between the verb + adverb combination learning and the single verb learning. This is because verb-and-adverb combinations cannot create enhanced imageability but tend to have low imageability.

126

Imageability means the image-evoking potential that a lexical item has. Concrete words are usually less likely to be forgotten than abstract words because concrete words have higher imageability than abstract words (De Groot & Keijzer, 2,000; Steinel, Hulstijn & Steinel, 2007). Learners tend to have much less trouble creating images of concrete words than abstract words. Clear visual images of concrete words can help learners retain their meanings. A great gap in imageability can be seen in a comparison of a verb + noun combination, *knide* (= stop) *smoking*, and a verb + adverb combination, *knide suddenly*. The former can give learners a concrete image of someone smoking a cigar or a cigarette. On the other hand, the image that the latter creates is rather vague and abstract because learners have no idea of the subject or the object of the verb *knide*. This makes it hard for them to create a concrete image of the combination, *knide suddenly*. The fact that verb + adverb combinations make it hard for learners to create their visual images may be the reason why this form of combination learning did not show its superiority over the single word learning in terms of retention of the target meanings.

Hypothesis 6.4 postulates that attaching a known adverb to a target verb will result in better retrieval of the verb compared to learning the target in isolation. This was supported because the MANOVA showed significantly higher scores in the immediate and delayed tests of combination learning than in the tests of single word learning. This could be explained by ESH and ACH: the participants may have used the cues' association with the targets. The appearances of known adverbs

127

both in the encoding and decoding phases worked as cues to help the participants to retrieve the meanings of the targets. The known adverbs activated the connections with the target words, which may have contributed to the successful retrieval of the meanings of the target verbs. In addition, the known adverbs were helpful in limiting the scope of the search for meaning of the target verbs, though adverbs are weaker in imageability than nouns. This was a great advantage over the single word presentation in the decoding phase.

Hypothesis 6.5 assumes that unknown verb + known noun combinations are as effective for retention of the target verbs as unknown verb + known adverb combinations. This null hypothesis was rejected: the three-way ANOVA confirmed a significant three-way interaction and the subsequent two-way ANOVAs found a significant two-way interaction between Learning Condition and Time in verb + noun combinations but not in verb + adverb combinations. It was found that the verb + noun combinations were more effective for retention of the target verbs than the verb + adverb combinations. This result was brought about due to the gap in enhanced imageability between the two types of combinations. As is explained above, this result was brought about due to the gap in imageability between the two types of combination. Images that verb + noun combinations give to learners are clearer and more concrete than images that verb + adverb combinations provide to learners. Concrete images can support the retention of target meanings more strongly than abstract images.

Hypothesis 6.6, which speculates that there is no difference in effective retrieval of target verbs between the two types of combination, was also discarded. The MANOVA revealed that the verb + noun combinations yielded significantly higher scores in the immediate and delayed tests than the verb + adverb combinations. This result could be explained by ACH. Nouns are more powerful cues for limiting the scope of a meaning search than adverbs. A typical example lies in a comparison of *doost* (= write) *a letter* and *doost well*. Verbs that come before *a letter* are limited, such as *read* or *write*, whereas learners can think of a number of verbs that could come before *well*, not only *read*, *write* but also *drive*, *speak*, *dance*, etc. It is true that the number of verbs they can think of depends on their vocabulary size. However, it can be said that nouns are powerful collocates with verbs to narrow down the meanings of the verbs; adverbs are weak collocates in this respect. Therefore, this study found that the verb + noun combinations were more effective for retrieving the meanings of the target verbs than the verb + adverb combinations.

In sum, this study has proved the superiority of nouns over adverbs in known-and-unknown combination learning when verbs are the unknown target words. One possible reason is that nouns have higher imageability than adverbs, which can lead to long-term retention. Another reason is that nouns tend to collocate with a smaller number of verbs than adverbs do. This means that a noun is stronger in narrowing down the scope of the meaning search of the preceding target verbs than an adverb.

Experiment 4 had the same two limitations that Experiment 3 had. First, the number of participants was small; therefore, it is necessary to replicate the study with a larger population. Second, using the 20 pseudowords did not reflect a real learning environment, and thus did not guarantee ecological validity (Nation & Webb, 2011).

6.5 Conclusions

This study has presented the following three findings: (a) attaching a known noun after a target new verb can facilitate the retention and retrieval of the meaning of the target verb; (b) attaching a known adverb after a target new verb can be effective for the retrieval of the meaning of the target verb, but not effective for its retention; (c) a known noun is a more effective collocate than a known adverb in order to remember a new verb in an unknown-and-known two-word combination.

A pedagogical implication from these findings is that EFL teachers can recommend an unknown verb and a known noun combination when learners work on remembering the meaning of the new verb. The teachers can tell the students that this two-word combination learning is more effective for the retention and retrieval of the meanings of target verbs than trying to remember the target as it is. The known nouns can help learners fix the target verbs in their mental lexicons because of the connection between the target and the known cue. The known nouns can also help them to retrieve the meanings of the targets because the known cues can limit the scope of the meaning search of the targets. Another

merit of unknown-and-known two-word learning is, as Kasahara (2015) suggested, that learners can increase their knowledge of verb-and-noun collocations. This contributes greatly to improving their productive skills "because a verb-and-noun combination is a core part of an English sentence" (p. 328). If learners already have a certain number of frequent English nouns in their mental lexicons, they can be advised to use these nouns as cues in the unknown-and-known combinations in order to acquire new verbs.

It is necessary for further studies to investigate what level of learner this type of two-word combination learning is appropriate for. This learning requires knowledge of basic English nouns. It would be beneficial to know what vocabulary size is needed to make use of this type of learning. This information would help teachers to know when to apply unknown-and-known two-word combination learning.

Note to Chapter 6

1.   All the adverbs that the present study employed were content words such as *abroad*, *fast*, or *well* because they contain semantic information that can help learners to retain and retrieve the meanings of target words. On the other hand, this study excluded adverbial particles (e.g., prepositions that work as adverbs) such as *on* in *put on*, or *up* in *put up with*. They cannot be good known cues because they are polysemous, and because they do not have great information value.

Chapter 7

The Effect of Known-and-Unknown Two-Word Combinations on Novice EFL Learners (Experiment 5)

7.1 Introduction

Experiments 1 and 2 showed the superiority of learning target words in known-and-unknown two-word combinations over learning the target words in isolation. The former type of learning showed higher rates of retention and retrieval of the target words as long as the known cues were presented in both the encoding and decoding phases. Experiments 3 and 4 explored effective types of two-word combinations: it was found that adjectives and verbs can work effectively as known cues to retain and retrieve target nouns, whereas nouns can be better cues than adverbs for remembering new verbs.

However, in order to take advantage of two-word combination learning, learners need to recognize cues in two-word combinations. This learning can be effective if learners already know the meaning of basic high-frequency English words, but another question arises: what level of English proficiency is needed to make use of this learning? Is this type of learning suitable for novice learners with a small vocabulary size?

Exploring this question, the author conducted another experiment, Experiment 5, employing first-year students at a junior high school (seventh graders). They were thought to be novice learners of English because they started to learn English as a subject after they entered

junior high school[1]. They experienced English learning in their elementary school days through a course *Foreign Language Activities*, which was conducted as an extra-curriculum program, not a subject. Foreign Language Activities were conducted once a week for the fifth and sixth graders. They mainly focused on oral English skills and did not deal with written texts or explicit grammar instructions. The first-year students at JHS that Experiment 5 employed understood a certain number of sound-and-meaning connections involving basic English words.

In addition, it was likely that they understood a certain number of spelling-and-meaning connections because they were exposed to a large number of loanwords from English in their daily life. Daulton (2008) claims that around half of the 3,000 highest frequency words in English are used as loanwords in the Japanese language. In fact, some studies reported that elementary school students understood a certain number of spelling-and-meaning connections and spelling-and-sound connections of English words (Kasahara, et al., 2012; Nakamura et al., 2008; Yoshimura, 2003, 2005, 2008). Experiment 5 was conducted seven months after the participants entered their junior high school. They started to learn the English alphabet at JHS and were thought to be familiar with written English when the experiment was carried out. It seemed possible that they could take advantage of known-and-unknown two-word combination learning.

Experiment 5 investigated whether learning a target word in a known-and-unknown combination could be more effective for retention and retrieval of the target word for novice English learners than learning

134

the target word in isolation. Considering the results of the previous experiments, the author set up the following two hypotheses. The definitions of retention and retrieval in Experiment 5 were identical to those in the previous studies.

H 7.1 Learning a target word with a known word is more effective for helping novice learners to retain the meaning of the target than learning the word in isolation.

H 7.2 Learning a target word with a known word is more effective for helping novice learners to retrieve the meaning of the target than learning the word in isolation.

7.2 Method

7.2.1 Participants

Experiment 5 employed 78 first-year students at a national junior high school. The experiment was carried out seven months after they entered the junior high school, when they had become familiar with basic written English. All of them learned spoken English for 45 minutes once a week through roughly 35 lessons a year of *Foreign Language Activities* when they were fifth and sixth graders at their elementary schools. Two-thirds of them came from a national elementary school, which gave them a 15-minute English learning period once a week for four years before they started to take the lessons in *Foreign Language Activities*.

The participants belonged to two different classes: 38 were in Class A and 40 were in Class B. In order to see whether the students in both classes had the same vocabulary size, the author had them take the

135

1,000- and 2,000-word levels of the revised Mochizuki Vocabulary Size Test (hereafter, RMVST; Kasahara, 2006). RMVST is a revised version of the Mochizuki Vocabulary Size Test (Mochizuki, 1998), which was developed to measure the vocabulary sizes of Japanese learners of English. The reason for the adoption of RMVST was that it had a 1000-word level test, which was necessary for measuring novice learners' vocabulary sizes. This level is not covered by the Vocabulary Levels Test. The author judged that measuring the most frequent 2,000 words was sufficient for first-year students at JHS. The results of the tests showed that there was no significant difference in vocabulary size between the two classes, $t(76) = -0.15$, $p = .88$. The students in Class A were assigned to Group 1, where they learned target words in known-and-unknown two-word presentations, whereas the students in Class B were assigned to Group 2, where they learned the same target words in isolation.

7.2.2 Materials

The target words in Experiment 5 were selected from the words beyond the 3,000-word level in *JACET 8000* (JACET, 2003), because the participants had little knowledge of the words with these frequency levels. They were either nouns or adjectives. The cue words, which were already familiar to the participants, were chosen from *Eigo Noto 1* (English Notebook 1; Ministry of Education, Culture, Sports, Science and Technology, 2009a) and *Eigo Noto 2* (English Notebook 2; Ministry of Education, Culture, Sports, Science and Technology, 2009b). The

136

participants used these books in the lessons of *Foreign Language Activities* when they were fifth and sixth graders. The known cue words were either adjectives or verbs. All the two-word combinations in Experiment 5 were either adjective-and-noun collocations or verb-and-noun collocations: some of them were known-and-unknown combinations, and the others were unknown-and-known combinations. The author confirmed that all the combinations existed in the BNC, the COCA, or *Oxford Collocations Dictionary for Students of English* (2nd ed. McIntosh, 2009). Following this process, the author selected 32 candidates for known cues and 32 candidates for unknown target words.

Then, a pre-test was conducted to investigate whether the chosen 32 cue words were actually known to the participants, and whether the 32 target words were unknown to them. A list that included the 32 cue candidates and the 32 target candidates was given to the participants. They were asked to put a checkmark next to a cue word if they did not know its meaning, and next to a target word if they did already know its meaning. Though removing every word with a checkmark would have been ideal, it turned out that the number of the words marked with a checkmark was greater than the author had expected. Experiment 5 was supposed to have about 20 known-and-unknown combinations, as the previous experiments did. If all the cues and targets with a checkmark had been removed, the number of the cues or the targets would have been far less than 20. Therefore, it was decided to remove cues that were not known to 10 or more participants, and targets that were known to two or more candidates. This left Experiment 5 with 17 known-and-unknown

two-word combinations. They are presented in Table 7.1.

Table 7.1

The 17 Target Items and 17 Combinations

Target	Translation	Combination	Translation
rendition	*ensou*	*beautiful* **rendition**	*utsukushii-ensou*
exterior	*gaiken*	*cool* **exterior**	*kakkouii-gaiken*
foliage	*ha*	*green* **foliage**	*midorino-ha*
anticipation	*yokan*	*happy* **anticipation**	*shiawaseno-yokan*
rind	*kawa*	*orange* **rind**	*orengino-kawa*
brick	*renga*	*red* **brick**	*akai-renga*
intestine	*chou*	*small* **intestine**	*shou-chou*
chrysanthemum	*kiku*	*yellow* **chrysanthemum**	*kiiroi-kiku*
anatomy	*kaibougaku*	*study* **anatomy**	*kaibougaku-wo-benkyousuru*
undergraduate	*daigakusei*	*teach* **undergraduate**	*daigakusei-wo-oshieru*
instinct	*hon-nou*	*animal* **instinct**	*doubutu-no-hon-nou*
stem	*Kuki*	*flower* **stem**	*hana-no-kuki*
suburban	*kougaino*	**suburban** *house*	*kougai-no-ie*
pediatric	*shounikano*	**pediatric** *hospital*	*shounika-no-byouin*
vague	*aimaina*	**vague** *idea*	*aimaina kangae*
nutritious	*eiyounoaru*	**nutritious** *lunch*	*eiyounoaru-ranchi*
frigid	*samusaga-kibishii*	**frigid** *morning*	*samusaga-kibishii-asa*

Two different learning lists were made: List 1 for Group 1 and List 2 for Group 2. List 1 consisted of the 17 known-and-unknown combinations and their Japanese equivalents; List 2 included the 17 target words and their Japanese translations. Then, two L1 recall tests were implemented: Test 1 for Group 1 and Test 2 for Group 2. Test 1 asked Group 1 to write down the L1 meanings of the combinations, whereas Test 2 asked Group 2 to produce the L1 meanings of the target words. The order of the items in both tests was different from the learning lists to avoid the learning order effect, though the target words were presented in the same order between the groups, both in the learning and testing phases.

7.2.3 Procedure

Experiment 5 was conducted during part of four English lessons for four weeks. In the first week, the participants took the pre-test to investigate their previous knowledge of the cues and the target words. In the second week, they took the 1,000- and 2,000-word level tests of RMVST. In the third week, they had a learning session and an immediate post-test. Group 1 participants were given List 1 (the combination learning) and Group 2 participants were given List 2 (the single word learning). Both groups received pronunciation instruction once from the author. Then, they were asked to connect the written target forms and their L1 translations within five minutes. After the learning session, the lists were collected, and the participants took the immediate post-test within three minutes. The participants in Group 1 were given Test 1 and

were instructed to write down the L1 meanings of the combinations; those in Group 2 were provided with Test 2 and were asked to produce the L1 meanings of the target words only. In the fourth week, they took the delayed post-test, which was identical to the immediate post-test within, three minutes without any advance notice.

7.2.4 Scoring

One point was given for each correct answer, and zero for an incorrect answer. In the case of the combinations, the translations of the target words were subject to the scoring. The translations of the cues were excluded.

7.2.5 Data Analysis

In order to examine Hypothesis 1, a two-way ANOVA (Time $\times$ Learning Conditions) was conducted. If there was a significant interaction between the groups, it would indicate that there was a difference in retention of the target words. In addition, a paired-sample t test was conducted to reveal the difference between the immediate and delayed tests in each group. In order to examine Hypothesis 2, an independent-sample t test was conducted to reveal the difference between the groups in each test.

7.3 Results

Table 7.1 presents the means and standard deviations of each group in the immediate and the delayed tests. Group 1, the combination

learning group, outperformed Group 2, the single word learning group, both in the immediate and the delayed tests. Figure 7.1 shows the declining score patterns of both groups from the immediate to the delayed tests. The patterns of the two groups seem to be identical.

Table 7.2

Means and Standard Deviations of the Two Groups in the Immediate and Delayed Tests (Full mark = 17)

	Group 1 (TWC, n = 33)		Group 2 (S, n = 33)	
	Mean	SD	Mean	SD
Immediate Test	15.37	2.89	10.45	4.41
Delayed Test	11.34	4.09	5.20	3.46

Note: TWC = two-word combinations; S = single words.

Figure 7.1

Means of the Two Groups in the Immediate and Delayed Tests
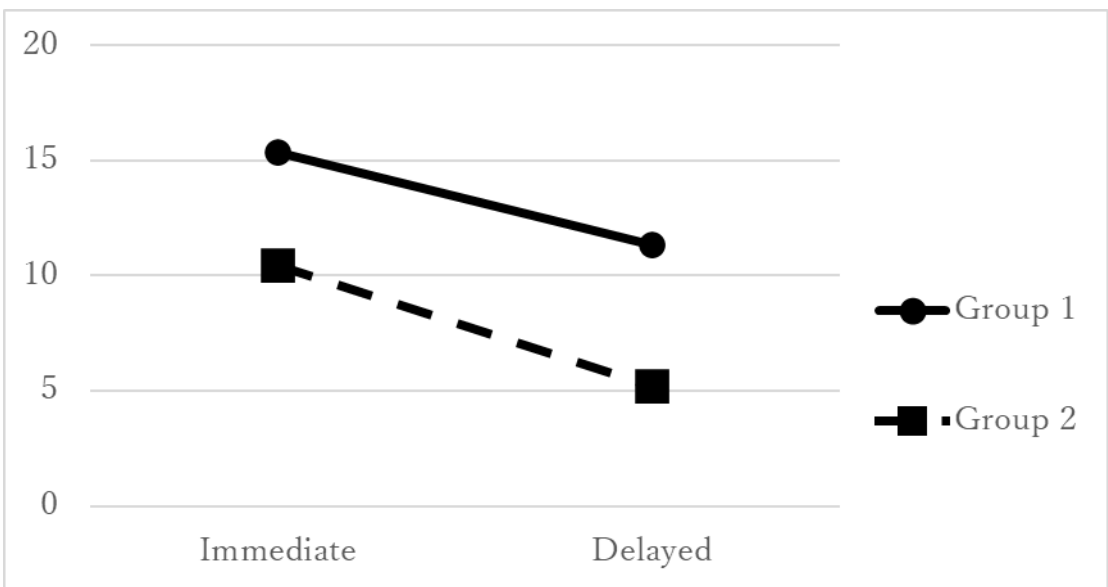
The result of the two-way ANOVA showed that there was no significant interaction between Learning Conditions and Time, $F(1, 76) = 3.03$, $p = .09$, $\eta^2 = .04$. The main effect of Time was significant, $F(1, 76) = 173.99$, $p = .0001$, $\eta^2 = .70$. The results of the paired-sample t tests showed that the scores of the immediate test were significantly higher than those of the delayed test in Group 1, $t(37) = 7.74$, $p = .0001$, $r = .79$, and in Group 2, $t(39) = 11.06$, $p = .0001$, $r = .87$. The main effect of learning conditions was also significant, $F(1, 76) = 50.68$, $p = .0001$, $\eta^2 = .40$. The results of the independent-sample t tests revealed that the scores of Group 1 were significantly higher than those of Group 2 in the immediate test, $t(74) = 5.85$, $p = .0001$, $r = .56$, and in the delayed test, $t(78) = 7.18$, $p = .0001$, $r = .64$.

7.4 Discussion

Hypothesis 7.1 posits that known-and-unknown combination learning is more effective for meaning retention of the target words than single word learning. This was not supported because there was no significant interaction between Time and Learning Conditions. Both groups showed the same declining pattern from the immediate to the delayed test, and got significantly lower scores in the delayed test than in the immediate test. A possible reason for this is that the novice learners with small vocabulary sizes could not take advantage of elaborative rehearsal, CLS, or enhanced imageability. The participants had not developed various connections between words in their mental lexicons. The larger vocabulary size learners have, the greater word

142

knowledge they acquire (Milton, 2009). As this process goes on, they develop various kinds of connections between the words that they have learned, such as semantic, syntactic, and phonological networks (Aitchison, 2003). Advanced learners have a large number of these lexical connections and have a greater ability to build new connections between a new word and words they have already acquired. Their dense lexical networks can help them to pick up and retain new words (Horst et al., 1998; Webb & Chang, 2015). Their web-like lexical networks could enable themselves to make use of elaborative rehearsal, CLS, and enhanced imageability of two-word combinations. On the other hand, the lexical networks of novice learners still have not well developed, and their ability to make use of these networks is immature. As the participants in this experiment were novice learners of English, they could not use the connections between the cues and the target words for long-term retention of the targets. Due to the limited capacity of their working memory, they might have focused on just target words and their L1 meanings. As a result, they might not have been able to use the cue words to help the targets fit into their mental lexicons.

Hypothesis 7.2 postulates that known-and-unknown combinations are also more effective for assisting novice learners to retrieve the meanings of target words than single words. This was supported because Group 1, the two-word combination learning group, had significantly higher scores in the immediate and delayed recall tests than Group 2, the single word learning group. These results could be explained by ACH. As mentioned in the previous chapters, a possible reason for the

143

superiority of the two-word combination learning is that the familiar words in the combinations may have helped Group 2 participants to narrow the scope of the meaning search for the target words. It seems that the participants in Group 2 were able to use the cue words to retrieve the meanings of the targets in the decoding phase, although they could not use the cues to retain the target words for a certain period of time due to their lack of complex lexical networks.

It is not still clear if the results of Experiment 5 can be applied to other novice learners of English. Whether learners can make use of the known-and-unknown combinations depends on their vocabulary size. Further studies are needed to clarify what vocabulary size is necessary for learners to gain benefits from two-word combination learning.

7.5 Conclusion

Experiment 5 investigated whether known-and-unknown two-word combinations could be effective for helping novice learners to retain and retrieve the meanings of target words. The results revealed that this way of learning can be effective for helping them to retrieve the meanings of the targets, but not effective in helping them retain the target words for a long time. Novice learners are thought to have difficulty in taking advantage of two-word combination learning because their vocabulary networks have not fully developed. This means that they do not have dense and varied connections between the lexical items they have in their mental lexicons. As a result, in this study they could not make use of the cue-and-target connections in the two-word combination learning.

Novice learners should be encouraged to acquire meaning-and-form connections of basic high-frequency words before they start to use known-and-unknown two-word combination learning. When they start to use this approach, they should be given occasional rehearsals of learned words in order to retain their meanings for a long time. In this case, learning should be divided into several occasions with an interval between each session. This is called *distributed practice*, which is more effective in terms of long-term retention than massed learning, where learners spend a large amount of time and effort to remember target items just in one occasion (Kornell, 2009; Sobel, Cepeda & Kapler, 2011; Baddeley, 2014; Kapler Weston & Wiseheart, 2015). Distributed practice can provide learners with repeated chances to learn the same items and less burden in one learning session. These advantages can help retain target items to learn for a long time.

Note to Chapter 7

1. Experiment 5 was conducted in the year 2012. At that time, fifth and sixth graders learned English through an extra-curricular course called *Foreign Language Activities*. The main purpose of the course was to have students become familiar with the English language. Fifth and sixth graders took a 45-minute lesson once a week. Most of them used the material called *Eigo Note 1* and *Eigo Note 2*, which mainly focused on spoken English. They did not have authorized evaluations of the course work because *Foreign Language Activities* was not an official subject.

Chapter 8

Making Lists of Known-and-Unknown Two-Word Combinations for JHS and SHS Students in Japan

8.1 Introduction

The previous chapters have shown that known-and-unknown two-word combination learning is effective for the retention and retrieval of the target word if learners already know the cue word in the combination. The cue word helps learners fix the target word in their mental lexicon in the encoding phase and limits the meaning search of the target in the decoding phase. This method is beneficial for learners who already know a certain number of basic English words. Kasahara (2005) confirmed that Japanese high school students know the meanings of the most frequent 1,000 English words and that they learn the meanings of words in the 2,000-, 3,000- and 4,000-word levels during their three years at SHS. The numbers of the words that they learn are similar to the number of words that were supposed to be taught at JHS and SHS in those days. The Course of Study announced in 1998 (MEXT, 1998) stipulated that 900 words should be taught at JHS, and that 1,300 words should be taught at SHS. These numbers were raised to 1,200 and 1,800 respectively in 2008 (MEXT, 2008). Therefore, this two-word combination learning can be effective for Japanese high school learners of English.

The known-and-unknown two-word combination learning has the potential to be effective for JHS students as well, because the number of

words they learn at elementary school and junior high school was raised again. The subsequent Course of Study published in 2017 announced that English was introduced as a compulsory subject for fifth and sixth graders at elementary school. An extra-curricular course, *Foreign Language Activities,* began to be taught to third and fourth graders. In the new curriculum, elementary school students learn about 500 to 600 basic English words. In addition, the number of words JHS students learn was increased: 1,600 to 1,800 words are to be taught at JHS. It could be said that JHS students under this Course of Study can take advantage of the two-word combination learning, especially second-year and third-year JHS students. Though Experiment 5 showed that the two-word combination learning was effective only for meaning-retrieval, not for meaning-retention, this vocabulary increase may make this method effective for JHS students under the new curriculum.

Therefore, the author decided to make a list of known-and-unknown two-word combinations for JHS and SHS students in Japan. He made the most frequent 1,000 English words known cue words, and subsequent 3,000 words (words in the 2,000, 3,000 and 4,000 word levels) target words to learn, because Kasahara (2005) has shown that most of them acquire the most frequent 1,000 words in the first two or three years and that they learn the words in the 2,000-word level to 4,000-word level in the rest of the years. Combinations of the cues and the targets were selected from a large and reliable corpus, *the Corpus of Contemporary American English* (COCA). This chapter deals with the process of making the two-word combination list.

8.2 Method

8.2.1 Materials

The author selected cues and target words from *JACET 8000* (JACET, 2003), because it is a reliable vocabulary list made for Japanese learners of English. *JACET 8000* was based on the data of *the British National Corpus* (BNC), and its selection was adjusted with data from materials that Japanese learners of English often use, such as authorized JHS and SHS textbooks. Since its publication, this vocabulary list has been widely used in Japan. The most frequent 1,000 words of *JACET 8000* were used as a source of cue words, whereas the 3,000 words that belong to the 2,000-, 3,000- and 4,000-word levels were employed as target words.

In order to find cue-and-target combinations and target-and-cue combinations, *the Corpus of Contemporary American English* (COCA; Davies, 2009, 2010) was used. COCA was the largest corpus in the world at that time and included 400 million words. This corpus is a reliable reflection of the real world because it is "is evenly divided between spoken, fiction, popular magazines, newspapers, and academic journals" (Davies, 2010, p. 447). There are two other great advantages to this corpus: one is that it is freely available; the other is that it has a really powerful collocation search engine. These advantages led the author to employ this corpus. With its collocation search engine, he collected two types of combination: cue + target combinations and target + cue combinations.

8.2.2 Procedure

In order to select cue + target and target + cue combinations, two basic criteria were set. The first criterion concerned the frequency of combinations. Only frequent combinations that appeared 10 times or more in COCA were selected, because this list was for intermediate learners of English such as JHS and SHS students in Japan. Learning combinations on the list could not only help them remember the target words in the combinations, but also help improve their productive skills in English. In order to use English in speaking and writing, correct collocational knowledge is indispensable. Iwasaki (2002) pointed out that most Japanese university learners lacked basic knowledge of English collocations.[1] Including frequent combinations would be beneficial for them in two ways: learning new words and their frequent collocations.

The other criterion concerned the strength of the combinations. An index called *mutual information* (MI) was employed because the results of the collocation search in COCA showed users the MI score of each collocation. If a two-word combination has a high MI score, it is highly likely that the other part of the pair appears nearby. It was decided that combinations whose MI score was 3 and more would be included in the list, because "[a] commonly cited threshold for statistical significance for MI is 3" (Schmitt, 2010, p. 131). These combinations have a high probability of appearing in natural discourses, which means that they are worth learning.

The next step was to select the words that function as good cue

words out of the most frequent 1,000 words in COCA. First, the author eliminated function words such as determiners (a, an, the), pronouns (I, you, my, your...), prepositions (of, in, at...), because these function words can be attached to countless other words. They are thought to have weak power to limit the meanings of target words. This step saw 140 function words removed from the 1,000 words. In addition, the author removed auxiliary verbs (can, may, will...), quantifiers (much, many, some...), interrogatives (what, who, when, where...), because they are thought to be weak cues. As a result, 758 cue words were left.

The final step was to select two-word combinations. First, using the collocation search engine of COCA, the author extracted two kinds of two-word combination: the first kind included combinations with a known cue before an unknown target word; the other kind included combinations with a known cue after an unknown target word. This led to the creation of two different combination lists: the list of known + unknown word combinations and the list of unknown + known word combinations. The target unknown words were frequent words that belonged to the 2,000-, 3,000- and 4,000-word levels of *JACET 8000* (JACET, 2003). Every chosen combination satisfied the two criteria mentioned above: its frequency in COCA was 10 or more; its MI score was more than 3.

Second, the author decided what types of two-word combinations should be included in the two combination lists, taking account of the results of the five experiments in this study. It was decided that combinations such as noun + noun, adjective + noun, verb + noun, and

151

verb + adverb combinations would be included in the lists because their effectiveness was confirmed in the experiments. In addition to these combinations, adverb + verb and adverb + adjective combinations were chosen for the lists because they are chunks that could be separable from larger chunks and that could exist as independent combinations. On the other hand, combinations that are a part of a larger chunk and cannot be independent on their own were discarded from the lists. These were noun + verb, noun + adjective, noun + adjective, noun + adverb, adverb + noun, adjective + adjective, and adverb + adverb combinations. This procedure left both of the lists with more than 40,000 items.

Finally, the author and another scholar who had joined the list-making project scrutinized the lists and discarded unsuitable items. For example, combinations including an archaic word (thou, ye…) were removed. Combinations that had a colloquial word (grandma, grandpa…) or a vulgar word were removed as well. Other types of combination that were abandoned were proper nouns (e.g. Bottle Mountain), names of products or trademarks, technical terms (e.g. branch circuit), and names of species (e.g. passion fruit). These items were judged to have little value in a pedagogical sense.

8.3 Results

The screening procedure mentioned in the precious section left the unknown + known list with 20,157 combinations and the known + unknown list with 17,146 combinations. Tables 8.1 and 8.2 show two sample items in each list. Each line has one combination: a target

152

unknown word and its known cue word appear on the right of the line in the unknown + known list; a known cue and its target unknown word appear on the right in the known + unknown list. Both lists include the following four items of information: (a) a frequency number of the combination in COCA, (b) MI score of the combination, (c) the frequency order of the target word in *JACET 8000*, and (d) the frequency order of the cue word in *JACET 8000*. These lists are currently available on the website: http://goo.gl/g1nwbq.

Table 8.1

Sample Items in the Unknown + Known List

Target Word	Cue Word	Frequency of the Combination	MI Score	Frequency of the Target	Frequency of the Cue
CULTURAL	activity	68	3.92	1003	619
CULTURAL	center	120	5.77	1002	420

Table 8.2

Sample Items in the Known + Unknown List

Cue Word	Target Word	Frequency of the Combination	MI Score	Frequency of the Target	Frequency of the Cue
Hard	EVIDENCE	509	4.52	1008	252
Clear	EVIDENCE	448	4.94	1008	339

8.4 Discussion and Conclusion

These two two-word combination lists can be helpful tools for vocabulary building for Japanese lower-intermediate learners of English who have mastered the most frequent 1,000 English words. The lists enable the learners to use these words as known cues in the combinations. These known cues can help them to learn less frequent 3,000 English words in the 2,000-, 3,000- and 4,000-word levels. The connections between cues and target words can work effectively for the retention and retrieval of the meanings of the targets. In the encoding phase, the connections can facilitate the fixation of target words in learners' mental lexicons; in the decoding phase, they can also help learners limit the scope of the meaning search for the targets. Moreover, learners can acquire frequent two-word English collocations, which can strengthen their productive skills.

However, there are no empirical studies to prove the effectiveness of these lists. The effectiveness of some types of combination, such as adverb + verb or adverb + adjective combinations, has not yet been proven. This line of studies would help decrease the number of items from both lists. They still have a great number of items and reducing the number would be handy and convenient for potential users.

Another problem about these two-word combination lists is whether a cue word is known or whether a target word is unknown depends on learners' vocabulary knowledge. The author used the frequency information of *JACET 8000* to decide whether each word should be a cue or a target. However, this frequency information does

not always reflect each learner's vocabulary knowledge. For instance, a combination *personal interview* consists of the known cue *personal* and the unknown target *interview,* but some learners may already know *interview* but not *personal.* Others may know both of them. Hence, each learner needs careful selection of two-word combinations from a large number of items and it would not be an easy task.

Note to Chapter 8

1. Iwasaki (2002) introduced his experiences he repeatedly had with his students at his university. Most of his students knew the word *umbrella* for *kasa* in Japanese. However, they could not produce the frequent collocation *open an umbrella* for the Japanese equivalent *kasa-wo-sasu*. This is partly because the L2 collocation is different from the L1 collocation, and partly because instructions on collocation are not frequently done in English lessons in Japan.

Chapter 9

Which Presentation, a Spaced Presentation or a Massed Presentation, Is More Effective for Learning Target Words?

(Experiments 6 and 7)

9.1 Introduction

The previous chapter saw the process of making lists of known-and-unknown and unknown-and-known two-word combinations. Now, two lists are available for learners: the list of unknown-and-known two-word combinations has 20,157 combinations, and the list of known-and-unknown two-word combinations has 17,146 combinations. In both lists, the known cues are the words that belong to the most frequent 1,000 word-level of *JACET 8000* (JACET, 2003), the unknown targets are the words that belong to 2,000-word, 3,000-word or 4,000-word levels. These lists are made for lower-intermediate EFL learners in Japan. However, effective uses of the lists are not yet to be examined. This chapter deals with how to use these lists; especially focuses on how to present two-word combinations to learners.

In both lists, each target word has several cue words. This means that several combinations are available to learn the same target word. In order to acquire L2 vocabulary, repetition is indispensable (Kanayama & Kasahara, 2016b; Nation, 2013). It would be better for learners to see a target word repeatedly in different two-word combinations than to see it just one time in one combination. However, it is not clear whether several combinations with the same target words should be presented

together simultaneously or separately with some interval between them. Imagine a situation where leaners try to remember 20 target words and select three combinations for each target. Should they work on a set of three combinations with the same target and move on to another set? Or, should they focus on just one combination for the 20 target words in the first round, and another combination for the 20 words in the second round, and then the third combination for them? The former type of presentation provides learners with the same target word repeatedly in a short period time, and this is called *massed learning* or *cramming*. The latter type of presentation shows them each target word with an interval, because the learners have to see 19 different target words before they encounter the same target again. This is called *spaced learning* or *distributed learning*.

A large number of studies in psychology have shown that spaced learning is more effective for long-term retention than massed learning (Koenell, 2009, Sobel et al., 2011; Baddley, 2014; Kapler et al., 2015). A possible reason for this is that divided learning sessions would give learners less burden than massed learning sessions (Kanayama & Kasahara, 2016). Human minds tend to feel more exhausted when they repeat the same thing in a short period of time than when they do several different things for the same space of time. Another reason is that spaced learning can prevent learners from getting overconfident in how well they have remembered target items (Kanayama & Kasahara, 2018). If learners learn the same items repeatedly in a short span of time, they feel as if they have already mastered the items toward the last learning

session. They pay less attention to the target items toward the end of learning sessions. On the other hand, in spaced learning, learners have to deal with different items in a limited time and have a gradual gain in each learning session. This can help them maintain their attentions to target items till the end of the learning sessions. They cannot be overconfident in their mastery of the target items and keep their effort to master them till the end. This continuous effort can lead to long-term retention of the target items.

Spaced learning is also effective for L2 vocabulary learning. For instance, Kornell (2009) compared spaced learning with massed learning with regard of L2 single word learning. He had his participants remember 40 L1-L2 word pairs through four learning sessions, each of which was conducted on a different day in the four-day consecutive schedule. The participants took a recall test on Day 5. He put 20 pairs under a spaced learning condition and the other 20 pairs under a massed learning condition. In the spaced learning, the participant saw 20 L1-L2 pairs on a screen one after another without a break. This procedure was repeated two times per learning session. In the following three days, they had the same procedure of two encounters of the 20 pairs per day. In the massed learning, the other 20 words were divided into 4 five-word groups. On each day of the four-day experiment, they just saw the same five L1-L2 pairs eight times consecutively. They learned another five pairs eight times on Day 2, another five pairs eight times on Day 3, and the last five pairs eight times on Day 4. The time assigned to each target pair is the same between the two learning conditions, and so is the total

learning time between the two. The recall test showed that the participants remembered significantly more words in the spaced learning condition than words in the massed learning condition. The whole procedure is also presented in Figure 9.1.

Figure 9.1

The Procedure of the Spaced Learning and the Massed Learning (Kornell, 2009)
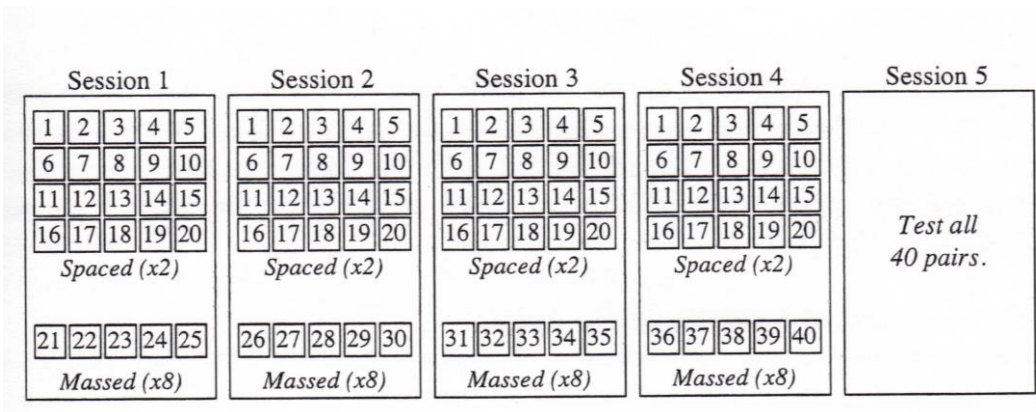
Poor performance by the massed condition may have been due to the participants' declining attention to the targets toward the end of each learning session. In the middle of the process of learning five target words in eight trials, they may have felt that they had already mastered all the target items. This overconfidence of theirs could have led to less and less attention to the target words toward the end of the session. In contrast, there was a longer interval (= seeing 19 other words) for the participants to see the same target word again under the spaced condition. Moreover, they were given just two times to see the same targets in one session. They could not have had the feeling that they had learned all the

160

20 items in each session. Therefore, they may have maintained their attention to the target till the end of the last learning session. Kornell (2009) revealed that spaced learning is better for retention of L2 words than massed learning.

Whether spaced learning is also effective for L2 two-word combination learning is still in question, because there are few studies to deal with this. One exception is Webb and Kagimoto (2011), who investigated effective presentations of L2 collocations. One of their research questions was how the number of collocates presented with node words influenced learning collocations.[1] They made five sets of 12 collocation lists, three of which "were created to examine the effect the number of collocates presented with node words had on learning" (p. 267). The first set (2×6) included two node words attached to six collocates each. The second set (4×3) included four node words attached to three collocates each. The third set had 12 nodes attached to one collocate each. The target collocations of three sets are shown in Table 9.1. Each collocation had its L1 (Japanese) translation and an example sentence including the collocation. Webb and Kagimoto had 41 Japanese learners of English learn each list for three minutes. After the learning session, they gave the participants a productive recall test, where the participants had to produce an English collocation, seeing its L1 equivalent. The results showed that "[t]he participants had significantly higher scores on the 2×6 set than the 4×3 set ($p < .05$) and 12×1 set ($p < .05$)" (p.270).

Webb and Kagimoto (2011) concluded that "increasing the number

161

of collocates presented with node words may increase learning" (p.270). This statement seems to indicate that massed presentation would be more effective for learning collocations than spaced presentation. Actually, this study did not prove the superiority of massed learning because it was not designed to compare massed learning with spaced learning. The better results of the 2×6 set can have been attributed to the fact that the list had less number of different words (= lemmas) to remember than the other lists. As can be seen in Table 9.1, the number of lemmas on the 2×6 set was 14, that of the 4×3 set was 16, and that of the 12×1 set was 24. The recall test of the 2×6 set was better than the other sets because it gave learners the least learning burden.

Table 9.1

Target Collocations in Webb and Kagimoto (2011)

the 2×6 set	the 4×3 set	the 12×1 set
Deep respect	Good laugh	Dead leaves
Deep feelings	Good reason	Simple truth
Deep end	Good behavior	Firm offer
Deep sleep	Big business	Wrong direction
Deep voice	Big day	Sweet tooth
Deep divisions	Big deal	Current affairs
Black mark	Dirty work	Thick hair
Black eye	Dirty words	Severe damage
Black humour	Dirty joke	Sad state

Black sheep	Short message	Honest mistake
Black cloud	Short cut	Old days
Black market	Short list	Bright ideas

Therefore, in order to examine the effect of spaced learning and massed learning on collocation learning, it is necessary to make sure that each condition can have the same amount of learning burden: the number of the words participants learn and the time they spent on each target item should be identical. The only difference between the two conditions is how the identical collocations should be presented to learners. With this research design, two experiments (Experiments 6 and 7) were conducted. The same number of two-word combinations were selected from the lists that the present study has produced. These combinations were presented in two different condition to two different groups of learners. One group learned the target combinations under a spaced learning condition; the other group learned the same combinations under a massed learning condition. Because there were no previous studies to investigate this question, the author set up the following null hypothesis. There is no difference in learning effect on combinations between the spaced learning condition and the massed learning condition.

9.2 Experiment 6

The purpose of Experiment 6 was to examine which presentation, a spaced presentation or a massed presentation, is more effective to learn target words in known-and-unknown two-word combinations. The author

employed two groups of learners with a similar level of English proficiency, and put one group under a spaced learning condition, and the other group under a massed learning condition. Both groups learned 18 target words in three different two-word combinations: hence, they learned 54 combinations. They learned the same 54 combinations in the same period of time, but the only difference between the groups was how to present the two-word combinations.

9.2.1 Method

9.2.1.1 Participants

The participants were 64 university first-year students who had learned English at least for 6 years. They were not English-major students, who were thought to be lower-intermediate learners of English. None of them had an experience of studying abroad more than a month. An instructor at the university who taught them English had an impression that most of them belonged to A1, A2 or B1 levels of CEFR. The author and his co-researcher explained the purpose and procedure of the experiment and secured their consent to participate in the experiment. The author divided them into three groups, according to the results of an English proficiency test that was conducted in their English lesson before the experiment. In the end, the number of the participants reduced to 43 students, who completed the whole procedure. There were 12 in a control group (Group 1), 16 in a spaced learning group (Group 2) and 15 into a massed learning group (Group 3).

9.2.1.2 Materials

All the two-word combinations were chosen from the lists of known-and-unknown and unknown-and-known two-word combinations that were described in Chapter 8. Because the participants were university students, the author selected target words from the 4,000 word-level, which was the least frequent band on the lists. In addition, a target word should have more than three high-frequency collocates, which belonged to the 1,000 word-level. Thus, 20 target words with three collocates were chosen from the known-and-unknown list, and another 20 target words with three collocates from the unknown-and-known list. This means that 60 two-word combinations were selected from each list (In total 120 combinations were selected).

Then, the participants took a preliminary yes-no test that investigated whether they were familiar with the 120 known cues and whether they were unfamiliar with the 40 target words. All the cue words were printed on one list and all the target on another list. They answered yes if they knew the meaning of a word and answered no if they did not know it. Referring to the results of the preliminary test, the author selected target words that satisfied the two following conditions. One is that they were known by less than 25% of the participants; the other one is that they had three collocates that were known by more than 80% of the participants. This process left the author 18 target words with three collocates in each target (= 54 two-word combinations). As a result, there are 8 known-and-unknown combinations and 10 unknown-and-known combinations selected for Experiment 6. All the

targets and their collocates are shown in Table 9.2.

Next, learning materials for the spaced learning (Group 2) and the massed learning (Group 3) were made. The material for each group consisted of three A4 sheets of paper, and each sheet listed 18 combinations and their Japanese translations side by side. For Group 2, three two-word combinations with the same target word were presented separately. The first sheet included 18 combinations, each of which had a target with a collocate. The second and the third sheets had the same 18 target words in the same order. However, on the second sheet, each target was presented with another collocate; on the third sheet, each target was attached to the other collocate. For instance, the target word *sensible* had three collocates, *idea*, *people*, and *way*. The first combination *sensible idea* was on the first sheet, the second one *sensible people* on the second sheet, and the third one *sensible way* on the third sheet (See Appendix 6). In this way, the same target word appeared separately, which would create a spaced learning condition. In contrast, for Group 3, three two-word combinations with the same target word were presented consecutively on the same sheet. Each sheet had six different sets of three combinations with the same target word attached to three different collocates. *Sensible idea*, *sensible people* and *sensible way* were shown in three consecutive lines of the same sheet (See Appendix 6). The participants were expected to work on the same target word through three combinations almost simultaneously, which could create a massed learning condition.

Finally, a recall test that would be conducted after the learning

166

session for all the groups was made. The test was a L1 meaning recall test because the author thought it would be appropriate for the participants' English proficiency. The test had 18 target words and asked them to write down their L1 meanings. The order of the target words was different from the order of the learning materials in order to avoid the order effect.

Table 9.2

Selected Combinations for Experiment 6

8 known-and-unknown combinations		10 unknown-and-known combinations	
Collocate	Target	Target	Collocate
high, receive, social	APPROVAL	ACCEPTABLE	answer, cost, level
energy, fish, tea	CONSUMPTION	ADEQUATE	care, job, sleep
news, television, war	CORRESPONDENT	CRUCIAL	event, meeting, moment
car, health, life	INSURANCE	DISTRIBUTION	company, list, system
full, police, special	INVESTIGATION	FUNDAMENTAL	cause, meaning, rule
bad, good, personal	INVESTMENT	PRECISE	date, number, word
happy, hot, real	PROSPECT	RIGIONAL	culture, newspaper, population
enough, lose, new	REVENUE	SENSIBLE	idea, people, way
		STATISTICS	class, report, service
		SUFFICIENT	condition, food, time

9.2.1.3 Procedure

First, all the participants took the preliminary test described above, which asked them whether they knew the meanings of the target words

and their collocates. The experiment was carried out on another day during an English lesson they took at the university. In the beginning, they took a pre-test for four minutes: it was the L1 recall test that asked them to write down the meanings of the 18 target words. After the tests were collected, the participants were given a list which had the 18 target words and their L1 equivalents side by side. The co-researcher taught the participants how to pronounce the target words for three minutes: she showed the model pronunciation of each word and the participants repeated it. Then, the list was collected.

Next, the participants had a 9-minute learning session: 3 minutes were assigned to each sheet of the 3-page material for Groups 2 and 3. In order to avoid the order effect, each group was divided into three smaller groups, each of which learned the three sheets in a different order. One small group learned the combinations in the order of Sheet 1, Sheet 2 and Sheet 3; another group in the order of Sheet 2, Sheet 3, and Sheet 1; the other group in the order of Sheet 3, Sheet 1, and Sheet 2. They were told to remember the meanings of as many combinations on each sheet as possible, and not to go back to the previous sheet. Group 2 learned 54 combinations under the spaced learning condition, whereas Group 3 learned the same combinations under the massed learning condition. Group 1, the control group, was also divided into three smaller groups. Each small group was given one of the three sheets that was made for Group 2. The control group learned the 18 combinations that consisted of the target and its collocate on one sheet for nine minutes.

Nine minutes later, the materials were collected. Then, the

participants took the same L1 meaning recall test as the pre-test for four minutes. In the end, they answered a questionnaire which asked them to describe freely how they remembered the target words.

9.2.1.4 Scoring

If the participants wrote down the L1 equivalent of a target word as shown on the learning material, they got one point. Otherwise, they got zero point. The top score was 18 points.

9.2.1.5 Data Analysis

In order to see whether there was any difference in learning effect between the two learning conditions, a 2 (Time) $\times$ 3 (Leaning Condition) two-way ANOVA was conducted for the two tests of the 3 groups. Necessary Post Hoc tests were carried out afterward.

9.2.2 Results

Table 9.3 shows the means and the standard deviations of each group in the pre-test and the post-test. Figure 9.2 shows the changing patterns in scores between both tests in terms of each group. The two-way ANOVA showed that there was no significant interaction between the groups, $F(2, 40) = 2.27$, $p = .17$, $\eta^2 = .10$. There was no significant main effect between the groups, either, $F(2, 40) = 2.11$, $p = .14$, $\eta^2 = .10$. Only the main effect between the test was confirmed, $F(2, 40) = 102.46$, $p = .0001$, $\eta^2 = .72$.

Table 9.3

Means and Standard Deviations of the Three Groups in the Pre-Teat and the Post-Test (Full Mark = 18)

Group	n	Pre-Test		Post-Test	
		M	SD	M	SD
G1 (Control)	12	0.67	1.78	6.83	5.46
G2 (Spaced)	16	0.75	1.39	10.63	6.10
G3 (Massed)	15	0.20	0.56	7.20	4.40

Figure 9.2

Means of the Three Groups in the Pre-Test and the Post-Test
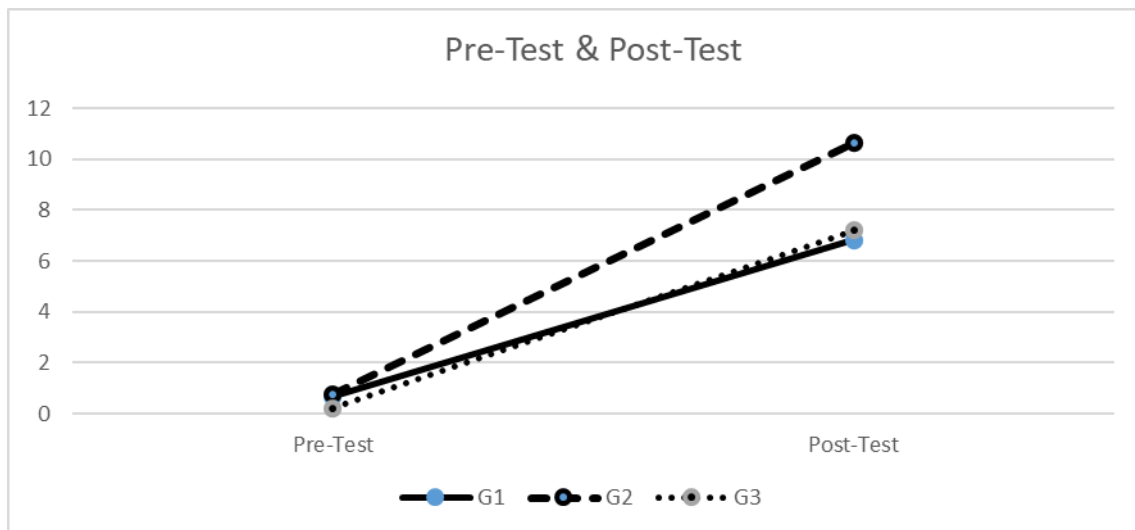
9.2.3 Discussion

The null hypothesis was not rejected because there was no significant interaction or significant main effect between the three groups. Either of two learning conditions, the spaced learning or the massed learning, did not show any better learning effect than the control

group, though the raw score of the spaced learning group in the post-test was higher than the other groups. Unlike the results of Kornell (2009) with regard to single word learning, Experiment 6 did not show the superiority of spaced learning over massed learning in terms of two-word combination learning. A possible main reason for this was too much learning burden for the participants. They had to remember 54 combinations for nine minutes, going through three sets of learning 18 combinations for three minutes. In the questionnaire given after the post-test, many of the participants mentioned that they needed more time to remember all the items. Besides, 30% of the participants remarked that they just focused on the target words only and ignored the cue words attached to them. They might not have taken advantage of known-and-unknown two-word combinations. In the case of the control group participants, who had just 18 combinations to remember, did not show better results than the other groups. This is due to their gradual attention attrition toward the end of the learning session; they looked at the same one sheet for nine minutes.

Considering the results of Experiment 6, the author decided to conduct another experiment with less learning burden to test the same null hypothesis. By reducing the learning burden, such as a smaller number of the target items and more learning time, participants could take advantage of spaced learning with regard of two-word combinations. Another problem of Experiment 6 was that it did not conduct a delayed test. A delayed test some period of time after the learning session could perceive difference in learning effect between the two learning

171

conditions that was not caught in the immediate post-test in Experiment 6. The last but not least important problem about Experiment 6 was its small number of the participants. More participants were needed to obtain the results that could be applied to various learning environments. With these modifications to the research design of Experiment 6, another experiment, Experiment 7 was carried out.

9.3 Experiment 7

Experiment 7 was a replication of Experiment 6 and aimed to test the same null hypothesis: there is no difference in learning effect on combinations between the spaced learning condition and the massed learning condition. Experiment 7 was designed to eliminate the defects of Experiment 6. First, the learning burden was reduced: the number of the target words was reduced, and the learning time was increased. Second, a delayed recall test was conducted a week after the learning session. However, the number of the participants could not be increased drastically because of various restrictions of lessons available for the author at that time.

9.3.1 Method

9.3.1.1 Participants

The participants were non-English major students at the same university where Experiment 6 was conducted. In spite of the effort to increase the number of the participants, the author could not collect a large number of participants because the number of English lessons

available was limited. Moreover, Experiment 7 had a delayed recall test, which reduced the number of the participants who completed the whole experimental procedure. In the end, Experiment 7 had 54 participants. There were 17 in the control group (Group 1), 17 in the spaced learning group (Group 2), and 20 in the massed learning group (Group 3).

9.3.1.2 Materials

The author reduced the 18 target words used in Experiment 6 to 12 words by removing the six words whose recognition rates by the participants in Experiment 6 were higher than those of other targets. The removed six words were *acceptable, distribution, fundamental, insurance, prospect* and *sensible*. By using the remaining 12 target words and their collocates (thee collocates for each target; 36 two-word combinations in total), the learning material were made in the same way as in Experiment 6. The material for the spaced learning group (Group 2) consisted of three A4 sheets, each of which had 12 different combinations and their Japanese equivalents. Each sheet had the same target words in the same order, but each target was presented with a different collocate on a different sheet. The Group 2 participants had to learn the same target separately in a different combination on a different sheet. On the other hand, the learning material for the massed learning group (Group 3) comprised three A4 sheets, each of which had four sets of three combinations with the same target word. As in Experiment 6, three combinations with the same target word were shown consecutively on the same sheet. The Group 3 participant had to learn the same target

173

three times without a break.

The same test format as that in Experiment 6, L1 meaning recall, was adapted in Experiment 7. The recall test in this experiment had 12 target words and asked the participants to write down the Japanese equivalents. This time, the same L1 recall tests were conducted three times as a pre-test, an immediate post-test and a delayed post-test.

9.3.1.3 Procedure

The basic procedure was the same as that of Experiment 6 except for the following points. First, there was no preliminary test to check their prior knowledge of the targets and the collocates, because the participants here were thought to have similar English proficiency as the participants of Experiment 6. Second, the learning period of time was extended from three minutes to four minutes per sheet. The participants in Groups 2 and 3 were given 12 minutes in total to learn the 36 combinations. The participants in Group 1 (the control group) was given one of the three sheet that was made for Group 2, and they worked on the same 12 combinations including 12 targets and 12 collocates for 12 minutes. Third, in addition to the pre-test and the immediate post-test, all of the participants took the same test as a delayed post-test one week after the learning session.

9.3.1.4 Scoring

The scoring system was the same as that of Experiment 6. One point was given to the correct answer, and zero to wrong answers. The

174

top score was 12 points.

9.3.1.5 Data Analysis

A 3 (Time) × 3 (Leaning Condition) two-way ANOVA was conducted for the three tests of the 3 groups to see whether there was any difference in learning effect between the two learning conditions. Necessary Post Hoc tests were carried out afterward.

9.3.2 Results

Table 9.4 shows the means and the standard deviations of each group in the pre-test, the immediate post-test, and the delayed post-test. Figure 9.3 shows the changing patterns in scores between the three tests in terms of each group. The results of the statistical tests on Experiment 7 were identical to those of Experiment 6. The two-way ANOVA showed that there was no significant interaction between the groups, $F(2, 51) = 1.74$, $p = .15$, $\eta^2 = .06$. There was no significant main effect between the groups, either, $F(2, 51) = 0.20$, $p = .82$, $\eta^2 = .01$. Only the main effect between the test was confirmed with a large effect size, $F(2, 51) = 327.08$, $p = .0001$, $\eta^2 = .87$. In the pre-test, the mean score of each group was less than one, but it reached around 10 in the immediate post-test. It remained around five in the delayed post-test. The three different presentations of the target items showed their effectiveness to some extent.

175

Table 9.4

*Means and Standard Deviations of the Three Groups in the Pre-Test, the
Immediate Post-Test, and the Delayed Post-Test* (Full Mark = 12)

Group	*n*	Pre-Test		Immediate Post-Test		Delayed Post-Test	
		M	*SD*	*M*	*SD*	*M*	*SD*
G1	17	0.88	1.93	11.24	1.48	5.12	2.91
G2	17	0.94	1.60	10.00	3.18	4.94	3.82
G3	20	0.95	1.57	9.70	2.81	5.75	3.06

Figure 9.3

Means of the Three Groups in the Pre-Test and the Post-Tests
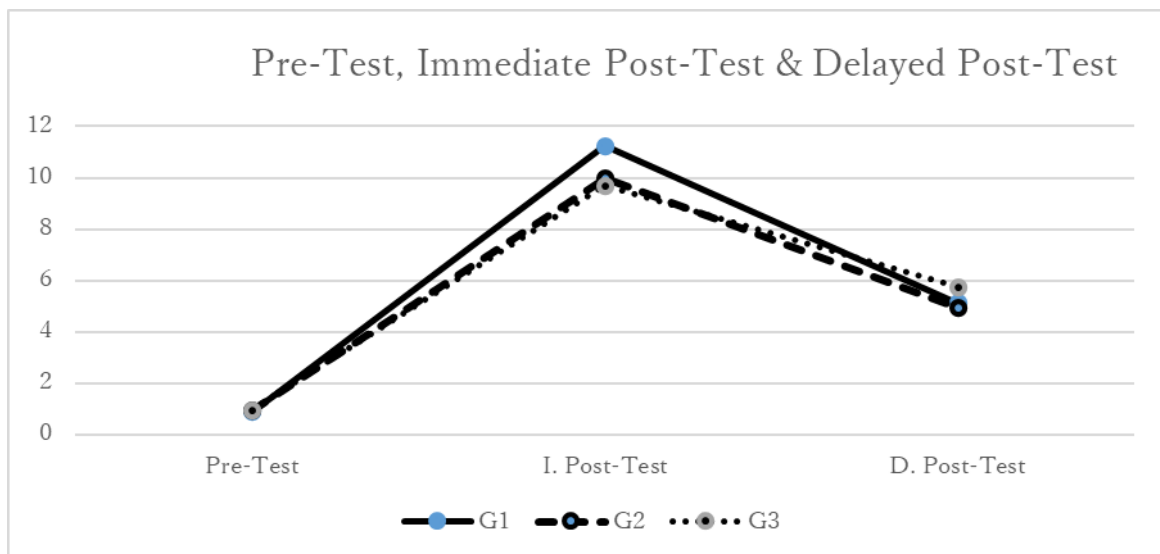
9.3.3 Discussion

Experiment 7 was a replication of Experiment 6, with less learning
burden to the participants. Again, the null hypothesis was not rejected
either, because there was no significant interaction or main effect

between the groups. Like Experiment 6, Experiment 7 did not obtain any proof that spaced learning can be effective than massed learning in terms of learning known-and-unknown (unknown-and-known) two-word combinations. The same reason described in Section 9.2.3 could be applied to the results of Experiment 7. The participants may not have been made use of the benefit of the known-and-unknown two-word combination learning by ignoring known cues and just focusing on the targets. Before the learning session, the instructor told them to remember the meanings of the combinations. However, the repeated appearances of the targets on the learning sheets made the participants pay more attention to and spend more time just on the targets. What is more, they could not see the combinations in the recall tests because the tests just presented the target words and asked them to write down the meanings of the targets. They could not use the help of the known cues to limit their meaning search of the target words. Recall tests of the combinations should have conducted after the recall tests of the targets.

Another possible reason is that Group 3 participants may not have learned the target items in a massed learning condition as the author had intended. In the learning material for Group 3, three combinations with the same target word were presented one after another on the same sheet. However, despite of this layout, the participants could have learned the three combinations separately. They might not have seen the items down the line from the top to the bottom of sheet. After looking at a target in combination, they could have moved on to a different target word in a different combination. They may not have seen the target items

177

consecutively three times in three combinations. With these defects in the research design in addition to the small number of the participants, Experiment 7 could not detect any difference between the two leaning conditions with regard to known-and-unknown two-word combinations.

9.4 Conclusion

Unlike previous studies that showed the superiority of spaced learning over massed learning in terms of single word acquisition, Experiments 6 and 7 did not show that spaced learning was more effective in acquisition of two-word combinations than massed learning. However, it is too early to conclude that spaced learning is no more effective than massed learning with regard to known-and-unknown two-word combination learning, because there is a high probability that this result was caused by the three following defects in Experiments 6 and 7. The first defect was the small number of the participants. Most groups in these experiments had less than 20 participants, which decreased the reliability of the experiments. Second, in both experiments, there was discrepancy between the learning session and the recall tests. The participants learned the target items in known-and-unknown (or unknown-and-known) two-word combinations, but they took the recall tests that showed them the target items only and asked them to write down the Japanese meanings. The third defect is a problem in presentation of the combinations. The material for the spaced learning condition presented every three combinations with the same target word separately on different sheets, whereas the material for the massed

learning showed every three combinations with the same target word together on the same sheet. However, the material for the latter could not force them to learn the three combinations with the same target consecutively. The participants had the freedom to move on to different target words randomly. There was possibility that the massed learning groups did not learn the target words in the way of massed learning.

Further studies are needed to examine which presentation is more effective for learning known-and-unknown two-word combinations. These studies should employ at least more than 30 participants in each condition, and conduct L1 recall tests of the combinations after those of the target words. What is more, these studies should use PowerPoint slides to show the target items instead of printed materials, so that participants can learn the target items in the spaced learning condition or in the massed learning condition.

Finally, one crucial thing about experimentation should be mentioned. Experiments 6 and 7 had just one-day learning sessions. In order to see benefit of spaced learning, it would be better for further studies to have several different learning sessions on several different days. The research design of Kornell (2009) could be adapted.

Note to Chapter 9

3. Actually, Webb and Kagimoto (2011) built two other research questions. One was whether the position of the node word in a collocation (before or after the collocate) would have an effect on learning collocation. The other one was whether learning collocation for synonyms together could be effective. They found that the position of the node word did not affect collation learning, and that learning semantically related node words together could impede learning.

Chapter 10

General Discussion

This study was designed to clarify the four research questions presented in Chapter 2. Chapters 3 and 4 dealt with Research Question 1, on whether known-and-unknown two-word combination learning is more effective than single word learning. Chapters 5 and 6 handled Research Question 2, concerning what types of two-word combinations are effective for intentional vocabulary learning. Chapter 7 investigated Research Question 3, on whether combination learning is effective for novice EFL learners. Chapters 8 and 9 handled Research Question 4, on effective presentation of two-word combinations. This chapter aims to answer all the research questions by summarizing the discussion sections in the previous chapters.

10.1 Answer to Research Question 1

The following is Research Question 1 shown in Chapter 2.

RQ1: Is learning a known-and-unknown two-word combination more effective for retention and retrieval of meaning than learning a single unknown word?

The answer to RQ1 is affirmative. The results of Experiment 1 in Chapter 3 and Experiment 2 in Chapter 4 have shown that known-and-unknown two-word combination learning is more effective for retention and retrieval of target words than single word learning as long as the known cues are presented in the decoding phase. The

181

superiority of combination learning was confirmed in both a within-subject design study (Experiment 1) and a between-subject design study (Experiment 2). As described in Chapter 2, this superiority can be mainly explained by three concepts: elaborative rehearsal, CLS, and enhanced imageability.

Elaborative rehearsal is a concept that connecting new and old information can lead to longer retention than remembering just new information. The superiority of two-word combination learning in retention lies in the effective function of connections between cues and target words (Kasahara, 2010, 2011). What matters in retention depends on whether newly learned items can be transferred from learners' short-term memory to their long-term memory. The results of Experiments 1 and 2 suggest the possibility that established connections between cues and targets can help the targets move to learners' long-term retention. When a learner sees a known-and-unknown two-word combination, the known cue that is already incorporated in the learner's mental lexicon can be activated. Then, a connection between the known cue and the target will be formed. This connection can help the learner transfer the target to his/her mental lexicon and fix it there.

This function of the connection can be explained by CLS (Davis & Gaskell, 2009; Lindsay & Gaskell, 2010; McCleland et al., 1995). Newly learned items of information and already acquired items of information are handled in different places in the brain. A place in the brain called the hippocampus, which is equipped with a rapid learning system, usually deals with new information. With a certain number of repetitions

and intervals, some items of information can be transferred to a stable long-term memory in the neocortex. It can be assumed that connections between cues and target words can promote and speed up this process.

Enhanced imageability of known-and-unknown two-word combinations may be the most crucial reason for their long-term retention. Attaching a known cue to a target can give the target a clearer and more specific image. For example, a word *savvy* means shrewdness and practical knowledge. Learners may have difficulty creating an image of this abstract word. However, if learners make a two-word combination *political savvy* by attaching a word *political,* they may have an image of a certain efficient politician. The image of *savvy* is enhanced, which could be helpful for learners to retain the word in their mental lexicon. According to dual coding theory (Paivio & Desrochers, 1980), a word with high imageability can be processed through two different routes: a route for literal information and a route for visual information. These two routes can facilitate retention of target words.

Another possible reason for effectiveness of the two-word combination learning in retention is that this learning gives learners the benefit of *the testing effect* (Barcroft, 2007; Carpenter, Pashler & Vul, 2006, Karpicke & Roediger, 2007). Taking a test has a positive effect on learning. In a test, test-takers make great effort to recall previously learned items. This mental effort is called *retrieval practice* (Nation, 2013), which can leave a deeper trace of learned items in learners' mental lexicons. Repeated retrieval practice can strengthen the memory of learned items. For example, some studies on paired-associate

183

vocabulary learning have shown that learning new words with word cards is more effective than learning new words on word lists (Karpicke & Roediger 2008; Kanayama & Kasahara, 2016a), because the former gives learners chances for retrieval but the latter does not (Nakata, 2020). A word card usually has a target word on one side and its meaning on the other. Learners try to retrieve its meaning while seeing its form, or vice versa. They are given time for retrieval practice. On the other hand, a word list usually has a number of new words and their meanings side by side on the same side of the sheet. Seeing the target and its meaning does not create any time for retrieval practice. In the known-and-unknown two-word combination learning, by seeing a familiar cue, learners try to recall the meaning of the target word. Every time they see the combination, they are given time to retrieve the meaning of the target like cued recall. This retrieval practice can be really effective for long-term retention of the meaning of the target word.

The greater effectiveness of the two-word combination learning in retrieval can be explained by two hypotheses: ESH and ACH. ESH clarifies how the existence of known cues both in the encoding and decoding phases can help learners to retrieve the meanings of target words. If a target word is remembered with a known word, the existence of the known word in the decoding phase can promote the retrieval of the target. The known cue word can work as a trigger to recall the target. The known cue can activate its connection to the target, and the connection can help learners to reach the meanings of the target.

ACH can explain how a known cue in a two-word combination can

184

help limit the range of the meaning search for the target word. Learners can narrow down the scope of the meaning of a target word because of the associations its cue word can create. In the decoding phase, learners see a two-word combination that they remember from the encoding phase. The known cue in the combination activates its equivalent in their mental lexicons, and then the equivalent activates its connection to the target word. The activated connection can enable the learners to retrieve the meaning of the target successfully. During this meaning search, the cue is thought to play a crucial role in limiting the range of possible meanings of the target. For example, when learners see a combination, *write a krirk* (= letter)*,* the known cue *write* can help them to narrow down the possible meanings of the target to something that can be written, such as a letter, a novel or a diary. Thus, known cues in two-word combinations can contribute to narrowing down the meanings of target words.

In addition to the two hypotheses, enhanced imageability of two-word combinations can help learners to retrieve the meanings of target words. Enhanced imageability means that known-and-unknown two-word combinations can provide learners with a clearer and more specific image of the target unknown word than the target in isolation does. For instance, imagine a situation where learners are trying to remember the word *damsel* with its L1 equivalent *otome* (= a young unmarried woman). They could have an image of a young woman while they process the word. When they see the word again in the retrieval phase, this image of the woman can help them to retrieve the meaning of

the target word. If they remember the target word *damsel* in the form of a two-word combination *beautiful damsel* with its Japanese equivalent, the known cue *beautiful* could give a clearer and stronger image of a young woman. This stronger image of the woman could provide more powerful assistance for them to retrieve the meaning of the target. In this way, the known cue in a combination can help create a vivid and specific image of a target, and this richer imageability could increase the probability of successful retrieval.

10.2 Answer to Research Question 2

The following is Research Question 2, shown in Chapter 2.

RQ2: What types of known-and-unknown two-word combinations are effective for vocabulary learning of intermediate EFL learners?

The two-word combinations investigated in this study are sorted into two groups. The first type is a known cue + an unknown noun combination, and the known cues are adjectives (including nouns that work like adjectives) and verbs. The second type is an unknown verb + a known cue combination, and the known cues include adverbs and nouns. In terms of the first type, Experiment 3 in Chapter 5 found that both adjectives (nouns) and verbs can work as effective known cues for retention and retrieval of target nouns. In terms of the second type, Experiment 4 in Chapter 6 revealed that nouns can function as effective known cues for retention and retrieval of target verbs, whereas adverbs can be effective only for retrieval, not for retention. Table 10.1 summarizes all the results.

Table 10.1

Results of Each Type of Two-Word Combination

Known Cue + Unknown Noun Combinations			Unknown Verb + Known Cue Combinations		
Cue Type	Phase	Result	Cue Type	Phase	Result
Adjective (Noun)	Retention	✔	Noun	Retention	✔
	Retrieval	✔		Retrieval	✔
Verb	Retention	✔	Adverb	Retention	—
	Retrieval	✔		Retrieval	✔

Note. ✔ = effective; — = not effective.

It seems that adverbs work as weak cues to retain meanings of target verbs in unknown verb + known adverb combinations. Their ineffectiveness for retention can be explained by low imageability of verb + adverb combinations, as shown in Chapter 6. Unlike the other types of combination, verb + adverb combinations can have difficulty helping learners to create clear and strong images about themselves. One illustrative example could be a comparison between *oamed* (= drive) a car and *oamed* slowly. The known cue *a car* can help create a more concrete image of a person driving a car than the known cue *slowly*. A concrete word has higher imageability than an abstract word (de Groot & Keijzer, 2000; Steinel et al., 2007), and a concrete noun tends to produce richer imageability than an adverb, which usually describes abstract movement. With this more concrete image of "*oamed* a car," learners can take advantage of dual coding: its visual representation can supplement

187

its verbal representation. On the other hand, it is difficult for the combination *oamed* + slowly to produce the effect of dual coding. Thus, low imageability of verb + adverb combinations can be attributed to their ineffectiveness for retention of target verbs.

In addition, lower effectiveness of verb + adverb combination in retention than verb + noun combinations could also be attributed to the fact that nouns tend to be easier to learn than verbs. Peters (2020) argues that there are two reasons for this. First, nouns appear in less various forms than verbs, whose forms changes according to number, person, or tense. Second, nouns are more concrete and imageable than verbs as Peters describes this in the following.

> In general, nouns refer to entities and as such are more specific, concrete, imageable, meaningful, and unambiguous. Verbs, on the other hand, are inherently relational—barring some exceptions (*to rain*), and as a consequence are more abstract, polysemous, less imageable, less meaningful, and less concrete (p. 129).

The higher imageability of nouns can make themselves easier to learn, whereas verbs need a good collocate to define themselves more clearly. Ellis and Beaton (1993a) examined effectiveness of several learning strategies in L1 (English)-and-L2 (German) paired-associate vocabulary learning. Targets words to be remembered consisted of nouns and verbs, and the results showed that "nouns were remembered more often (68%) than were verbs (53%)" (p.550). Ellis and Beaton argued that nouns have

higher imageability than verbs, reporting another study of theirs (1993b), where their participants rated nouns' imageability as higher than verbs' imageability. Verb + noun combinations tend to have higher imageability than verb + adverb combinations because the former combination includes a noun. Its higher imageability help learners retain and retrieve the meaning of the target word.

10.3 Answer to Research Question 3

The following is Research Question 3, shown in Chapter 2.

RQ3: Is known-and-unknown two-word combination learning effective for novice EFL learners?

The results of Experiment 5 in Chapter 7 showed that known-and-unknown two-word combination learning was effective for helping novice EFL learners to retrieve the meanings of target words, but not effective for helping them to retain the meanings of target words. Experiment 5 confirmed the superiority of two-word learning over single word learning in terms of retrieval but not in terms of retention.

The effectiveness in retrieval could be explained by the function of known cues, which helps learners to narrow down the range of the meaning search for the target words. Though the participants in Experiment 5 were first-year students at junior high school, they could utilize their L1 collocation knowledge and also their limited L2 knowledge. They were exposed to a countless number of loan words from English in their daily life (Daulton, 2008) and a certain amount of English input through *Foreign Language Activities,* which were taught at

elementary school. When they saw the combination *green foliage*, for example, they may have made use of their knowledge of the loan word *green*. The fact that they knew the meaning of *green* could have enabled them to guess the meaning of *foliage* with their L1 knowledge of collocation. They might have associated the target word with something green such as grass or a leaf. In this way, they probably succeeded in retrieving the meaning of the target word.

The unsuccessful results for retention may have been caused by the undeveloped vocabulary networks in the participants' mental lexicons. The participants in Experiment 5 were novice learners of English with a limited amount of English learning experience. Their vocabulary sizes were still small, so they had not developed dense vocabulary networks in their mental lexicons. In other words, they did not have a large number of connections among lexical items, unlike advanced learners of English. Their sparse vocabulary networks are thought to have been disadvantageous for retaining the meanings of newly learned target words.

Novice learners' disadvantage in retention is illustrated in the left side of Figure 10.1. The vocabulary network in the mental lexicon of a novice learner is compared to a rough-meshed net. His/her mental lexicon does not have a large number of lexical connections, and each cell of the net is quite large. Even if a learner knows a cue word in a two-word combination, the cue does not have numerous connections with other words. As a result, the cue word cannot greatly help with keeping the target word in the mental lexicon. The rough-meshed net of the

lexical network has great difficulty catching and especially retaining the target word. The target word can easily slip through the rough-meshed net.

Figure 10.1

Vocabulary Network of an Advanced Learner and Vocabulary Network of a Novice Learner
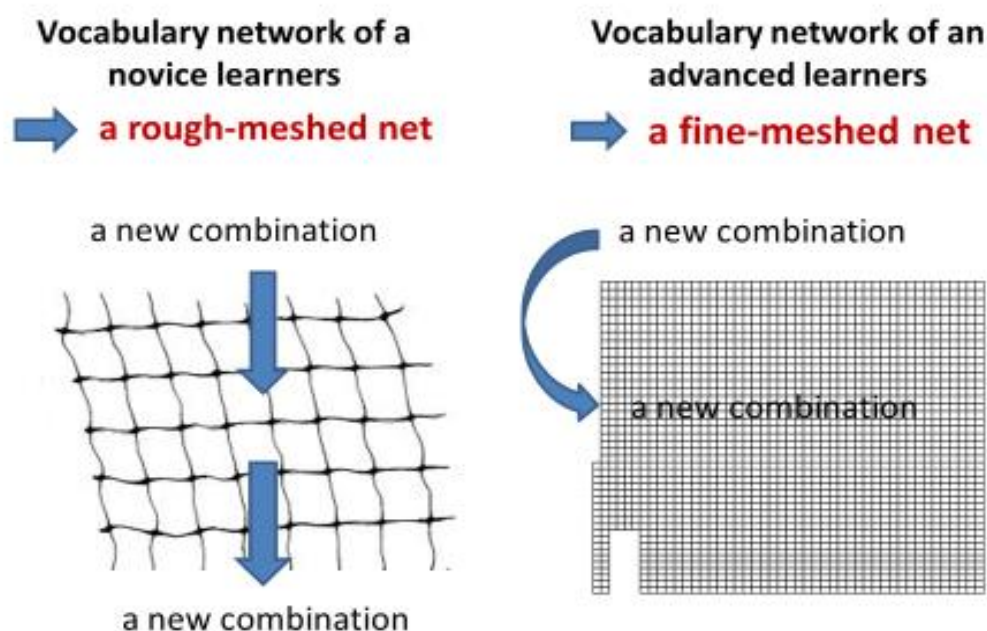
On the other hand, the vocabulary network in the mental lexicon of an advanced learner is associated with a fine-meshed net, as shown in the right side of Figure 10.1. This fine-meshed can catch a target word easily and retain it for a long time. Advanced learners have developed various kinds of connections between the words they have acquired. These include semantic-related, syntactic-related, and phonological related

connections. When they see a known-and-unknown two-word combination, the cue word in the combination can activate its connections with other lexical items in their mental lexicon. Then a connection between the cue and the target can be gradually formed. This newly established connection is thought to remain in their mental lexicon for a long time with the help of the old connections between the cue and other words. The old connections that the cue word has can increase the possibility that the target word will stay in the mental lexicon.

In sum, known-and-unknown two-word learning is effective for helping novice learners to retrieve the meaning of a target word, because the known cue can help them to narrow down their meaning search in the decoding phase with the help of their knowledge of English loan words and L1 collocations. On the other hand, this learning is not effective for helping them to retain the meaning of a target word, because their lexical nets are not dense enough to support target word retention in their mental lexicons.

10.4 Answer to Research Question 4

The following is Research Question 4, shown in Chapter 2.

RQ4: What kind of presentation of two-word combinations is effective for learners?

A clear answer to this question was not obtained in the present study. In Chapter 8, the author described the process of making the lists of known-and-unknown and unknown-and-known two-word lists for

lower-intermediate learners of English. In Chapter 9, he searched for an effective way of presenting the two-word combinations on the lists to learners. Two experiments were conducted to examine the effectiveness of two ways of presentation: a spaced presentation and a massed presentation. Experiments 6 and 7 revealed that there was no significant difference between the two presentations, though there was some learning effect in both of them.

However, it is too early to conclude that there is no difference in effect for learning two-word combinations between the two way of presentations, because a large number of previous studies have shown the superiority of spaced learning over massed learning with regard to single word acquisition. This result was due to some defects of Experiments 6 and 7: a small number of participants, the discrepancy between the learning conditions and the recall tests and using printed materials instead of PowerPoint slides. Further studies that will cure these defects are needed to clarify this research question.

10.5 Limitations of the whole study

This section summarizes the limitations mentioned in each chapter. To sum up, there are three major limitations to this study. The first one is the small number of participants in each experiment. There were 39 participants in Experiment 1, 66 in Experiment 2, 62 in Experiment 3, 82 in Experiment 4, 78 in Experiment 5, 43 in Experiment 6, and 54 in Experiment 7. In order to consolidate the results obtained from these experiments, a certain number of replication studies with more

participants are necessary.

The second limitation concerns an issue related to ecological validity (Nation & Webb, 2011): the use of pseudowords in Experiments 3 and 4. The two experiments used 20 and 18 pseudowords that replaced high-frequency English words. The participants were asked to learn the combinations of two high-frequency words, which was against the original intention of the whole study. Of course, it was not easy to find suitable known-and-unknown combinations for all the participants because their vocabulary knowledge varied. However, this study started from the idea of helping learners to acquire low-frequency words with the help of high-frequency words that they already know. Strictly speaking, Experiments 3 and 4 did not reflect the learning situation that the study originally expected. Moreover, learning the pseudowords was not beneficial for their English learning. In these respects, it cannot be said that this study strictly achieved ecological validity. It would be desirable that further studies use known-and-unknown combinations that consist of real high-frequency and low-frequency English words.

The third limitation is that this study has not found an effective way of using the lists of known-and-unknown two-word combinations whose development process was shown in Chapter 8. As mentioned in Chapter 8, the unknown + known list includes 20,157 combinations, and the known + unknown list includes 17,146 combinations. The known words in the combinations belong to the most frequent 1,000-word level, whereas the target words belong to the following 2,000-, 3,000- or 4,000-word level. They were created to help lower-intermediate learners

of English who already know the most frequent 1,000 English words to learn the subsequent 3,000 words. Therefore, it is necessary to examine whether these lists can really be effective to help English learners of this level to develop their vocabulary knowledge. One fundamental problem with the lists is that they include a great number of combinations. It is crucial to limit the number of items, so that lower-intermediate learners of English can use the lists easily and effectively. Several experiments performed under a variety of conditions are needed to identify what items are really helpful to learners. Besides, two experiments were conducted to examine what type of presentation could be effective to learn two-word combinations, but no useful pedagogical implications were obtained. Further studies are needed in terms of effective presentations of two-word combinations on the lists.

Chapter 11

Conclusions and Pedagogical Implications

11.1 Conclusions

The conclusions that the whole study has obtained are summarized in the following three findings. First, this study has shown that known-and-unknown (or unknown-and-known) two-word combination learning is more effective for the retention and retrieval of meanings of target words than single word learning, as long as the following two conditions are satisfied. One is that the environments of the encoding phase and the decoding phase should be identical: in other words, learners must see target words with the same known cues in both phases. The other condition is that learners need to know the meanings of the cues in two-word combinations before they start two-word combination learning. If these two conditions are satisfied, known cue words can help learners retain target words because newly established connections between the cues and the targets can help the target words stay in a learner's mental lexicon. The cues also help learners to retrieve the meanings of the targets by limiting the scope of the meaning search and enhancing the imageability of the target words.

The second finding is that this study has identified effective types of cues in known-and-unknown two-word combination learning. The author focused on two-word combinations that have nouns or verbs as unknown target words, partly because they are crucial components in English sentences, and partly because learning noun-related collocations

and verb-related collocations is indispensable for learning another language (Aitchison, 2003). These collocations are especially crucial for developing productive skills in the target language. In terms of noun-target combinations, the results of this study have revealed that known adjectives, known nouns that function as adjectives, and known verbs can work effectively as known cues. Put differently, learning known adjective, noun, or verb cues + target unknown noun combinations is more effective for retaining and retrieving the meanings of the target nouns than learning the single target words in isolation. In terms of verb-target combinations, it was found that known nouns can function as effective cues, but that known adverbs can be less effective. This means that learning unknown verb + known noun combinations is more effective than learning target verbs in isolation, whereas this is not the case with unknown verb + known adverb combinations. Verb + adverb combinations are effective for retrieval, but not for retention. The difference between effective combinations and ineffective combinations can be attributed to the imageability that each combination can create in the mental lexicon. Higher imageability, or a clearer image of a lexical item, can lead to longer-term retention and better retrieval (Baddley, 2014; Steinel et al., 2007) because a visual image can help verbal information to stay in the mental lexicon. It can be assumed that noun + verb combinations have a greater potential to create high imageability, but that verb + adverb combinations do not have the same potential.

The third finding is that known-and-unknown two-word

combination learning is effective for helping novice learners of English to retrieve but not to retain target words. They can make use of known cues in combinations in order to retrieve the meanings of unknown target words. It can be assumed that learners can succeed in retrieving the target word meanings by using their knowledge of English loanwords and L1 collocations. If the meaning of a cue overlaps with one of their known loanwords, they can limit the scope of the meaning search of the target word using their knowledge of L1 collocations. On the other hand, the vocabulary networks in their mental lexicons are not dense enough to retain the meaning of a target word. The number of other English words that they have stored in their mental lexicons is still limited. They have difficulty in creating new connections between the combination that they have just taken in and other lexical items that they already have in their mental lexicons. Because of the limited networks in their mental lexicons, it is very difficult for target words to be caught and to stay there.

In terms of useful presentations of known-and-known combinations, this study did not obtain any convincing results due to the defects of the two experiments described in Chapter 9. Further studies are needed to find effective ways to use the lists of two-word combinations created in this study.

11.2 Pedagogical Implications

This study has shown that known-and-unknown two-word combination learning is effective for helping learners of English who

already know basic high-frequency words to expand their vocabularies. The possibility of retaining and retrieving the meaning of the new word in a known-and-unknown two-word combination is much higher than that of the new word remembered as a single word. Learners who already know the meanings of the most frequent 1,000 English words should be encouraged to use the list of known-and-unknown two-word combinations this study has created. As shown in Chapter 8, this list adopts the most frequent 1,000 words in *JACET 8000* (JACET, 2003) as known cues and the subsequent 3,000 words as target words. The list could be a desirable vocabulary learning tool for JHS and SHS learners of English (Kasahara, 2005), as well as for some university learners.

The use of this combination list can help learners to acquire basic two-word collocations, which can strengthen their productive skills in English. It is said that Japanese intermediate learners of English have a fragile knowledge of English collocations. Iwasaki (2002) pointed out that a large number of university learners cannot produce basic English collocations such as *open an umbrella* or *use a dictionary*, even though they know the words *umbrella* and *dictionary*. This is probably because they have different Japanese equivalents that include different verbs to the English counterparts. The difference between L1 and L2 collocations could be a great obstacle for L2 learners (Komuro, 2009; Nusselhauf, 2003, 2005). According to Yan (2010), learners often make mistakes in terms of verb-noun collocations and adjective-noun collocations: the former accounts for 50% and the latter accounts for 25% of all collocation mistakes. This study has shown that two types of collocation

are effective in known-and-unknown two-word combination learning. Hence, the combination list created in this study includes a large number of these types of combination. The list can provide an effective and efficient vocabulary learning tool for lower-intermediate and intermediate learners of English, including JHS, SHS, and university students who still work on the English words in the 2,000, 3,000- and 4,000-word levels.

Vocabulary acquisition in another language is a time-consuming incremental process (Nation, 2013; Schmitt, 2010). Through repeated encounters with the same lexical items, learners gradually accumulate the vocabulary knowledge of these items. Therefore, it is not ideal to teach various types of vocabulary knowledge at one time to learners. This is especially the case with novice EFL learners, who do not have plenty of exposure to English in their daily life. In their early stage of English learning, they should be encouraged to establish form-and-meaning connections of the most frequent 1,000 English words. After they know the meanings of these high-frequency words, they could make use of the known-and-unknown two-word combination learning that the resent study dealt with. This learning can help them increase they English vocabulary effectively and efficiently by taking advantage of old-and-new item connections. Then, they can be able to use more vocabulary learning strategies including contextualized incidental learning. This combination learning can be one of the bridges from decontextualized intentional learning such as word cards or word lists to contextualized incidental learning with authentic spoken and written

input.

Both teaching and learning single words and formulaic sequences plays a crucial role in ESL/EFL courses. What lexical items should be taught depends on learners' proficiency and their developmental stages. Fortunately, studies of effective intentional methods and activities on formulaic sequences is gradually catching up with studies of the counterparts on single lexical items (Pellicer-Sánchez, 2020). Some methods and activities can be equally applied to single words and formulaic sequences; others can be more effective to either of them. English teachers should be careful in choosing activities and methods that are suitable for their students. The known-and-unknown two-word learning that the present study examined can be an appropriate choice for learners of English who already know the meanings of basic high-frequent English words.

References

Aitchison, J. (2003). *Words in the mind* (3rd. ed.). Blackwell Publishing Ltd.

Anderson, R. C., & Freebody, P. (1981). Vocabulary knowledge. In T. Guthrie (Ed.), *Comprehension and teaching: Research reviews* (pp. 77-117). Newark: IRA.

Atkinson, R. C., & Raugh, M. R. (1975). An application of the mnemonic keyword method to the acquisition of a Russian vocabulary. *Journal of Experimental Psychology: Human Learning and Memory, 104,* 126-133.

Baddeley, A. D. (1997). *Human memory: Theory and practice* (rev. ed.). Psychology Press.

Baddeley, A. D. (2014). *Essentials of Human Memory.* Psychology Press.

Bahrick, H. P. (1969). Measurement if memory by prompted recall. *Journal of Experimental Psychology, 79,* 213-219.

Bahrick, H. P. (1970). Two-phase model of prompted recall. *Psychological Review, 77,* 215-222.

Barcroft, J. (2002). Semantic and structural elaboration in L2 lexical acquisition. *Language Learning, 52,* 323-363.

Barcroft, J. (2007). Effects of opportunities for word retrieval during second language vocabulary learning. *Language Learning, 57*(1), 35-56. https://doi.org/10.111/j.1467-9922.2007.00398.x.

Barcroft, J. (2009). Strategies and performance in intentional L2

vocabulary learning. *Language Awareness, 18*(1)*,* 74-89.

Barcroft, J. (2012). *Input-based incremental vocabulary instruction.*
TESOL International Association.

Barcroft, J. (2015). *Lexical input processing and vocabulary learning.*
John Benjamins Publishing Company.

Barfield, A. (2009). Exploring productive L2 collocation knowledge.
In T. Fitzpatrick, & A. Barfield (Eds.), *Lexical processing in
second language learners* (pp. 95-110). Multilingual Matters.

Bilodeau, E. A., & Blick, K. A. (1965). Courses of mis-recall over
long-term retention intervals as related to strength of
pre-experimental habits of word association. *Psychological
Reports, 16,* 1173-1192.

Bishop, H. (2004). The effect of typographic salience on the look up
and comprehension of unknown formulaic sequences. In N.
Schmitt (ed.), *Formulaic Sequences* (pp. 227-244), Benjamins
Publishing Company.

Boers, F. (2000). Metaphor awareness and vocabulary retention.
Applied Linguistics, 21, 553-571.

Boers, F., & Lindstromberg, S. (2008). *Cognitive linguistic
approaches to teaching vocabulary and phraseology.* Mouton
de Gruyter.

Brasford, J. D., Franks, J. J., Morris, C. D., & Stein, B. S. (1979).
Some general constraints on learning and memory research. In
L. S. Cermak & F. I. M. Craik (Eds.), *Levels of processing in
human memory* (pp. 331-354). Lawrence Erlbaum Associates,

Inc.

Brown, T. S., & Perry, F. L. Jr. (1991). A comparison of three learning strategies for ESL vocabulary acquisition. *TESOL Quarterly, 25*(4), 655-670.

Cameron, L. (2001). *Teaching languages to young learners.* Cambridge University Press.

Carpenter, S. K., Pashler, H., & Vul, E. (2006). What types of learning are enhanced by a cued recall test? *Psychometric Bulletin and Review, 13*(5), 826-830. https://doi.org/10.3758/BF03194004.

Coxhead, A. (2006). *Essentials of teaching academic vocabulary.* Heinle Cengage Learning.

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: a framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11,* 671-684.

Daller, H., Milton, J., & Treffers-Daller, J. (2007). *Modelling and assessing vocabulary knowledge*. Cambridge University Press.

Daulton, F. E. (2008). *Japan's built-in lexicon of English based loanwords.* Multilingual Matters.

Davies, M. (2009). The 385+ million word *Corpus of Contemporary American English* (1990-2008+): Design, architecture, and linguistic insights. *International Journal of Corpus Linguistics, 14*(2), 159-190. https://doi: 10.1075/ijcl.14.2.02dav.

Davies, M. (2010). The Corpus of contemporary American English as the first reliable monitor corpus of English. *Literary and*

Linguistic Computing, 25(4), 447-464. https://doi: 10.1093/llc/fqq018.

Davis, M. H., & Gaskell, M. G. (2009). A complementary systems account of word learning: Neural and behavioural evidence. *Philosophical Transactions of the Royal Society B: Biological Sciences, 364,* 3773-3800. https://doi: 10.1098/rstb.2009.0111.

De Groot, A. (2006). Effects of stimulus characteristics and background music on foreign language vocabulary learning and forgetting. *Language Learning, 56*(3), 463-503.

De Groot, A., & Keijzer, R. (2000). What is hard to learn is easy to forget: The roles of word concreteness, cognate status, and word frequency in foreign language vocabulary learning and forgetting. *Language Learning, 50,* 1-56.

Dekeyser, R. (2003). Implicit and explicit learning. In C. J. Doughty & M. H. Long (Eds.), *The handbook of second language acquisition* (pp. 313-348). Blackwell Publishing Company.

Durrant, P., & Schmitt, N. (2009). To what extent do native and non-native writers make use of collocations? *IRAL, 47,* 157-177. https://doi:10.1515/iral.2009.007.

Durrant, P., & Schmitt, N. (2010). Adult learners' retention of collocations from exposure. *Second Language Research, 26*(2), 163-188.

Eychmans, J., & Lindstormberg, S. (2017). The power of sound in idiom learning. *Language Teaching Research, 21*, 341-361.

Elgort, I. (2011). Deliberate learning and vocabulary acquisition in a

second language. *Language Learning, 61*(2), 367-413.

Ellis, N., & Beaton, A. (1993a). Factors affecting the learning of foreign language vocabulary: Imagery keyword mediators and phonological short-term memory. *The Quarterly Journal of Experimental Psychology, 46A*(3), 533-558.

Ellis, N., & Beaton, A. (1993b). Psycholinguistic determinants of foreign vocabulary learning. *Language Learning 43*(4), 559-617.

Ellis, R. (1985). *Understanding second language acquisition.* Oxford University Press.

Ellis, R. (2008). *The study of second language acquisition* (2nd ed.). Oxford University Press.

Eyckmans, J., & Lindstormberg, S. (2016). The power of sound in L2 idiom learning. *Language Teaching Research, 21*(3), 341-361. https://doi.org/10.1177/1362168816655831.

File, K. A., & Adams, R. (2010). Should vocabulary instruction be integrated or isolated? *TESOL Quarterly, 44*(2), 222-249. https://doi.org/10.5054/tq.2010.219943.

Folse, K. (2004). *Vocabulary Myths.* The University of Michigan Press.

Fox, P. W., Blick, K. A., & Bilodeau, E. A. (1964). Stimulation and prediction of verbal recall and misrecall. *Journal of Experimental Psychology, 68,* 321-322.

Hasegawa, Y. (2014). Aptitude treatment interaction in intentional vocabulary learning: Different effects of context on EFL

learners at three stages of lexical development. *Annual Review of English Language Education in Japan, 25,* 317-332.

Hatch, E., & Brown, C. (1995). *Vocabulary, semantics, and language education.* Cambridge University Press.

Henriksen, B. (1999). Three dimensions of vocabulary development. *Studies in Second Language Acquisition, 21,* 303-317.

Horst, M., Cobb, T., & Meara, P. (1998). Beyond a clockwise orange: Acquiring second language vocabulary through reading. *Reading in a Foreign Language, 11,* 207-223.

Higham, P. A. (2002). Strong cues are not necessarily weak: Thomson and Tulving (1970) and the encoding specificity principle revisited. *Memory and Cognition 30*(1), 67-80.

Highham, P. A., & Tam, H. (2005). Generation failure: Estimating metacognition in cued recall. *Journal of Memory and Language, 52,* 595-617.

Hsu, J. (2007). Lexical collocations and their relation to the online writing of Taiwanese college English majors and non-English majors. *Electronic Journal of Foreign Language Teaching, 4*(2), 192-209.

Hulstijin, J. H. (2003). Incidental and intentional learning. In C. J. Doughty & M. H. Long (Eds.), *The handbook of second language acquisition* (pp. 349-381). Oxford: Blackwell Publishing Company.

Inoue, N., & Akano, I. (Eds.). (2008). *The wisdom English Japanese dictionary* (2nd ed.). Tokyo: Sanseido.

Ishizuka, H. (2005). The effect of learning method on efficacy of lexical memory retrieval. *Annual Review of English Language Education in Japan, 16,* 111-120.

Iwasaki, H. (2002). *For a better use of English dictionaries* [Eigo jisho ryoku wo kitaeru]. DHC.

JACET. (2003). *JACET list of 8000 basic words: JACET 8000.* JACET.

Jones, R. F. (1995). Learning an alien lexicon: A teach-yourself case study. *Second Language Research 11*(2), 95-111.

Judd, E. L. (1978). Vocabulary teaching and TESOL: A need for reevaluation of existing assumptions. *TESOL Quarterly, 12*(1), 71-76.

Kanayama, K., & Kasahara, K. (2016a). The effect of word retrieval on L2 vocabulary learning: Which are better tools, word lists or word cards? *HELES Journal, 15,* 21-33. https://doi.org/10.24675/helesje.15.0_21

Kanayama, K., & Kasahara, K. (2016b). The effects of expanding and equally-spaced retrieval practice on long-term L2 vocabulary retention. *Annual Review of English Education in Japan, 27,* 217-232.

Kanayama, K., & Kasahara, K. (2018). The indirect effects of testing: Can poor performance in a vocabulary quiz lead to long-term vocabulary retention? *Vocabulary Learning and Instruction, 7*(1), 1-13. https://doi: 10.7820.v07.1.kanayama.kasahara.

Kapler, V. I., Weston, T., & Wiseheart, M. (2015). Spacing in a

simulated undergraduate classroom: Long-term benefits for factual and higher-level learning. *Learning Instruction, 36,* 38-45.

Karpicke, J. D., & Roediger, H. L. (2007). Repeated retrieval during learning is the key to long-term retention. *Journal of Memory and Language, 57,* 151-162. doi.org/10.1016/j.ml.2006.09.004.

Karpicke, J. D., & Roediger, H. L. (2008). The critical importance of retrieval for learning. *Science, 319,* 966-968. https://doi.org/10.1126/science.1152408.

Kasahara, K. (2005). Comparison in vocabulary size and lexical inference between Japanese high school and college students. *Tsukuba Review of English Language Teaching 26,* 21-39.

Kasahara, K. (2006). Producing a revised version of the Mochizuki vocabulary size test. *JLTA Journal, 9*, 55-72.

Kasahara, K. (2010). Are two words better than one for intentional vocabulary learning? *Annual Review of English Education in Japan, 21,* 91-100.

Kasahara, K. (2011). The effect of known-and-unknown word combinations on intentional vocabulary learning. *System,* 39, 491-499. https://doi:10.1016/j.system.2011.10.001.

Kasahara, K. (2015). Which cues, adjectives or verbs, provide most assistance for remembering new nouns? *Annual Review of English Language Education in Japan, 26,* 317-332.

Kasahara, K., Machida, H., Nagata, E., Takanashi, T., & Yoshizawa, S. (2012). Shogakkou gorokunennsei no goi chishiki: Onsei,

imi, moji no mushubitsuki ni kanshite [Vocabulary knowledge of fifth and sixth graders: In terms of connections between sound, meaning and spelling]. *JES Journal, 12*, 90-101.

Katagiri, K. (2007). Examining the rationale of vocabulary size tests based on word-frequency levels. *JLTA Journal, 10,* 36-55.

Komuro, Y. (2008). Japanese learners' collocation dictionary retrieval performance. In A. Barfield & H. Gyllstad (Eds.), *Researching collocations in another language* (pp. 86-98). Palgrave Macmillan.

Konishi, T., & Minamide, K. (Eds.). (2006). *Genius Japanese-English dictionary* (4th ed.). Taishukan.

Kornell, N. (2009). Optimising learning using flashcards: Spacing is more effective than cramming. *Applied Cognitive Psychology, 23,* 1297-1317.

Krashen, S. D. (1982). *Principles and practice in second language acquisition.* Pergamon Press.

Krashen, S. D. (1985). *The input hypothesis: Issues and implications.* Laredo Publishing Company.

Krashen, S. D. (1993). *The power of reading: Insights from the research.* Libraries Unlimited Inc.

Lado, R. (1990). Toward a lexico-semantic theory of language and language teaching. *The Georgetown Journal of Languages and Linguistics, 1*(1), 96-100.

Larsen-Freeman, D., & Anderson, M. (2011). *Techniques & principles in language teaching* (3rd ed.). Oxford University

Press.

Laufer, B. (1992). How much lexis is necessary for reading comprehension? In H. Bejoint & P. Arnand (Eds.), *Vocabulary and Applied Linguistics.* (pp. 126-132). Macmillan.

Laufer, B. (2017). From word parts to full texts: Searching for effective methods of vocabulary learning. *Language Teaching Research, 21*(1), 5-11. https://doi:101177/1362168816683118.

Laufer, B., & Girsai, N. (2008). Form-focused instruction in second language learning: A case for contrastive analysis and translation. *Applied Linguistics, 29*(4), 694-716.

Laufer, B., & Rozovski-Roitblat, B. (2011). Incidental vocabulary acquisition: The effects of task type, word occurrence and their combination. *Language Teaching Research, 15*(4), 391-411.

Laufer, B., & Shmueli, K. (1997). Memorizing new words: Does teaching have anything to do with it? *RELC Journal, 28,* 89-108.

Lewis, M. (1993). *The lexical approach: The state of ELT and a way forward*. London: Language Teaching Publications.

Lewis, M. (1997). Pedagogical implications of the lexical approach. In J. Coady, & T. Huckin (Eds.), *Second language vocabulary acquisition* (pp. 255-270). Cambridge University Press.

Lewis, M. (2000). *Teaching collocations: Further developments in the lexical approach.* London: Language Teaching Publications.

Li, J., & Schmitt, N. (2010). The development of collocation use in

academic texts by advanced L2 learners: A multiple case study approach. In D. Wood (Ed.), *Perspectives on formulaic language* (pp. 23-46). Continuum International Publishing Group.

Lindsay, S., & Gaskell, M. G. (2010). A complementary systems account of word learning in L1 and L2. *Language Learning, 60*(Suppl. 2), 45-63.

Lindstormberg, S. (2020). Intentional L2 vocabulary learning. In S. Webb (Ed.), *The Routledge handbook of vocabulary studies*. Routledge.

Lindstormberg, S., & Boers, F. (2005). From movements to metaphor with manner-of-movement verbs. *Applied Linguistics, 26*(2), 241-261. https://doi:10.1093/applin/ami002

Liu, N. & I. S. P. Nation (1985). Factors affecting guessing vocabulary in context. *RELC Journal, 16*(1), 33–42.

Llach, M. P. (2011). *Lexical errors and accuracy in foreign language writing*. Multilingual Matters.

McCarthy, M. (1990). *Vocabulary*. Oxford University Press.

McClelland, J. L., McNaughton, B. L., & O'Reilly, R. C. (1995). Why there are complementary learning systems in the hippocampus and neocortex: Insights from the successes and failures of connectionist models of learning and memory. *Psychological Review, 102,* 419-457.

McCrostie, J. (2007). Examining learner vocabulary notebooks. *ELT Journal, 61,* 246-255.

McIntosh, C. (2009). *Oxford collocations dictionary for student of English (2nd. ed.).* Oxford University Press.

Meara, P. (1980). Vocabulary acquisition: A Neglected aspect of language learning. *Language Teaching, 13,* 221-246. https://doi:10.1017/S0261444800008879

Meara, P. (1996). The dimensions of lexical competence. In G. Brown, K. Malmkjaer, & J. Williams (Eds.), *Competence in second language acquisition* (pp. 35-53). Cambridge University Press.

MEXT, (1998). Chuugakkou gakushu sido youryo gaikokugo-hen [*A commentary on the JHS Course of Study (announced in 1998): Foreign languages*]. Kairyudo.

MEXT, (2008). Chuugakkou gakushu sido youryo gaikokugo-hen [*A commentary on the JHS Course of Study (announced in 2008): Foreign languages*]. Kairyudo.

MEXT, (2017). Chuugakkou gakushu sido youryo gaikokugo-hen [*A commentary on the JHS Course of Study (announced in 2017): Foreign languages*]. Kairyudo.

Milton, J. (2009). *Measuring second language vocabulary acquisition.* Bristol: Multilingual Matters.

Ministry of Education, Culture, Sports, Science and Technology. (2009a). *Eigo Note 1.* Kairyudou.

Ministry of Education, Culture, Sports, Science and Technology. (2009b). *Eigo Note 2.* Kairyudou.

Mochizuki, M. (1998). Nihonjin gakushuusha no tameno goi saizu tesuto [A vocabulary size test for Japanese learners of English].

213

Gogaku Kenkyuujo Kiyoou, 12, 27-53.

Mondria, J. (2003). The effects of inferring, verifying, and memorizing on the retention of L2 word meanings. *Studies in Second Language Acquisition, 25,* 437-499.

Mori, A., Inoue, T., & Matsui, T. (1995). *Graphic ninchi shinrigaku* [Graphic cognitive psychology]. Tokyo: Science Publishing Company.

Morris, C. D., Bransford, J. D., & Franks, J. J. (1977). Levels of processing versus transfer appropriate processing. *Journal of Verbal Learning and Verbal Behavior, 16*(5), 519-533.

Nagy, W. E., & Herman, P. A. (1987). Breadth and depth of vocabulary knowledge: Implications for acquisition and instruction. In M. G. Mckeown & M. F. Curtis (Eds.), *The nature of vocabulary acquisition* (pp. 19-36). Laurence Erlbaum Associate.

Nakagawa, C. (2008). Effects of link strength between cues and targets on word retrieval. *Annual Review of English Language Education in Japan, 19,* 161-170.

Nakamura, N., Suematsu, A., & Hayashida, K. (2008). Shogakkou eigo ni okeru mojishidou to sono kadai: *Eigo Note* (shisakuban) no naiyou wo fumaete [Instructions on alphabet at elementary school and its problems: Referring to *Eigo Note* (the trial version)]. *JES Journal, 9*, 63-70.

Nakata, T. (2020). Learning words with flash cards and word cards. In S. Webb, (Ed.), *The Routledge handbook of vocabulary*

studies (pp. 304-319). Routledge.

Nation, I. S. P. (1990). *Teaching and learning vocabulary.* Heinle and Heinle Publishers.

Nation, I. S. P. (2001). *Learning vocabulary in another language.* Cambridge University Press.

Nation, I. S. P. (2008). *Teaching vocabulary: Strategies and techniques.* Heinle Cengage Learning.

Nation, I. S. P. (2013). *Leaning vocabulary in another language* (2nd ed.). Cambridge University Press.

Nation, I. S. P. (2020). The different aspects of vocabulary knowledge. In S. Webb (Ed.), (2020). *The Routledge handbook of vocabulary studies* (pp. 15-29). Routledge.

Nation, I. S. P., & Webb, S. (2011). *Researching and analyzing vocabulary.* Heinle Cengage Learning.

Nation, I. S. P., & Waring, R. (1997). Vocabulary size, text coverage and word lists. In N. Schmitt & M. McCarthy (Eds.), (1997). *Vocabulary: description, acquisition and pedagogy.* (pp. 6-19). Cambridge University Press.

Nattinger, J. R., & DeCarrico, J. S. (1992). *Lexical phrases and language teaching.* Oxford University Press.

Nelson, T. O., & Narens, L. (1990). Metamemory: A theoretical framework and new findings. *The Psychology and Motivation, 26,* 125-173.

Nesselhauf, N. (2003). The use of collocations by advanced learners of English and some implications for teaching. *Applied*

Linguistics, 24(2), 223-242.

Nesselhauf, N. (2005). *Collocations in a learner corpus.* John Benjamins.

Noro, T. (2002). The roles of depth and breadth of vocabulary knowledge in reading comprehension in EFL. *Annual Review of English Language Education in Japan, 13,* 71-80.

Noro, T. (2003). Gaikokugo no goi gakushu to shidouhou [Learning and teaching foreign language vocabulary]. In S. Kadota (Ed.), *Eigo no mental lexicon* [English mental lexicon]. Shohakusha.

Oxford, R., & Crookall, D. (1990). Vocabulary learning: A critical analysis of techniques. *TESL Canada Journal, 7*(2), 9-30.

Paivio, A., & Desrochers, A. (1980). A dual-coding approach to bilingual memory. *Canadian Journal of Psychology, 34,* 388-399. https://doi.org/10.1037/h0081101

Pellicer-Sánchez, A. (2020). Learning single words vs. multiword items. In S. Webb (Ed.), (2020). *The Routledge handbook of vocabulary studies.* Routledge.

Peters, E. (2012). The differential effects of two vocabulary instruction methods on EFL word learning: A study into task effectiveness. *IRAL, 50,* 213-238. doi:10.1515/iral-2012-0009.

Peters, E. (2014). The effects of repetition and time of post-test administration on EFL learners' form recall of single words and collocations. *Language Teaching Research, 18(1)*, 75-94. https://doi:10.1177/1362168813505384

Peters, E. (2020). Factors affecting the learning of single-word items.

In S. Webb (Ed.), *The Routledge handbook of vocabulary studies* (pp. 125-142). Routledge.

Pierson, H. D. (1989). Using etymology in the classroom. *ELT Journal, 43*(1), 57-63.

Prince, P. (1996). Second language vocabulary learning: The role of context versus translation as a function of proficiency. *The Modern Language Journal, 80,* 478-493.

Qian, D. D. (1996). ESL vocabulary acquisition: Contextualization and decontextualization. *The Canadian Modern Language Review, 53*(1), 120-142.

Qian, D. D. (1999). Assessing the roles of depth and breath of vocabulary knowledge in reading comprehension. *Canadian Modern Language Review, 56,* 282-307.

Qian, D. D. (2002). Investigating the relationship between vocabulary knowledge and academic reading performance: An assessment perspective. *Language Learning, 53*(3), 513-536. https://doi.org/10.1111/1467-9922.00193

Qian, D. D., & Lin, L. H. (2020). The relationship between vocabulary knowledge and language proficiency. In S. Webb, (Ed.), *The Routledge handbook of vocabulary studies.* Routledge.

Rastle, K., Harrington, J., & Coltheart, M. (2002). 358,534 nonwords: The ARC nonword database. *The Quarterly of Experimental Psychology, 55A*(4), 1139-1362.

Read, J. (2000). *Assessing vocabulary.* Cambridge University Press.

217

Richards, J. C. (1976). The role of vocabulary teaching. *TESOL Quarterly, 10*(1), 77-89.

Santos, T. (1998). Professor's reactions to the academic writing to non-native speaking students. *TESOL Quarterly, 22,* 69-90.

Schmitt, N. (2004). *Formulaic sequences.* Johm Benjamin Publishing.

Schmitt, N. (2010). Key issues in teaching and learning vocabulary. In R. Chacón-Beltrán, C. Abello-Contesse, & M. M. Torreblanca-López, (Eds.), *Insights into Non-native Vocabulary Teaching and Learning.* Multilingual Matters.

Schmitt, N., & Carter, R. (2004). Formulaic sequences in action: An Introduction. In N. Schmitt (Ed.), *Formulaic sequences* (pp. 1-22). John Benjamin Publishing Company.

Schmitt, N., Schmitt, D., & Clapham, C. (2001). Developing and exploring the behavior of two new versions of the Vocabulary Levels Test. *Language Testing, 18,* 55-88.

Shin, D., & Nation, I. S. P. (2008). Beyond single words: the most frequent collocations in spoken English. *ELT Journal, 62*(4), 339-348. https://doi:10.1093/elt/ccm091

Shimamoto, T. (2005). Exploring lexical network systems of Japanese EFL learners through depth and breadth of word knowledge. *Annual Review of English Language Education in Japan, 16,* 121-130.

Shirahata, T., Wakabayashi, S., & Muranoi, H. (2010). *Dainigengo shutoku kenkyu: Riron kara kenkyuu made* [The study of second language acquisition: From theories to research methods].

Kenkyusha.

Simpson-Vlach, R., & Ellis, N. C. (2010). An academic formulas list: New methods in phraseology research. *Applied Linguistics, 31*(4), 487-512.

Sinclair, J. (1991). *Corpus, concordance, collocation.* Oxford University Press.

Siyanova, A., & Schmitt, N. (2007). Native and non-native use of multi-waord vs. one-word verbs. *IRAL, 45,* 119-139. https://doi:10.1515/IRAL.2007.005.

Sobel, S. H., Cepeda, J. N., & Kapler, V. I. (2011). Spacing effects in real-world classroom vocabulary learning. *Applied Cognitive Psychology, 25,* 763-767.

Sökmen, A. J. (1997). Current trends in teaching second language vocabulary. In N. Schmitt, & M. McCarthy, (Eds.), *Vocabulary: Description, acquisition and pedagogy* (pp. 237-259). Oxford University Press.

Spada, N., & Lightbown, P. M. (2008). Form-focused instruction: Isolated or integrated? TESOL Quarterly, 42(2), 181-207. https://doi.org/10.1002/j.1545-7249.2008.tb00115.x

Steinel, M. P., Hulstijn, J. H., & Steinel, W. (2007). Second language idiom learning in a paired-associate paradigm: Effects of direction of learning, direction of testing, idiom imageability, and idiom transparency. *Studies in Second Language Acquisition, 29,* 449-484.

Swan, M. (2006). Chunks in the classroom: Let's not go overboard.

The Language Trainer, 20(3). Retrieved from http://www. Mikeswan.co.uk/elt-applied-lingusitics/chunks-in-the-classroom.html.

Thomson, D. M., & Tulving, E. (1970). Associative encoding and retrieval: weak and strong cues. *Journal of Experimental Psychology, 86*, 255-262.

Thorndike, E. L. (1908). Memory for paired associates. *Psychology Review, 15,* 122-138.

Tomasello, M. (2003). *Constructing a language: The usage-based theory of language acquisition.* Harvard University Press.

Tulving, E., & Osler, S. (1968). Effectiveness of retrieval cues in memory for words. *Journal of Experimental Psychology, 4,* 593-601.

Tulving, E., & Pearlstone, Z. (1966). Availability versus accessibility of information in memory for words. *Journal of verbal learning and verbal behavior, 5,* 381-391.

Tulving, E., & Thomson, D. M. (1973). Encoding specificity and retrieval processes in episodic memory. *Psychological Review, 80*(5), 352-373.

Underwood, G., Schmitt, N., & Galpin, A. (2004). The eyes have it: An eye-movement study into the processing of formulaic sequences. In N. Schmitt (Ed.), *Formulaic sequences* (pp. 153-172). John Benjamins Publishing Company.

Van Hell, J. G., & Candia Mahn, A. (1997). Keyword mnemonics versus rote rehearsal: Learning concrete and abstract words by

experienced and inexperienced learners. *Language Learning, 47*(3), 507-546.

Vermeer, A. (2004). The relation between lexical richness and vocabulary size in Dutch L1 and L2 children. In P. Bogaards, & B. Laufer (Eds.), *Vocabulary in second language* (pp. 173-189). John Benjamins.

Webb, S. (2007). Learning word pairs and glossed sentences: The effect of a single context on vocabulary knowledge. *Language Teaching Research, 11*(1). 63-81.

Webb, S., & Chang, A. C. S. (2015). How does prior knowledge affect vocabulary learning progress in an extensive reading program? *Studies in Second Language Acquisition, 37,* 651-675.

Webb, S., & Kagimoto, E. (2011). Learning collocations: Do the number of collocates, position of the node word, and synonymy affect learning? *Applied Linguistics, 32*(3), 259-276.

Webb, W. B. (1962). The effects of prolonged learning on learning. *Journal of Verbal Learning and Verbal Behavior, 1,* 173-182.

Wolter, B. (2020). Key issues in teaching multiword items. In S. Webb (Ed.), *The Routledge handbook of vocabulary studies* (pp. 493-510). Routledge.

Wilkins, D.A. (1972). *Linguistics in language Teaching.* London: Edward Arnold.

Wray, A. (2002). *Formulaic language and the lexicon.* Cambridge University Press.

Wray, A. (2008). *Formulaic language: Pushing the boundaries.*

Oxford University Press.

Yan, H. (2010). Study on the causes and countermeasures of the lexical collocation mistakes in college English. *English Language Teaching 3,* 162-165.

Yang, Y., Shintani, N., Li, S., & Zhang, Y. (2017). The effectiveness of post reading word-focused activities and their associations with working memory. *System, 70,* 38-49.

Yoshimura, H. (2003). Kouritsu shougakkou jidou no eigo no moji ya tango ni kansuru juyouteki chishiki [Public elementary school students' receptive knowledge of English letters and words]. *KATE Journal, 17*, 101-112.

Yoshimura, H. (2005). Eigo no moji ya tango ni kansuru shougakkou jisou no juyouteki chishiki ni kansuru chosa [A Survey on elementary school students' receptive knowledge of English letters and words]. *KATE Journal, 19*, 79-90.

Yoshimura, H. (2008). Kouritsu shougakkou jidou no goi chishiki ni kansuru chosa no jissen houkoku [A practical report on vocabulary knowledge of students at elementary school]. *JES Journal, 9*, 23-30.

Appendices

Appendix 1: Materials for Experiment 1

(The Word List for Experiment 1)

business acumen　ビジネスの才覚

amnesia　記憶喪失

violent bandit　乱暴な盗賊

myopia　近視

unlighted cheroot　火のついていない葉巻

disdain　軽蔑

beautiful damsel　美しい乙女

eczema　湿疹（しっしん）

drug fiend　麻薬常習者

glutton　大食いの人

dirty hovel　汚いあばら家

knoll　小さな丸い丘

school janitor　学校の用務員

mason　石屋

memory lapse　記憶の途切れ

natter　おしゃべり

horrible rabies　恐ろしい狂犬病

odium　憎悪

political savvy　政治的な実務能力

pannier　荷物かご

(Test 1 for Experiment 1)

Class （　　　） Number （　　　） Name （　　　　　　　　）

acumen 　（　　　　　　）

myopia 　（　　　　　）

cheroot 　（　　　　　　　）

damsel 　（　　　　　　）

amnesia 　（　　　　　）

disdain 　（　　　　　）

bandit 　（　　　　　　）

eczema 　（　　　　　）

fiend 　（　　　　　）

janitor 　（　　　　　　）

mason 　（　　　　　）

lapse 　（　　　　　）

knoll 　（　　　　　）

natter 　（　　　　　）

glutton 　（　　　　　）

hovel 　（　　　　　　）

rabies 　（　　　　　　）

odium 　（　　　　　）

savvy 　（　　　　　　）

pannier 　（　　　　　　）

(Test 2 for Experiment 1)

Class (   )   Number   (   )   Name (   )

business acumen   (   )

myopia   (   )

unlighted cheroot   (   )

beautiful damsel   (   )

amnesia   (   )

violent bandit   (   )

eczema   (   )

drug fiend   (   )

disdain   (   )

school janitor   (   )

mason   (   )

memory lapse   (   )

natter   (   )

glutton   (   )

dirty hovel   (   )

horrible rabies   (   )

odium   (   )

knoll   (   )

political savvy   (   )

pannier   (   )

Appendix 2: Materials for Experiment 2

(The Word List for Group 1 in Experiment 2)

business acumen　ビジネスの才覚

heavy arrears　多額の未払い金

violent bandit　乱暴な盗賊

last bastion　最後のとりで

unlighted cheroot　火のついていない葉巻

deep chasm　深い溝

diamond heist　ダイアモンド強盗

lavender sachet　ラベンダーの匂い袋

drug fiend　麻薬常習者

lonely recluse　孤独な世捨て人

dirty hovel　汚いあばら家

social pariah　社会ののけ者

delicious morsel　おいしいひと口

strange quirk　変わったくせ

memory lapse　記憶の途切れ

divorce decree　離婚判決

horrible rabies　恐ろしい狂犬病

smooth contour　なめらかな輪郭

red splotch　赤いしみ

street brawl　路上のけんか

(The Word List for Group 2 in Experiment 2)

acumen　才覚

arrears　未払い金

bandit　盗賊

bastion　とりで

cheroot　葉巻

chasm　溝

heist　強盗

sachet　匂い袋

fiend　常習者

recluse　世捨て人

hovel　あばら家

pariah　のけ者

morsel　ひと口

quirk　くせ

lapse　途切れ

decree　判決

rabies　狂犬病

contour　輪郭

splotch　しみ

brawl　けんか

(The Test for Group 1 in Experiment 2)

Class (   )   Number   (   )   Name (   )

lonely recluse   (   )

divorce decree   (   )

unlighted cheroot   (   )

heavy arrears   (   )

memory lapse   (   )

street brawl   (   )

diamond heist   (   )

last bastion   (   )

social pariah   (   )

horrible rabies   (   )

delicious morsel   (   )

lavender sachet   (   )

business acumen   (   )

deep chasm   (   )

red splotch   (   )

dirty hovel   (   )

drug fiend   (   )

smooth contour   (   )

strange quirk   (   )

violent bandit   (   )

(The Test for Group 2 in Experiment 2)

Class （　　　　）　Number （　　　　）　Name （　　　　　　　　　　）

recluse　（　　　　　　　　）

decree　（　　　　　　）

cheroot　（　　　　　　　　）

arrears　（　　　　　　　）

lapse　（　　　　　　）

brawl　（　　　　　　）

heist　（　　　　　　　）

bastion　（　　　　　　）

pariah　（　　　　　　　）

rabies　（　　　　　　　）

morsel　（　　　　　　）

sachet　（　　　　　　）

acumen　（　　　　　　　）

chasm　（　　　　　　）

splotch　（　　　　　）

hovel　（　　　　　　　）

fiend　（　　　　　　　　）

contour　（　　　　　）

quirk　（　　　　　　　）

bandit　（　　　　　　　）

Appendix 3: Materials for Experiment 3

(The Word List for Group 1 in Experiment 3)

plique = お金   much plique　たくさんのお金

queale = 問題   a difficult queale　　難しい問題

krirk = 手紙   a long krirk　長い手紙

chaumb = 牛乳   white chaumb　　白い牛乳

zighnd = 草   green zighnd　　緑の草

rourve = 戸   a back rourve　　裏の戸

tauff = シャワー   a hot tauff　熱いシャワー

stilch = クジラ   a big stilch　大きなクジラ

weibb = 歌   a new weibb　新しい歌

urnth = 川   a deep urnth　　深い川

dwoughk = 会社   an international dwoughk　　国際的な会社

jyled = 皿   a dirty jyled　　汚い皿

crell = 手   a left crell　　左手

woadge = 愛   true woadge　　真実の愛

dryzz = 人   a famous dryzz　　有名な人

spleth = 食事   a cold spleth　　冷たい食事

yeabb = 部屋   a private yeabb　　個人の部屋

blife = 自動車   a foreign blife　外国の自動車

gnalp = 会議   a special gnalp　　特別な会議

fighd = 塔   a tall fighd　　高い塔

(The Word List for Group 2 in Experiment 3)

plique = お金　　　　　　　　　　　waste plique　お金を無駄にする

queale = 問題　　　　　　　　　　　cause a queale　　問題を引き起こす

krirk = 手紙　　　　　　　　　　　write a krirk　手紙を書く

chaumb = 牛乳　　　　　　　　　　drink chaumb　　牛乳を飲む

zighnd = 草　　　　　　　　　　　cut zighnd　　草を刈る

rourve = 戸　　　　　　　　　　　open a rourve　　戸を開ける

tauff = シャワー　　　　　　　　　take a tauff　　シャワーを浴びる

stilch = クジラ　　　　　　　　　catch a stilch　　クジラを捕まえる

weibb = 歌　　　　　　　　　　　sing a weibb　歌を歌う

urnth = 川　　　　　　　　　　　cross an urnth　　川を渡る

dwoughk = 会社　　　　　　　　　start a dwoughk　　会社を始める

jyled = 皿　　　　　　　　　　　wash a jyled　　皿を洗う

crell = 手　　　　　　　　　　　wave a crell　　手をふる

woadge = 愛　　　　　　　　　　need woadge　　愛を必要とする

dryzz = 人　　　　　　　　　　　meet a dryzz　　人に会う

spleth = 食事　　　　　　　　　　eat a spleth　　食事をとる

yeabb = 部屋　　　　　　　　　　clean a yeabb　　部屋を掃除する

blife = 自動車　　　　　　　　　drive a blife　自動車を運転する

gnalp = 会議　　　　　　　　　　attend a gnalp　　会議に出る

fighd = 塔　　　　　　　　　　　build a fighd　　塔を建てる

(Test 1 for Both Groups in Experiment 3)

Class (　　　)　Number　(　　　　)　　Name (　　　　　　　　　　)

dwoughk　(　　　　　　　　)

blife　(　　　　　　)

jyled　(　　　　　　)

rourve　(　　　　　　　)

zighnd　(　　　　　　　)

crell　(　　　　　　)

krirk　(　　　　　　　)

woadge　(　　　　　　　)

spleth　(　　　　　　)

gnalp　(　　　　　　)

chaumb　(　　　　　　　)

plique　(　　　　　　)

dryzz　(　　　　　　)

queale　(　　　　　　　)

urnth　(　　　　　　)

yeabb　(　　　　　　)

tauff　(　　　　　　)

weibb　(　　　　　　　)

fighd　(　　　　　　)

stlich　(　　　　　　　)

Class (　　　)　Number　(　　　　)　　Name (　　　　　　　　　　)

(Test 2 for Group 1 in Experiment 3)

Class （　　　　）　Number （　　　　）　　Name （　　　　　　　　）

a big stilch　（　　　　　　　　）

a tall fighd　（　　　　　　　　）

a new weibb　（　　　　　　　　）

a hot tauff　（　　　　　　　　）

a privete yeabb　（　　　　　　　　）

a deep urnth　（　　　　　　　　）

a difficult queale　（　　　　　　　　）

a famous dryzz　（　　　　　　　　）

much plique　（　　　　　　　　）

white chaumb　（　　　　　　　　）

a special gnalp　（　　　　　　　　）

a cold spleth　（　　　　　　　　）

true woadge　（　　　　　　　　）

a long krirk　（　　　　　　　　）

a left crell　（　　　　　　　　）

green zighnd　（　　　　　　　　）

back rourve　（　　　　　　　　）

a dirty jyled　（　　　　　　　　）

a foreign blife　（　　　　　　　　）

an international droughk　（　　　　　　　　）

(Test 2 for Group 2 in Experiment 3)

Class （　　　） Number （　　　） Name （　　　　　　　）

catch a stilch （　　　　　　）

build a fighd （　　　　　　）

sing a weibb （　　　　　　）

take a tauff （　　　　　　）

clean a yeabb （　　　　　　）

cross a urnth （　　　　　　）

cause a queale （　　　　　　）

meet a dryzz （　　　　　　）

waste plique （　　　　　　）

drink chaumb （　　　　　　）

attend a gnalp （　　　　　　）

eat a spleth （　　　　　　）

need woadge （　　　　　　）

write a krirk （　　　　　　）

wave a crell （　　　　　　）

cut zighnd （　　　　　　）

open a rourve （　　　　　　）

wash an jyled （　　　　　　）

drive a blife （　　　　　　）

start a droughk （　　　　　　）

Appendix 4: Materials for Experiment 4

(The Word List for Group 1 in Experiment 4)

blunged = 勉強する	blunged history　歴史を勉強する
cuised ＝話す	cuised Japanese　日本語を話す
doost = 書く	doost a letter　手紙を書く
erves = 食べる	erves breakfast　朝食を食べる
fleed = 選ぶ	fleed a gift　贈り物を選ぶ
gieze = 切る	gieze trees　木を切る
himps = 投げる	himps a ball　ボールを投げる
jelds = 焼く	jelds a cake　ケーキを焼く
knide = やめる	knide smoking　タバコをやめる
luibs = 愛する	luibs peace　平和を愛する
marves = 理解する	marves the situation　状況を理解する
niffed = 吸う	niffed air　空気を吸う
oamed = 運転する	oamed a car　車を運転する
psurled = 答える	psurled the question　質問に答える
rhigned = 育てる	rhigned vegetables　野菜を育てる
swoars = 読む	swoars a book　本を読む
thrints = 動かす	thrints a machine　機械を動かす
ushed = 忘れる	ushed names　名前を忘れる
wralled = 乾かす	wralled hands　手を乾かす
ziped = キスする	ziped a friend　友達にキスする

(The Word List for Group 2 in Experiment 4)

blunged = 勉強する　　　　　　　　blunged abroad　　外国で勉強する

cuised ＝話す　　　　　　　　　　cuised fast　　早口で話す

doost = 書く　　　　　　　　　　　doost well　　上手に書く

erves = 食べる　　　　　　　　　　erves outside　外で食べる

fleed = 選ぶ　　　　　　　　　　　fleed carefully　　慎重に選ぶ

gieze = 切る　　　　　　　　　　　gieze half　　半分に切る

himps = 投げる　　　　　　　　　　himps forward　　前に投げる

jelds = 焼く　　　　　　　　　　　jelds hard　　固く焼く

knide = やめる　　　　　　　　　　knide suddenly　　突然やめる

luibs = 愛する　　　　　　　　　　luibs forever　　永遠に愛する

marves = 理解する　　　　　　　　marves clearly　　はっきりと理解する

niffed = 吸う　　　　　　　　　　　niffed deeply　　深く吸う

oamed = 運転する　　　　　　　　oamed slowly　　ゆっくり運転する

psurled = 答える　　　　　　　　　psurled quietly　　静かに答える

rhigned = 育つ　　　　　　　　　　rhigned rapidly　　急速に育つ

swoars = 読む　　　　　　　　　　swoars widely　　幅広く読む

thrints = 動く　　　　　　　　　　thrints quickly　　すばやく動く

ushed = 忘れる　　　　　　　　　　ushed completely　　完全に忘れる

wralled = 乾く　　　　　　　　　　wralled naturally　　自然に乾く

ziped = キスする　　　　　　　　　ziped gently　　やさしくキスする

(Test 1 for Both Groups in Experiment 4)

Class (   ) Number (   )   Name (   )

himps   (   )

luibs   (   )

erves   (   )

ziped   (   )

blunged   (   )

swoars   (   )

cuised   (   )

ushed   (   )

fleed   (   )

oamed   (   )

psurled   (   )

wralled   (   )

doost   (   )

knide   (   )

gieze   (   )

thrints   (   )

rhigned   (   )

marves   (   )

jelds   (   )

niffed   (   )

Class （　　　　） Number （　　　　） Name （　　　　　　　　）

knide smoking　（　　　　　　　　　　）

ushed names　（　　　　　　　　　）

luibs peace　（　　　　　　　　　）

jelds a cake　（　　　　　　　　　）

erves breakfast　（　　　　　　　　　）

thrints a machine　（　　　　　　　　　）

psurled the question　（　　　　　　　　　）

doost a letter　（　　　　　　　　）

himps a ball　（　　　　　　　　）

marves the situation　（　　　　　　　　　）

niffed air　（　　　　　　　　）

blunged history　（　　　　　　　　　）

oamed a car　（　　　　　　　　）

gieze trees　（　　　　　　　　）

ziped a friend　（　　　　　　　　　）

fleed a gift　（　　　　　　　　）

cuised Japanese　（　　　　　　　　　）

swoars a book　（　　　　　　　　　）

rhigned vegetables　（　　　　　　　　　）

wralled hands　（　　　　　　　　　）

(Test 2 for Group 2 in Experiment 4)

Class   (   )   Number (   )   Name (   )

knide suddenly   (   )

ushed completely   (   )

luibs forever   (   )

jelds hard   (   )

erves outside   (   )

thrints quickly   (   )

psurled quietly   (   )

doost well   (   )

himps forward   (   )

marves clearly   (   )

niffed deeply   (   )

blunged abroad   (   )

oamed slowly   (   )

gieze half   (   )

ziped gently   (   )

fleed carefully   (   )

cuised fast   (   )

swoars widely   (   )

rhigned rapidly   (   )

wralled naturally   (   )

Appendix 5: Materials for Experiment 5

(The Word List for Group 1 in Experiment 5)

beautiful rendition　美しい演奏

cool exterior　かっこいい外見

green foliage　緑の葉

happy anticipation　幸せの予感

orange rind　オレンジの皮

red brick　赤レンガ

small intestine　小腸（しょうちょう）

yellow chrysanthemum　黄色い菊

study anatomy　解剖学（かいぼうがく）を勉強する

teach undergraduates　大学生を教える

animal instinct　動物の本能

flower stem　花の茎（くき）

suburban house　郊外の家

pediatric hospital　小児科の病院

vague idea　あいまいな考え

nutritious lunch　栄養のあるランチ

frigid morning　寒さが厳しい朝

(The Word List for Group 2 in Experiment 5)

rendition　演奏

exterior　外見

foliage　葉

anticipation　予感

rind　皮

brick　レンガ

intestine　腸（ちょう）

chrysanthemum　菊

anatomy　解剖学

undergraduates　大学生

instinct　本能

stem　茎（くき）

suburban　郊外の

pediatric　小児科の

vague　あいまいな

nutritious　栄養のある

frigid　寒さが厳しい

(Test for Group 1 in Experiment 5)

1 年　　（　　　　）組　　　名　　前　（　　　　　　　　　　　　　　　）

study anatomy　（　　　　　　　　　　）

vague idea　（　　　　　　　　　）

beautiful rendition　（　　　　　　　　　　）

happy anticipation　（　　　　　　　　　　）

suburban house　（　　　　　　　　　　）

frigid moring　（　　　　　　　　　）

red brick　（　　　　　　　　　）

cool exterior　（　　　　　　　　　）

animal instinct　（　　　　　　　　　）

small intestine　（　　　　　　　　　）

green foliage　（　　　　　　　　　）

yellow chrysanthemum　（　　　　　　　　　　）

teach undergraduates　（　　　　　　　　　　）

nutritious lunch　（　　　　　　　　　　）

flower stem　（　　　　　　　　　）

pediatric hospital　（　　　　　　　　　　）

orange rind　（　　　　　　　　　）

(Test for Group 2 in Experiment 5)

1 年　　（　　　）組　　名　　前　（　　　　　　　　　）

anatomy　（　　　　　　　）

idea　（　　　　　　）

rendition　（　　　　　　　）

anticipation　（　　　　　　　）

suburban　（　　　　　　　）

frigid　（　　　　　　）

brick　（　　　　　　）

exterior　（　　　　　　）

instinct　（　　　　　　）

intestine　（　　　　　　）

foliage　（　　　　　　）

chrysanthemum　（　　　　　　　）

undergraduates　（　　　　　　　）

nutritious　（　　　　　　）

stem　（　　　　　）

pediatric　（　　　　　　）

rind　（　　　　　）

Appendix 6: Materials for Experiment 6

(The Word List for Group 2 [A Spaced Learning Condition] in Experiment 6)

List 1

sensible idea　　分別のある考え

precise date　　正確な日付

enough revenue　　十分な収入

happy prospect　　幸せな見込み

full investigation　　詳細な調査

best candidate　　最高の候補者

fundamental cause　　根本的原因

news correspondent　　ニュースの通信員

bad investment　　不利な投資

regional culture　　地方の文化

acceptable answer　　満足のいく答え

car insurance　　自動車保険

energy consumption　　エネルギー消費

adequate care　　適切な世話

statistics class　　統計の授業

sufficient condition　　十分な条件

distribution company　　配給会社

crucial event　　重大な行事

(The Word List for Group 2 [A Spaced Learning Condition] in Experiment 6)

List 2

sensible people　分別のある人々

precise number　正確な数字

lose revenue　収入を失う

hot prospect　暑い見込み

police investigation　警察の調査

only candidate　唯一の候補者

fundamental meaning　根本的意味

television correspondent　テレビの通信員

good investment　有利な投資

regional newspaper　地方の新聞

acceptable cost　満足のいく価格

health insurance　健康保険

fish consumption　魚の消費

adequate job　適切な仕事

statistics report　統計の報告

sufficient food　十分な食料

distribution list　配給リスト

crucial meeting　重大な会議

(The Word List for Group 2 [A Spaced Learning Condition] in Experiment 6)

List 3

sensible way　分別のあるやり方

precise word　正確なことば

new revenue　新たな収入

real prospect　本当の見込み

special investigation　特別な調査

strong candidate　有力な候補者

fundamental rule　根本的ルール

war correspondent　戦争の通信員

personal investment　個人投資

regional population　地方の人口

acceptable level　満足のいくレベル

life insurance　生命保険

tea consumption　お茶の消費

adequate sleep　適切な睡眠

statistics service　統計のサービス

sufficient time　十分な時間

distribution system　配給システム

crucial moment　重大な瞬間

(The Word List for Group 3 [A Massed Learning Condition] in Experiment 6)

List 1

sensible idea　　分別のある考え

sensible people　　分別のある人々

sensible way　　分別のあるやり方

precise date　　正確な日付

precise number　　正確な数字

precise word　　正確なことば

enough revenue　　十分な収入

lose revenue　　収入を失う

new revenue　　新たな収入

happy prospect　　幸せな見込み

hot prospect　　暑い見込み

real prospect　　本当の見込み

full investigation　　詳細な調査

police investigation　　警察の調査

special investigation　　特別な調査

best candidate　　最高の候補者

only candidate　　唯一の候補者

strong candidate　　有力な候補者

(The Word List for Group 3 [A Massed Learning Condition] in Experiment 6)

List 2

fundamental cause　根本的原因

fundamental meaning　根本的意味

fundamental rule　根本的ルール

news correspondent　ニュースの通信員

television correspondent　テレビの通信員

war correspondent　戦争の通信員

bad investment　不利な投資

good investment　有利な投資

personal investment　個人投資

regional culture　地方の文化

regional newspaper　地方の新聞

regional population　地方の人口

acceptable answer　満足のいく答え

acceptable cost　満足のいく価格

acceptable level　満足のいくレベル

car insurance　自動車保険

health insurance　健康保険

life insurance　生命保険

(The Word List for Group 3 [A Massed Learning Condition] in Experiment 6)

List 3

energy consumption　　エネルギー消費

fish consumption　　魚の消費

tea consumption　　お茶の消費

adequate care　　適切な世話

adequate job　　適切な仕事

adequate sleep　　適切な睡眠

statistics class　　統計の授業

statistics report　　統計の報告

statistics service　　統計のサービス

sufficient condition　　十分な条件

sufficient food　　十分な食料

sufficient time　　十分な時間

distribution company　配給会社

distribution list　配給リスト

distribution system　配給システム

crucial event　　重大な行事

crucial meeting　　重大な会議

crucial moment　　重大な瞬間

(Test for All Groups in Experiment 6)

Class (　　　) Number (　　　　) Name (　　　　　　　　)

acceptable　(　　　　　　　)

adequate　(　　　　　　　)

candidate　(　　　　　　　)

consumption　(　　　　　　　)

correspondent　(　　　　　　　)

crucial　(　　　　　　　)

distribution　(　　　　　　　)

fundamental　(　　　　　　　)

insurance　(　　　　　　　)

investigation　(　　　　　　　)

investment　(　　　　　　　)

precise　(　　　　　　　)

prospect　(　　　　　　　)

regional　(　　　　　　　)

revenue　(　　　　　　　)

sensible　(　　　　　　　)

statistics　(　　　　　　　)

sufficient　(　　　　　　　)

Appendix 7: Materials for Experiment 7

(The Word List for Group 2 [A Spaced Learning Condition] in Experiment 7)

<div align="center">List 1</div>

precise date　　正確な日付

enough revenue　　十分な収入

full investigation　　詳細な調査

best candidate　　最高の候補者

news correspondent　　ニュースの通信員

bad investment　　不利な投資

regional culture　　地方の文化

energy consumption　　エネルギー消費

adequate care　　適切な世話

statistics class　　統計の授業

sufficient condition　　十分な条件

crucial event　　重大な行事

(The Word List for Group 2 [A Spaced Learning Condition] in Experiment 7)

List 2

precise number　正確な数字

lose revenue　収入を失う

police investigation　警察の調査

only candidate　唯一の候補者

television correspondent　テレビの通信員

good investment　有利な投資

regional newspaper　地方の新聞

fish consumption　魚の消費

adequate job　適切な仕事

statistics report　統計の報告

sufficient food　十分な食料

crucial meeting　重大な会議

(The Word List for Group 2 [A Spaced Learning Condition] in Experiment 7)

List 3

precise word　正確なことば

new revenue　新たな収入

special investigation　特別な調査

strong candidate　有力な候補者

war correspondent　戦争の通信員

personal investment　個人投資

regional population　地方の人口

tea consumption　お茶の消費

adequate sleep　適切な睡眠

statistics service　統計のサービス

sufficient time　十分な時間

crucial moment　重大な瞬間

(The Word List for Group 3 [A Massed Learning Condition] in Experiment 7)

List 1

precise date　　正確な日付

precise number　　正確な数字

precise word　　正確なことば

enough revenue　　十分な収入

lose revenue　　収入を失う

new revenue　　新たな収入

full investigation　　詳細な調査

police investigation　　警察の調査

special investigation　　特別な調査

best candidate　　最高の候補者

only candidate　　唯一の候補者

strong candidate　　有力な候補者

(The Word List for Group 3 [A Massed Learning Condition] in Experiment 7)

List 2

news correspondent　　ニュースの通信員

television correspondent　　テレビの通信員

war correspondent　　戦争の通信員

bad investment　　不利な投資

good investment　　有利な投資

personal investment　　個人投資

regional culture　　地方の文化

regional newspaper　　地方の新聞

regional population　　地方の人口

energy consumption　　エネルギー消費

fish consumption　　魚の消費

tea consumption　　お茶の消費

(The Word List for Group 3 [A Massed Learning Condition] in Experiment 7)

List 3

adequate care　　適切な世話

adequate job　　適切な仕事

adequate sleep　　適切な睡眠

statistics class　　統計の授業

statistics report　　統計の報告

statistics service　　統計のサービス

sufficient condition　　十分な条件

sufficient food　　十分な食料

sufficient time　　十分な時間

crucial event　　重大な行事

crucial meeting　　重大な会議

crucial moment　　重大な瞬間

(Test for All Groups in Experiment 7)

Class (   )   Number (   )   Name (   )

adequate   (   )

candidate   (   )

consumption   (   )

correspondent   (   )

crucial   (   )

investigation   (   )

investment   (   )

precise   (   )

regional   (   )

revenue   (   )

statistics   (   )

sufficient   (   )