Vocabulary Learning and Instruction
Volume 5, Issue 1, December 2016
http://vli-journal.org

Article

A Lexical Network Approach to the Acquisition of English Verbs of Memory: The Case of Japanese Learners

Shun Morimoto
Tokiwa University
doi: http://dx.doi.org/10.7820/vli.v05.1.morimoto

Abstract

The present study investigated the acquisition of L2 English memory verbs, *memorize, remember,* and *recall*, by Japanese learners within the framework of a lexical network. In the fields of psychology and cognitive science, the human memory has been conceptualized as consisting of three cognitive phases, namely *input, retention*, and *output*. In English, *memorize* and *recall* are used for the input and the output phases, respectively, while *remember* can be used across the three phases. In order to investigate the extent to which Japanese learners of English can appropriately make differential use of these verbs in relation to the above cognitive phases, a test called "the Memory Verb Acceptability Judgment Test" was administered on 173 Japanese university students grouped into three proficiency levels. The results showed that while they were able to accept *memorize* and *recall* with high accuracy for the input and the output phases, respectively, they tended to accept *remember* primarily for the retention phase, failing to fully accept it in the remaining two phases. This tendency was observed even among those learners whose average length of stay in English-speaking countries was 5 years. It was also revealed that basic-level learners tended to over-generalize *memorize* for the retention phase. Based on the overall results, theoretical and pedagogical implications of the lexical network approach are discussed.

1 Introduction

In the field of English teaching and learning, it has been widely acknowledged that the ability to fully use what is called basic words such as verbs and prepositions constitutes an integral part of communicative English competence (Henriksen, 1999; Meara, 2002; Schmitt, 2000; Tanaka, 2012) since they appear more frequently and cover a large proportion of the running words in spoken and written texts across a wide range of discourse types (Nation, 2001).

There have been a number of studies which investigated the acquisition of L2 basic words by Japanese learners of English such as the verbs of vision (Hiki, 1995), the verbs of utterance (Sato & Batty, 2012), the verbs of perception (Sato & Tanaka, 2015), dimensional adjectives (Takahashi, 1985), and the verbs like *put* (Shirai, 1990) and *give* (Tanaka, 1983, 1987). These previous studies showed that Japanese learners often failed to make full use of basic words and exhibit under- and over-generalizations.

Please cite this article as: Morimoto, S. (2016). A Lexical Network Approach to the Acquisition of English Verbs of Memory: The Case of Japanese Learners. *Vocabulary Learning and Instruction*, *5* (1), 1–17. doi: 10.7820/vli.v05.1.morimoto

Researchers have sought to identify the factors which make the acquisition of basic words difficult. One of these factors is that almost all basic words are polysemous words having multiple semantically related senses (Schmitt, 1998). For example, *Oxford Dictionary of English* (third edition) lists as many as nine major senses for the verb *take* such as "lay hold of (something) with one's hands," "remove (someone or something) from a particular place," "make, undertake, or perform (an action or task)," and so on. Including the number of sub-senses under each major sense, learners face the daunting task of remembering each sense one by one in a cumulative manner, resulting in a heavy learning burden.

The polysemous nature of basic words is related to the second factor, input dependency. When learning the meaning of a given polysemous word, learners are not usually exposed to all of its exemplars but only to its subset. In the case of the verb *take*, if learners are predominantly exposed to exemplars under the "lay hold of (something) with one's hands" sense, it is likely that they would not be able to use it in other senses. Learners' mental representation of the word's meaning is therefore dependent upon the nature of the input they have been exposed to (Tanaka, 1987).

Furthermore, given a set of exemplars, learners do not necessarily take in all of them, as new words are processed through a well-developed conceptual and semantic structure in their L1 (Ijaz, 1986; Kellerman, 1978, 1979). Tanaka and Abe (1985) argued that in L2 lexical acquisition, learners often go about learning new L2 words by adopting what they call the "search-translation-equivalent (STE) strategy," in which they attempt to understand the meaning of a given target word through its translation-equivalent. In the case of Japanese learners, they often formulate a "*take* = *toru*" formula in learning the verb *take*. However, this strategy can only be effective as long as the semantic ranges of the L1 and L2 words completely overlap. However, in the case of basic words, most of which are polysemous, this strategy impedes learning since the meaning potential of the target L2 word cannot be fully captured by a single L1 translation-equivalent. It is therefore necessary to take cross-linguistic differences into consideration in investigating the acquisition of basic words.

1.1 The Lexical Network Model

In recent years, there has been a growing interest among the researchers of second language lexical acquisition with regard to lexical networking (Haastrup & Henriksen, 2000; Verspoor & Lowie, 2003; Wolter, 2006). It is premised on the fact that words do not exist in learners' mental lexicon in isolation but instead interrelate with other words to form a network (Crossley, Salsbury, & McNamara, 2010; Lakoff, 1987; Meara, 2009; Norvig & Lakoff, 1987). There are a number of organizing principles of lexical networking. One of the major principles is the associative network, which assumes that upon hearing a given word, a set of semantically related words will be triggered (Schmitt, 2000). For example, the word *dog* typically triggers responses such as *pet*, *leash*, *bark,* and *bone*. Although the responses can vary among people, Schmitt (2000, p. 38) states that "associations from groups of respondents exhibit a great deal of systematicity." Another dominant organizing principle of lexical networking is the thematic principle

(Lehrer, 1974), which states that words can be categorized under specific topics or fields such as sports, politics, weather, the Internet, and health.

In addition to the above two principles, there is yet another important one called the conceptual principle, in which words are grouped together into semantic domains such as the domain of possession, the domain of breaking, and the domain of vision (Miller & Johnson-Laird, 1976). For instance, the domain of breaking consists of verbs such as *destroy*, *shatter*, *fracture*, *disintegrate*, *crack*, and so on.

Within the lexical network framework, Sato and Tanaka (2015) investigated the acquisition of English verbs of perception (e.g. *see*, *listen*, *smell*) by Japanese learners within the matrix of five domains (olfactory, taste, visual, auditory, and tactile) and three semantic phases (*action*, *experience*, and *result*) (Gisborne, 2010; Terasawa, 2008). For instance, the verb *smell* in the olfactory domain can be used in the following three semantic phases:

(1) Action: Naomi *smelled* the roses when she found them by the road.
(2) Experience: Naomi *smelled* roses when she entered the house.
(3) Result: The rose *smelled* very good.

Sato and Tanaka developed the following lexical network shown in Table 1 and investigated which domain(s) were more problematic to Japanese learners of English.

The results of the lexical network test of perception verbs showed that in terms of the five sensory domains, the order of difficulty from easiest to most difficult turned out be: olfactory = tactile / visual = taste / auditory. The order of difficulty in terms of the three semantic phases was as follows: experience > action > result, from easiest to most difficult. Among all combinations, [+auditory, +result] was found to be particularly difficult for the learners. Sato and Tanaka argued that their frequent incorrect use of *hear* for *sound* was induced by cross-linguistic transfer. They concluded that "[l]exical development involves lexical networking, and the domain-specific lexical network approach that highlights the verbal domain of perception, for example, may be beneficial in network-building, which, in turn, leads to the development of inter-lexical competence" (p. 18).

Table 1. A Lexical Network Framework of the Basic Verbs of Perception in English (Sato & Tanaka, 2015)

	Three semantic phases		
	Action	Experience	Result
Olfactory	*smell*	*smell*	*smell*
Taste	*taste*	*taste*	*taste*
Visual	*look*	*see*	*look*
Auditory	*listen*	*hear*	*sound*
Tactile	*touch/feel*	*feel*	*feel*

Based on the lexical network approach, the present study focused on the domain of memory, which has not been the target of investigation in the previous studies.

1.2 Memory Verbs in English and Japanese

In psychology and cognitive science, the human memory has long been conceptualized in terms of what is called the "computational metaphor" involving three cognitive phases, namely *input*, *retention*, and *output* (Atkinson & Shiffrin, 1971; Craik & Lockhart, 1972). As shown in Table 2, input is processed and stored in the memory, and gets retrieved for use just like a computer. In English, *memorize* and *recall* are used for the input and the output phases, respectively, as in the following examples.

(1) We had to *memorize* the parts of the brain in our biology class. [input]
(2) I can clearly *recall* the moment when the accident happened. [output]

Unlike *memorize* and *recall*, the verb *remember* can be used in all of the three phases as follows:

(1) The researcher asked a group of students to *remember* seven random numbers. [input]
(2) I will *remember* this day throughout my life. [retention]
(3) I can't *remember* the face of my homeroom teacher. [output]

Although *remember* can be used across the three phases, it has to be noted here that these phases are not mutually exclusive but are the aspects of the memory schema which can be cognitively highlighted or focalized (Langacker, 1987).

In Japanese, the verb *oboeru* is used for the input phase, and *oboeteiru* for the retention phase, and *omoidasu* for the output phase as follows:

(1) Watashitachi-wa seibutsu-no jugyo-de nou-no bui-wo
We in our biology class the parts of the brain
oboenakereba narimasendeshita.
memorize had to
(2) Watashi-wa kyo-no hi-wo issho oboeteimasu.
I this day throughout my life will remember
(3) Watashi-wa tannin-no sensei-no kao-wo omoidasukotoga dekimasen.
I the face of my homeroom teacher recall can't

Table 2. A Lexical Network Framework of the Basic Verbs of Memory in English

Three cognitive phases				
Input	→	Retention	→	Output
memorize		–		–
remember		*remember*		*remember*
–		–		*recall*

The cross-linguistic network of the memory verbs between English and Japanese can be illustrated as in Figure 1.

Given the above cross-linguistic network, the question is: Given a set of verbs of memory, which is easier or more difficult to learn, and why?

One of the major factors which can influence the relative difficulty of learning L2 lexicon is learners' L1 (Ijaz, 1986; Kellerman, 1978, 1979; Ringbom, 1987). As discussed above, learners often go about learning L2 lexicon by employing the STE strategy and seek one-to-one correspondence between the L2 word and its L1 translation-equivalent. With the use of this strategy, it can be hypothesized that Japanese learners approach the English memory verbs in the following manner:

$$\begin{gathered} memorize = oboeru \\ remember = \{oboeru, oboeteiru, omoidasu\} \\ recall = omoidasu \end{gathered}$$

From this, we can hypothesize that *memorize* and *recall* are easier to learn than *remember* since they can be equated with a single translation-equivalent in Japanese. On the contrary, *remember* can be more problematic for learners since there is no single translation-equivalent which fully captures its meaning potential. In addition, learners' mental representations of the meaning of *remember* can be biased depending on the nature of input they have been exposed to. For example, when learners encounter *remember* used in the retention phase as in "I will *remember* this day throughout my life," they will formulate a hypothesis such as "*remember = oboeteiru*." As learning proceeds, they may encounter *remember* used in other phases, which will force them to restructure their initial hypothesis (Hatch, 1974). Depending on the nature of input they have encountered, their hypotheses can take various forms such as "*remember = oboeteiru*," "*remember = {oboeteiru, omoidasu}*," and "*remember = {oboeteiru, oboeru, omoidasu}*." However, once learners' hypotheses get "fossilized" at some point of the learning process, it will lead to the under-generalization of the verb. For example, once learners' hypothesis of the

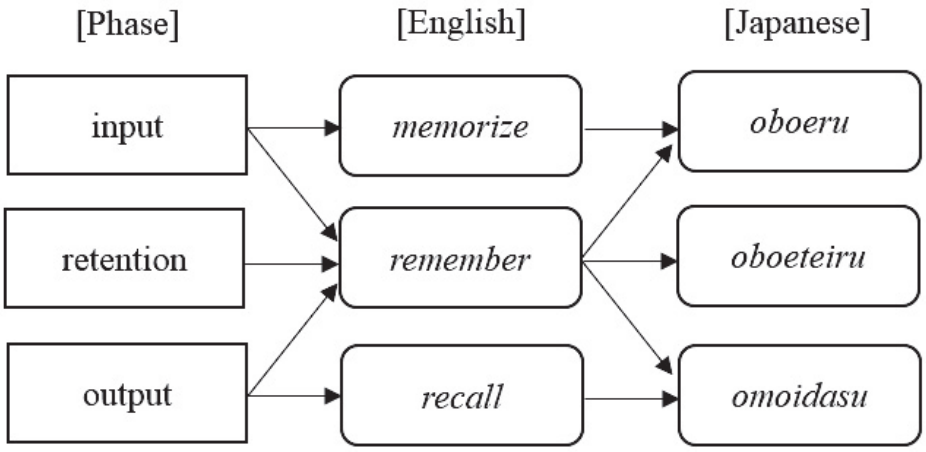

Figure 1. Lexical Network of the Memory Verbs in English and Japanese.

meaning of *remember* gets fossilized at the stage of "*remember* = {*oboeru* [input], *oboeteiru* [retention]}," it is likely to be underused in the output phase as *omoidasu*. The number of available translation-equivalents can therefore be one of the factors which can affect the relative difficulty of learning L2 words.

1.3 Research Questions

Based on the above discussion, the present study addressed the following research questions:

(1) To what extent can Japanese learners recognize appropriate use of the English verbs of memory in relation to the three cognitive phases of memory?
(2) Is there a relationship between the acquisition of the verbs of memory and the level of English proficiency?

Although there are a number of other verbs related with memory in English, the present study dealt with *memorize*, *remember*, and *recall*, all of which are covered at school and appear frequently in everyday speech and writing, and can therefore be considered basic. For both research questions, the ability to accept the appropriate verb(s) is the dependent variable, and the level of proficiency and the three cognitive phases are the dependent variables.

2 Methodology

2.1 Participants

The participants in this study were 173 Japanese university students (71 females; 102 males) from two different universities. Their age ranged from 18 to 23 years old with the average of 19.6. According to their TOEFL-iBT scores (mean = 53.5, SD = 23.0), the participants were placed into three groups. The first group consisted of 67 students (41 females; 26 males) whose average TOEFL score was 32.4. The second group was made up of 91 students (23 females; 68 males) with their average TOEFL score being 64.5. None of the students in the first and the second groups had had prior experience living in English-speaking countries, and had studied English in Japan for an average of 8 years. The third group consisted of 15 students (7 females; 8 males) who had lived in English-speaking countries for more than 1 year. Their length of stay ranged from 1 to 17 years with the average of 5 years. Their average TOEFL score was 80.7. One-way ANOVA performed on the TOEFL scores of the three groups showed that there were statistically significant differences among the average scores of the three groups [$F(2, 170) = 111.634$, $p < 0.001$]. *Post hoc* tests revealed each pairwise comparison was significant ($p < 0.01$ for each).

2.2 Materials

In order to measure Japanese learners' ability to choose the appropriate verbs of memory, a test called "the Memory Verb Acceptability Judgment Test"

was devised. The test consisted of 15 items, five from each of the three semantic phases. For each item, the context of situation was presented in Japanese, followed by its English translation. There is a square bracket in the English sentence, and the participants were asked to judge whether or not each of the three verbs could be used to fill the bracket. They were asked to put a circle if the given verb was acceptable, and cross it out if not. They were told that there could be two or more appropriate or inappropriate verbs. In addition, their judgment must be based on how accurate the English sentence reflected the Japanese sentence. The following are examples of the test items:

(INPUT)
[Context] Kenkyusha-ha hikensha-ni nanatsuno randamu no suji-wo oboeruyou shiji shimasita.
The researcher asked a group of students to [] seven random numbers.
→ memorize ( ), remember ( ), recall ( )
(RETENTION)
[Context] Kono goon-ha kesshite wasuremasen.
I will always [] your kindness.
→ memorize ( ), remember ( ), recall ( )
(OUTPUT)
[Context] Jiko-ga okita shunkan-no kotowo senmeini omoidasukotoga dekimasu.
I can clearly [] the moment when the accident happened.
→ memorize ( ), remember ( ), recall ( )

Two versions of the test with a varying order in the presentation of test items were developed, and each participant was given one of the two versions on a random basis.

Prior to the administration of the test, three native English-speaking teachers who are proficient in Japanese took the test and a 100% agreement in their responses was obtained.

2.3 Procedures

The participants were first given a short questionnaire on their biographical data and language learning background. In order to ensure their prior knowledge on the three target memory verbs, they were asked to write the meaning of each verb in Japanese, and all of them were able to provide appropriate words in Japanese. Although there were some variations as to the words provided, they were judged acceptable as long as they had similar meanings. For instance, verbs like *omoiokosu* and *yobidasu* were considered to be semantically equivalent to *omoidasu*. After the instructor of the class read the directions aloud, the participants took the Memory Verb Acceptability Judgment Test, which took about 20 minutes to complete.

For each item, the participants' responses were scored. One point was given to each verb that a participant marked as acceptable, and the percentage of participants who accepted each answer choice was calculated. The data management and analysis were done by using EXCEL (Microsoft, Redmond, WA) and SPSS (IBM, Armonk, NY).

3 Results

Table 3 shows the descriptive statistics of the acceptability judgment test scores for *memorize* (KR20 = 0.69). The mean acceptance rates are presented in Figure 2. The average acceptance rate for items testing the input phase was over 90% while that for items testing the output phase was 8.74%. As for the retention phase, the acceptance rates of Group 2 and 3 were found to be close to 30%. On the contrary, 51.94% of Group 1 accepted *memorize* in the retention phase.

Table 4 summarizes the results of two-way ANOVA. The main effects for level [$F(2, 510) = 6.416$, $p < 0.01$] and phase [$F(2, 510) = 374.724$, $p < 0.01$] were significant. There was a significant interaction effect between level and phase [$F(4, 511) = 8.148$, $p < 0.01$]. *Post hoc* pairwise comparisons revealed that learners in Group 1 accepted *memorize* in the retention phase significantly higher than those in Group 2 and 3 ($p < 0.01$). There were no significant differences among the three groups in the input and the output phases.

Descriptive statistics of the acceptability judgment test scores for *remember* are shown in Table 5 (KR20 = 0.65). Figure 3 illustrates the mean acceptance rates. The average acceptance rate in the retention phase was 87.28%. While the acceptance rates of Group 2 and 3 were over 90%, that of Group 1 remained at 79.40%. As for the input and the output phases, the average acceptance rates turned out to be rather low, 46.36% and 65.78%, respectively.

The two-way ANOVA results are summarized in Table 6. The main effect for level turned out to be insignificant [$F(2, 510) = 2.786$, $p = 0.063$ while the main effect for phase was significant [$F(2, 510) = 38.068$, $p < 0.001$]. No significant interaction effect between level and phase was identified [$F(4, 510) = 1.275$, $p = 0.279$]. In terms of the phase, Tukey's *post hoc* test revealed that the differences between the three phases were all statistically significant at the 0.001 level, yielding the following order of acceptance:

$$\textit{retention}\ (87.28\%) > \textit{output}\ (65.78\%) > \textit{input}\ (46.36\%)$$

Table 7 shows the descriptive statistics of the acceptability judgment test scores for *recall* (KR20 = 0.55). The mean acceptance rates are presented in Figure 4. The average acceptance rate in the input phase was 6.36%, and that in the retention phase was 24.86%. As expected, the acceptance rate in the output phase turned out to be the highest, 86.36%.

Table 8 summarizes the results of two-way ANOVA. The main effect for level was not significant [$F(2, 510) = 1.251$, $p = 0.287$] while that for phase turned out

Table 3. Descriptive Statistics of the Acceptability Judgment Test Scores (*memorize*)

	Input		Retention		Output	
	Mean (%)	SD	Mean (%)	SD	Mean (%)	SD
Group 1 ($n = 67$)	88.96	20.89	51.94	29.76	11.18	18.08
Group 2 ($n = 91$)	93.63	18.35	29.89	26.56	7.03	16.00
Group 3 ($n = 15$)	96.00	15.49	30.67	31.95	8.00	12.65
Total ($n = 173$)	92.02	18.89	38.50	30.12	8.74	16.43

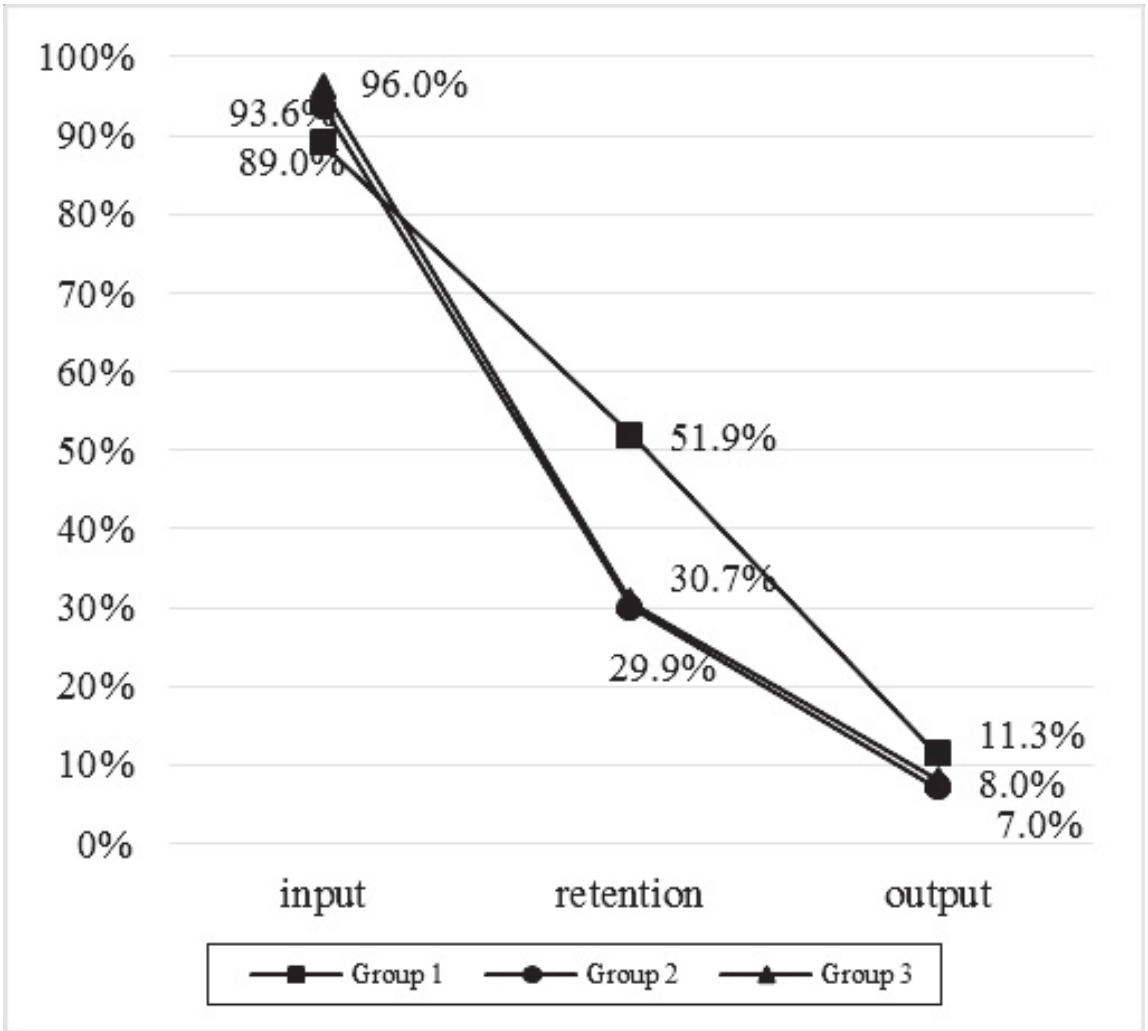

Figure 2. The Mean Acceptance Rates of *memorize.*

Table 4. ANOVA: Tests of Between-subjects Effects (*memorize*)

Source	Sum of squares	df	Mean squares	*F* value	Sig.	η^2
Level	6091.005	2	3045.502	6.416	0.002	0.007
Phase	355767.948	2	177883.974	374.724	0.000	0.403
Level*Phase	15472.422	4	3868.106	8.148	0.000	0.018

Table 5. Descriptive Statistics of the Acceptability Judgment Test Scores (*remember*)

	Input		Retention		Output	
	Mean (%)	SD	Mean (%)	SD	Mean (%)	SD
Group 1 (n = 67)	42.99	35.55	79.40	25.58	66.57	33.46
Group 2 (n = 91)	47.03	38.34	92.31	15.99	64.18	32.87
Group 3 (n = 15)	57.33	31.05	92.00	21.11	72.00	35.30
Total (n = 173)	46.36	36.71	87.28	21.46	65.78	33.19

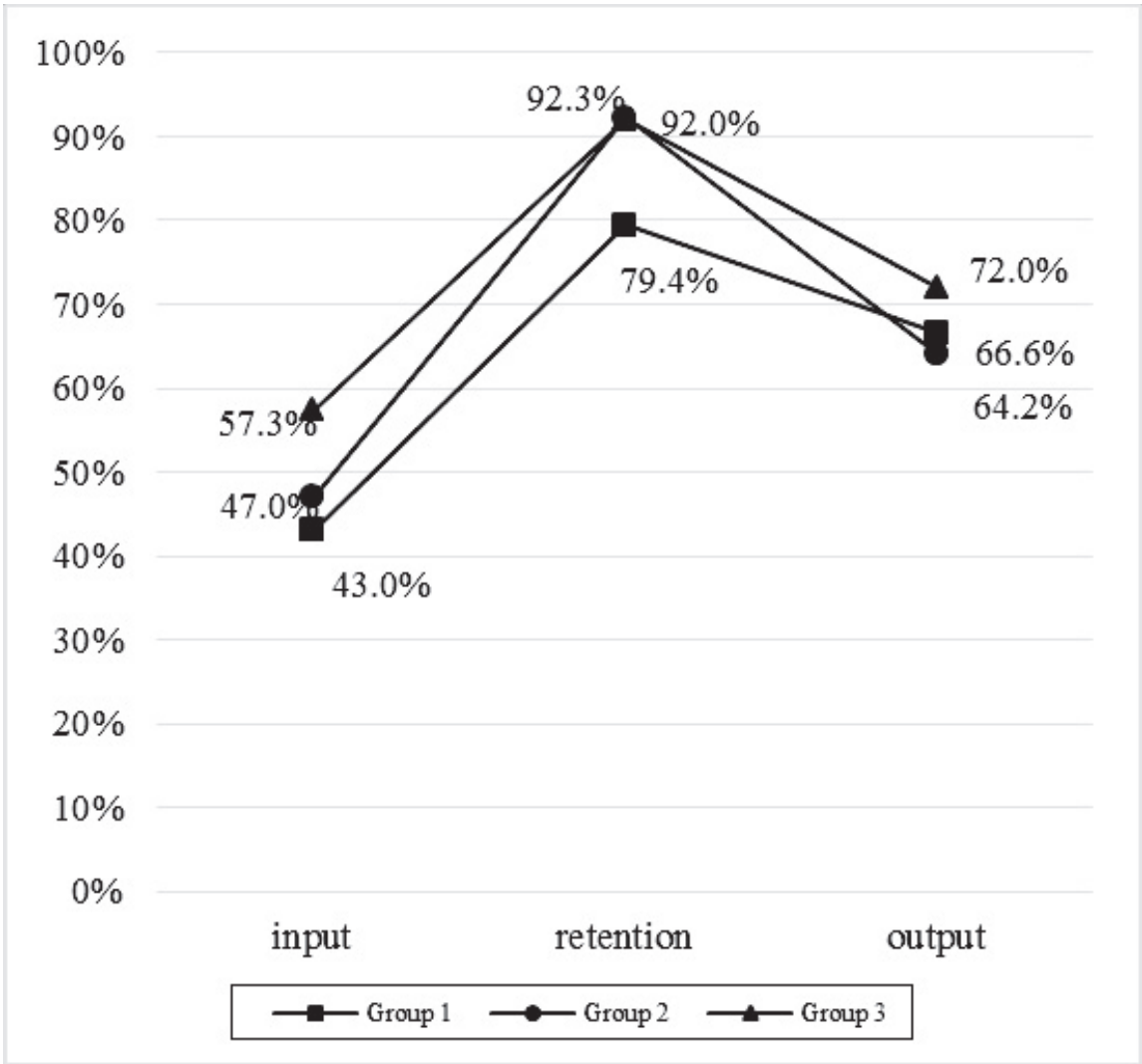

Figure 3. The Mean Acceptance Rates of *remember*.

to be significant [$F(2, 510) = 380.941$, $p < 0.001$]. The interaction effect between level and phase did not reach significance [$F(4, 510) = 0.812$, $p = 0.518$], indicating that there was no significant differences in the extent to which each group accepted each verb.

4 Discussion

The first research question of the present study addressed the extent to which Japanese learners of English can recognize appropriate use of memory verbs in relation to the three cognitive phases of memory. It was found that learners were

Table 6. ANOVA: Tests of Between-subjects Effects (*remember*)

Source	Sum of squares	df	Mean squares	*F* value	Sig.	η^2
Level	5355.757	2	2677.879	2.786	0.063	0.008
Phase	73178.320	2	36589.160	38.068	0.000	0.113
Level*Phase	4902.439	4	1225.610	1275	0.279	0.008

Table 7. Descriptive Statistics of the Acceptability Judgment Test Scores (*recall*)

	Input		Retention		Output	
	Mean (%)	SD	Mean (%)	SD	Mean (%)	SD
Group 1 (n = 67)	10.75	19.80	26.27	23.67	85.97	22.02
Group 2 (n = 91)	3.52	10.58	24.62	27.18	86.59	23.30
Group 3 (n = 15)	4.00	8.28	20.00	22.68	86.67	16.33
Total (n = 173)	6.36	15.06	24.86	25.42	86.36	22.18

able to use *memorize* and *recall* in the input and the output phases, respectively, with high accuracy since the use of each verb is restricted to single phases. On the contrary, *remember* turned out to be the most problematic of the three verbs since it can be used across the three phases. It was also revealed that while learners were able to accurately accept *remember* in the retention phase, they tended to under-generalize it in the input and the output phases. In addition, learners showed a tendency to over-generalize *memorize* and *recall* in the retention phase.

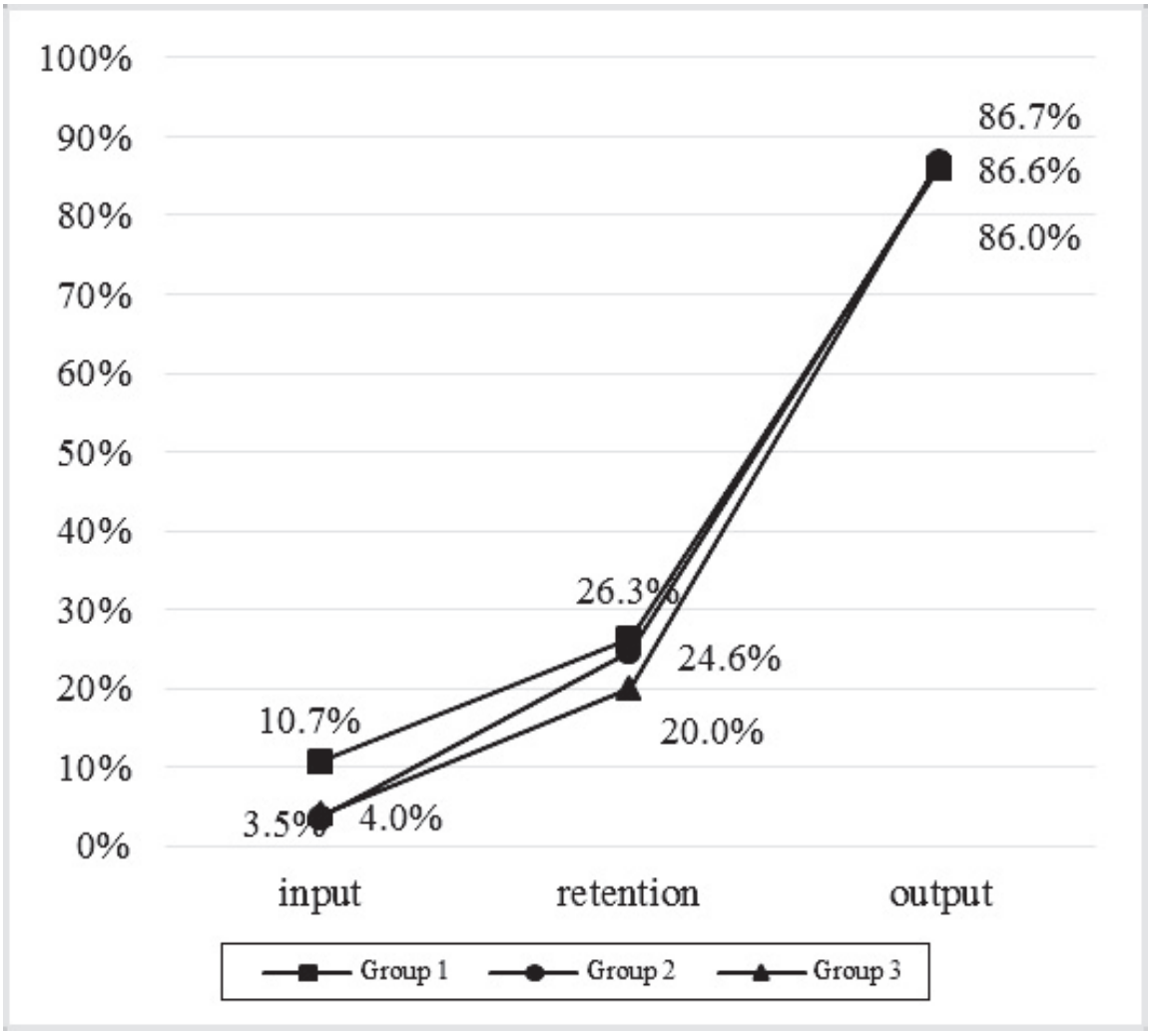

Figure 4. The Mean Acceptance Rates of *recall.*

Table 8. ANOVA: Tests of between-Subjects Effects (*recall*)

Source	Sum of squares	df	Mean squares	*F* value	Sig.	η^2
Level	1138.632	2	569.316	1.251	0.287	0.001
Phase	346754.204	2	173377.102	380.941	0.000	0.412
Level*Phase	1478.972	4	369.743	0.812	0.518	0.002

One of the possible reasons for the above findings could be the number of available L1 translation-equivalents. As discussed earlier, learners approach L2 lexicon with a well-developed conceptual and semantic structure in their L1. This naturally leads them to rely on the STE strategy. In the case of the memory verbs, *memorize* and *recall* can straightforwardly be equated with a single translation-equivalent as in "*memorize* = *oboeru*" and "*recall* = *omoidasu*." On the contrary, the meaning of *remember* cannot be fully represented by a single translation-equivalent since it requires distinct L1 verbs for each phase as in "*remember* = {*oboeru*, *oboeteiru*, *omoidasu*}." Since *remember* was accepted across the three phases, it can be assumed that these L1 translation-equivalents all existed in the learners' mental lexicon. Given this fact, we need to turn our attention to the relative strengths of association between *remember* and each L1 translation-equivalent since they can vary depending on the nature of input learners have encountered in the course of learning. For the participants in this study, *remember* was understood in the following order: *remember* = {*oboeteiru* [retention] > *omoidasu* [output] > *oboeru* [input]}, indicating that it was more firmly associated with the retention phase than the other two phases. In support of this finding, the meaning of *remember* was consulted in five major English-Japanese dictionaries,[1] which together with textbooks are one of the primary sources from which learners understand its meaning. It was found that all of them listed *oboeteiru*, which is used for the retention phase, as the first sense of the verb *remember*, followed by *omoidasu*, used for the output phase. Interestingly, none of the five dictionaries had a separate entry for the input phase, putting it together under the retention phase. As learners tend to focus on the first entry in the dictionary (Prichard, 2008), it can be assumed that their understanding of *remember* could have been biased toward the retention phase rather than the remaining two phases.

Given the fact that each translation-equivalent is associated with *remember* with varying degrees of strength, the question of what leads to such differences now arises. One of the possible factors could be the inter-lexical relationship among the three verbs. Since *memorize* and *recall* can only be used in the input and the output phases, respectively, *remember* could have been taken as the one to be most strongly associated with the retention phase, following the principle of division of labor. It is therefore conceivable that learners had formulated the following schema for the use of the memory verbs: {input: *memorize*, retention: *remember*, output: *recall*}. As each verb is associated with a single phase, it imposes less burden on learners. The mental representation of the memory verb network by Japanese learners in the present study can be schematically represented as in Figure 5 below.

The second research question of the present study was concerned with the relationship between learners' use of the memory verbs and their level of English proficiency. The overall results showed that the higher the level of proficiency, the

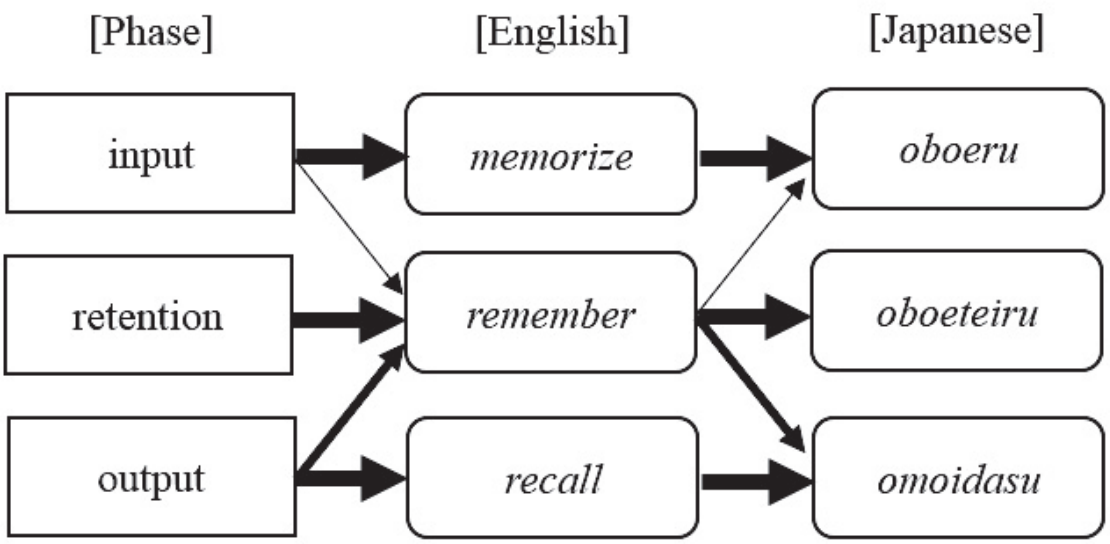

Figure 5. Mental Representations of the Memory Verb Network by Japanese Learners in the Present Study. The thicker the lines, the stronger the relationship between each element.

better learners can recognize appropriate use of each verb. It was also revealed that compared to Group 2 and 3, Group 1 tended to over-generalize *memorize* in the retention phase and under-generalize *remember* in the retention phase, indicating that they had not yet achieved accurate understanding of which verb is responsible for which phase. In addition, in the case of *remember*, it is worth noting that even those learners who had prior experience living in English-speaking countries for a certain period of time under-generalized *remember* in the input and the output phases, 57.3% and 72.0% respectively, despite being exposed to a large amount of language input. This implies that incidental learning alone may not be sufficient for obtaining accurate knowledge of the use of the memory verbs but instead be supplemented by more explicit, systematic learning.

As a pedagogical implication, in teaching memory verbs, it would be beneficial for learners to be presented with them in a cross-linguistic network and be shown how each verb is used in relation to the three phases of memory rather than being presented with them in an isolated manner. Due attention has to be paid to *remember* since it covers multiple phases, and learners should be encouraged not to understand its meaning from a single translation-equivalent. The format used in the acceptability judgment test in the present study can be an effective form of awareness-raising exercise through which learners can systematically understand which verbs are used in each situation. This way of instruction can be effective not only for learners at the basic level but also for those who are at the intermediate level or above. Needless to say, learners should also be exposed to an ample amount of usage in parallel with the above explicit, systematic instruction.

5 Conclusions

The present study investigated the acquisition of English memory verbs by Japanese learners within the framework of a lexical network. It was revealed that compared to *memorize* and *recall*, learners had difficulty realizing the meaning

potential of *remember*. More specifically, they were able to use it accurately in the retention phase but tended to under-generalize it in the input and output phases regardless of their level of English proficiency. The present study also argued that (1) the number of available L1 translation-equivalents, (2) the relative strengths between each verb and its L1 translation-equivalent, and (3) the inter-lexical relationship among the verbs in a given conceptual domain can affect the relative difficulty of acquiring English memory verbs.

As has been seen, utilizing the concept of a lexical network is of theoretical and practical importance. From a theoretical point of view, the lexical network approach enables researchers to look into the nature of the acquisition of L2 basic words in a more detailed manner than dealing with single words. For teachers, lexical networks can be a useful tool for presenting the words to learners more systematically, leading to a better understanding of how a given conceptual domain is organized in L2.

Note

1. The dictionaries consulted were *The New Century English-Japanese Dictionary*, Second Edition (Sanseido, 1991), *GENIUS English-Japanese Dictionary*, Fourth Edition (Taishukan, 2006), *The WISDOM English-Japanese Dictionary*, Third Edition (Sanseido, 2013), *O-LEX English-Japanese Dictionary*, Second Edition (Obunsha, 2013), and *PROGRESSIVE English-Japanese Dictionary*, Fifth Edition (Shogakukan, 2012).

References

Atkinson, R., & Shiffrin, R. (1971). The control processes of short-term memory. *Scientific American*, *224*, 82–90. doi:10.1038/scientificamerican0871-82.

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. doi:10.1016/S0022-5371(72)80001-X

Crossley, S., Salsbury, T., & McNamara, D. (2010). The development of polysemy and frequency use in English second language speakers. *Language Learning*, *60*(3), 573–605. doi:10.1111/j.1467-9922.2010.00568.x

Gisborne, N. (2010). *The event structure of perception verbs*. Oxford: Oxford University Press.

Haastrup, K., & Henriksen, B. (2000). Vocabulary acquisition: Acquiring depth of knowledge through network building. *International Journal of Applied Linguistics*, *10*(2), 221–240. doi:10.1111/j.1473-4192.2000.tb00149.x

Hatch, E. (1974). Are there second language learning – Universals? *Working Papers on Bilingualism*, *3*(1), 303–317.

Henriksen, B. (1999). Three dimensions of vocabulary development. *Studies in Second Language Acquisition*, *21*(2), 303–317. doi:10.1017/S027226319 9002089

Hiki, K. (1995). *An exploratory study into second language learner knowledge of semantically similar lexical items: The case of verbs of perception* (Doctoral dissertation), Indiana University.

Ijaz, I. H. (1986). Linguistic and cognitive determinants of lexical acquisition in a second language. *Language Learning*, *36*(4), 401–451. doi:10.1111/j.1467-1770.1986.tb01034.x

Kellerman, E. (1978). Giving learners a break: Native language intuitions as a source of predictions about transferability. *Working Papers on Bilingualism*, *15*, 59–92.

Kellerman, E. (1979). Transfer and non-transfer: Where we are now. *Studies in Second Language Acquisition*, *2*(1), 37–59. doi:10.1017/S0272263100000942

Lakoff, G. (1987). *Women, fire, and a dangerous thing: What categories reveal about the mind*. Chicago, IL: Chicago University Press.

Langacker, R. W. (1987). *Foundations of cognitive grammar, Vol. I, Theoretical prerequisites*. Stanford: Stanford University Press.

Lehrer, A. (1974). *Semantic fields and lexical structure*. Amsterdam: Norton.

Meara, P. (2002). The rediscovery of vocabulary. *Second Language Research*, *18*(4), 393–407. doi:10.1191/0267658302sr211xx

Meara, P. (2009). *Connected words: Word associations and second language lexical acquisition*. Amsterdam: John Benjamin.

Miller, G., & Johnson-Laird, P. (1976). *Language and perception*. Cambridge, MA: Harvard University Press.

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

Norvig, P., & Lakoff, G. (1987). Taking: A study in lexical network theory. In J. Aske, N. Beery, L. Michaelis, & H. Filip (Eds.), *Proceedings of the 13th Berkeley Linguistics Society Annual Meeting* (pp. 195–206). Berkeley, CA: BLS.

Prichard, C. (2008). Evaluating L2 readers' vocabulary strategies and dictionary use. *Reading in a Foreign Language*, *20*(2), 216–231.

Ringbom, H. (1987). *The role of first language in the second language learning*. Clevedon: Multilingual Matters.

Sato, M., & Tanaka, S. (2015). L2 lexical development and the lexical network model: The case of basic verbs of perception. *International Journal of Applied Linguistics*. doi:10.1111/ijal.12108

Sato, Y., & Batty, A. (2012). A study of learners' intuitions behind the use of utterance verbs in English. *Vocabulary Learning and Instruction*, *1*(1), 29–36. doi:10.7820/vli.v01.1.sato.batty

Schmitt, N. (1998). Tracking the incremental acquisition of a second language vocabulary: A longitudinal study. *Language Learning*, *48*(2), 281–317. doi:10.1111/1467-9922.00042

Schmitt, N. (2000). *Vocabulary in language teaching*. New York: Cambridge.

Shirai, Y. (1990). Putting PUT to use: Prototype and metaphorical extension. *Issues in Applied Linguistics*, *1*(1), 78–97. Retrieved from: http://escholarship.org/uc/item/0df4z0hr.

Takahashi, T. (1985). *A study on lexico-semantic transfer* (Doctoral dissertation), Columbia University.

Tanaka, S. (1983). *Language transfer as a constraint on lexico-semantic development in adults learning English in an acquisition-poor environment* (Doctoral dissertation), Columbia University.

Tanaka, S. (1987). The selective use of specific exemplars in second-language performance: The case of dative alternation. *Language Learning*, *37*(1), 63–88. doi:10.1111/j.1467-1770.1968.tb01312.x

Tanaka, S. (2012). New directions in L2 lexical development. *Vocabulary Learning and Instruction*, *1*(1), 1–9. doi:10.7820/vli.v01.1.tanaka

Tanaka, S., & Abe, H. (1985). Conditions on interlingual semantic transfer. In P. Larson, E. Judd & D. Messerschmitt (Eds.), *On TESOL'84: A brave new world for TESOL* (pp. 101–120). Washington, DC: TESOL.

Terasawa, S. (2008). Focusing on verbs of perception. *ARCLE Review*, *2*(1), 80–96.

Verspoor, M., & Lowie, W. (2003). Making sense of polysemous words. *Studies in Second Language Acquisition*, *30*(1), 79–95. doi:10.1111/1467-9922.00234

Wolter, B. (2006). Lexical network structures and L2 vocabulary acquisition: The role of L1 lexical/conceptual knowledge. *Applied Linguistics*, *27*(4), 741–47. doi:10.1093/applin/aml036

Appendix

15 Sentences in the Lexical Network Test of Memory Verbs

(1) Input

I'm trying to [] the names of all AKB48 members.

The researcher asked a group of students to [] seven random numbers.

We had to [] the parts of the brain in our biology class.

I can't [] so many lines in such a short time.

I have to [] twenty new words by tomorrow.

(2) Retention

I will [] this day throughout my life.

I will always [] your kindness.

I'm not sure whether I can [] this information until next week.

[] your promise.

Even though we are far apart, please [] me.

(3) Output

I'm trying to [] the time when we first met.

I can clearly [] the moment when the accident happened.

I can't [] his phone number.

He has the ability to [] past events.

I can't [] the face of my homeroom teacher.