An Analysis on How Derivation Inferences Instruction Affects Acquisition of Polysemous Senses of Words of Japanese Learners of English

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Abstract

This study aims to investigate whether or not derivation inference instruction is effective for Japanese learners of English in acquiring polysemous senses of adjectives and verbs.

In Experiment 1, 58 Japanese participants were presented with two English sentences per one verb or adjective; one of which was a basic and familiar expression of the verb or adjective, and the other was a sentence with unfamiliar usage of the verb or adjective. The participants were assigned randomly to one of the three learning conditions, viz., the derivation inference condition, the image generation condition, or the frequency judgment condition, before they were instructed to recall the unfamiliar usages. The result of the recall test showed no significant differences among the three groups. In Experiment 2, 118 Japanese participants were divided into four groups; three of which were assigned to the same conditions each as the Experiment 1, and the fourth one was the control group, which was not given any materials. The result of the analogical inference test indicated that there were significant differences between the groups with three conditions and the control group. Possibilities for utilizing the results from this study in a program for vocabulary acquisition are discussed.

Keywords

polysemy, analogical inference, semantic network

Introduction

Aotani's previous research (Aotani 2003, 2004, 2008) revealed the fact that the metaphorical expansion of word senses in students' TL mental lexicon did not occur properly, even if they continued studying English through university level. In most Japanese classroom environments, after a new word is introduced with its Japanese translation, further learning to acquire polysemous senses of the word is left up to each student. Unless they happen to read or hear the word again in a different sense, the chances of expanding vocabulary knowledge are nil. Learners think they know the word, however, they do not notice that there are other senses. In production, the ranges they can express are then very narrow.

Kurosawa's experiments (1999) showed interesting implications where one participant group which had been instructed to infer whether two meanings (familiar and unfamiliar Japanese equivalents) of an English noun were derived from one etiological root showed the best ability in identifying unfamiliar Japanese equivalents among others as compared to participant groups that were given other instructions.

The present study investigates whether or not a derivation instruction such as that used in Kurosawa's study can also be effective in acquiring unfamiliar polysemous senses of adjectives and verbs, and if it also affects learners' strategy in analogical inference when participants encounter unfamiliar expressions of words.

1   Experiment 1

1.1   Method

1.1.1   Participants

Participants were 58 Japanese university students. Ages ranged from 18 to 19 years old. They were not English majors, and they were enrolled in compulsory English classes. English proficiency level of the subjects was between 100 and 120 points on the TOEIC Bridge Test.

1.1.2   Procedure

The surveys were administered to students in

regular English classes during class hours. The participants were given two English sentences per one verb or adjective; one of which was a basic and familiar expression of the verb or adjective, and the other was a sentence with unfamiliar usage of the verb or adjective (see Appendix A for some examples). The participants were assigned randomly to a derivation inference condition (DI Group), image generation condition (IG Group), or frequency judgment condition (FJ Group). The participants in the DI Group were instructed to consider derivative relationship between two verbs or adjectives in each pair of sentences, and make judgments as to whether they can recognize such relationship. Responses were scored on a six-point scale from 1 (*not recognizable*) to 6 (*very much recognizable*). The participants in the IG Group were instructed to judge which expression of the verb or adjective was easier to generate a concrete image. Responses were scored on a six-point scale from 1 (*first verb/adjective is much more imaginable*) to 6 (*second verb/adjective is much more imaginable*). The participants in the FJ Group were instructed to judge which expression of the verb or adjective was used more frequently. Responses were scored on a six-point scale from 1 (*first verb/adjective is much more frequently used*) to 6 (*second verb/adjective is much more frequently used*). Thirteen verbs and 11 adjectives (see Appendix B for the list of the verbs and adjectives) were examined.

A week later, all participants were given a recall test in the cloze test format, which contained the same unfamiliar sentences of the 13 verbs and 11 adjectives as used in the previous week. The test was a multiple-choice, and the participants were instructed to choose the best verb or adjective from 4 choices.

1.2   Results and Discussion

A one-way ANOVA was administered for the result of the cloze test. The result showed that there were no significant differences between the mean scores of the three groups ($F(2, 54)=0.56$, *n.s.*). Table 1 shows the descriptive statistics of the recall test of three groups.

Table 1: Descriptive Statistics of Recall Test

	n	M	SD
DI	21	0.29	0.12
IG	18	0.28	0.10
FJ	19	0.29	0.09

Note: Unit: Propotion

The reasons why participants in the DI Group did not show significantly better abilities in the recall test like Kurosawa's experiments (1999) have

to be analyzed from every possible aspect. As for the design of the experiment, the recall test of this study was administered at a week interval, while Kurosawa conducted it on the same day after a 2-minute interfering activity. The design of the recall test of this study was a cloze test that made the participants choose an English word, while the participants in Kurosawa's study were made to recall Japanese words. Regarding the materials, the participants of this study were given sentences, which means they had to understand the meanings of the target word with the context; while the participants in Kurosawa's study were given only target word with no context. Also, we focused on the polysemous senses of verbs and adjectives, while Kurosawa focused on those of nouns.

It would be overhasty to conclude derivation inference instruction was ineffective. In order to clarify if it is truly ineffective in acquisition of polysemous senses of adjectives and verbs should be carefully examined with more detailed conditions, and the effectiveness should be observed for a longer period of time.

2   Experiment 2

2.1   Method

2.1.1   Participants

Participants were 118 Japanese university students[1]. Ages ranged from 18 to 19 years old. They were not English majors, and they were enrolled in compulsory English classes. English proficiency level of the subjects was between 100 and 120 points on the TOEIC Bridge Test.

2.1.2   Procedure

The surveys were administered to students in regular English classes during class hours. The participants were assigned randomly to the DI Group, the IG Group, the FJ Group, or the control condition group. The first three groups were given the same materials as Experiment 1, and given the same instruction accordingly. The control group was given no materials in the first week.

A week later, all of the participants were given 24 English sentences each of which contained the same 13 verbs and 11 adjectives with their Japanese translations, and were instructed to make analogical judgments as to whether those verbs or adjectives could be used as the translations of given Japanese expressions. Sentences used in this test were different from the ones given in the previous week, and verb or adjective usages in all sentences were acceptable as English expressions (see Appendix C for some examples). There were two types of

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[1] Different participants from the Experiment 1.

expressions [2]; the congruent type expressions (L1=TL)[3] and the convergent type expressions (L1$\neq$TL)[4]. Responses were scored on a four-point scale from 1 (*cannot be used*) to 4 (*can be used*).

2.2   Results and Discussion

A two (four conditions) x two (types of expressions) ANOVA with repeated measures uncovered significant main effects of types of expressions (F(1,106)=12.61, *p*<.001). The interaction between conditions and types of expressions was non-significant. The result of the *t*-test between the mean scores of the three condition groups and the control group indicated significant differences (*t*(44.1)=2.37, *p*<.05) for the convergent expressions. Table 2 shows the descriptive statistics of the analogical inference test of four groups. Figure 1 shows the means of acceptability scores according to two types of expressions, congruent or convergent, of four groups.

Table 2: Descriptive Statistics of Analogical Inference Test

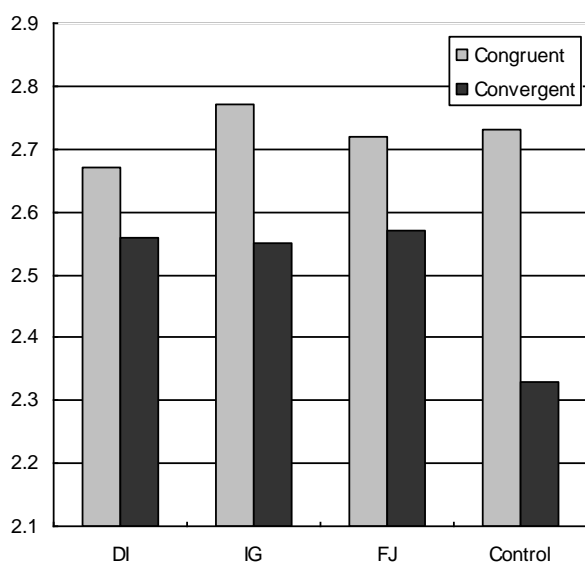|	*n*	*M*	*SD*
DI	25	2.62	0.27
IG	25	2.66	0.23
FJ	24	2.65	0.27
Control	37	2.52	0.34

Figure 1: Means of Congruent/Convergent Scores

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[2] Definition of the terms, *congruent* and *convergent*, refers to Takahashi (1984).
[3] Which means that Japanese translation of the verb or adjective is congruent with what they had been taught as the Japanese equivalent word of the verb or adjective.
[4] Which means that Japanese translation of the verb or adjective is convergent with what they had been taught as the Japanese equivalent word of the verb or adjective.

The results showed the pattern of participants' analogical inference judgment was different from the types of expression, that is, acceptability rates were higher for congruent expressions than convergent ones. This finding is fully predictable and not surprising at all, however, together with another finding obtained from the differences between the three preliminary condition groups and the control group, these results were very interesting and significant. Participants did the three types of preliminary activities showed significantly higher analogical acceptability rates regarding convergent expressions, which implies that preliminary activities encouraged learners to have a bolder and more positive view toward the expansion of word senses, which is a very important point regarding the development of students' learning strategies on acquisition of polysemous senses of words. We discuss this matter in the conclusion.

3   Conclusion

The learning situation in Japanese schools affords no spare time for this kind of activity, and as a result, the typical classroom Japanese learners of English have virtually no access to the metaphorical expansion of the TL words even after six years of study at junior and senior high school.

Materials for preliminary activities used in this study only contained two sentences for each of the 13 verbs and 11 adjectives, and the working time was only ten to fifteen minutes. The results suggests that even such small and short activities could give learners the chance to become psychologically involved in the domain of meanings more deeply, and which might have affected their analogical judgment of word senses.

Aotani et al. (2010) investigated how Japanese learners of English perceive the world of meanings that are different from what they thought was the meaning of the word (L1$\neq$TL expressions) by taking the case of polysemous verb *run*. The result implied that learners could have abilities to perceive some similarity link between the senses if appropriate instruction was given.

It might be difficult to spare classroom time in teaching the various expressions each word has, however, what should be taught is not each expressions of a word, but the way of thinking and attitude about the world of meanings. The important point is to investigate what activities and guidance are the most effective for learners to develop their own strategies on detecting the meaning of unknown usage of words, and the aim of this study was to investigate if derivation inferences instruction is the most effective way to achieve that.

It, however, was not an easy problem to solve. In order to expand the network of meanings, learners first need to improve their metaphorical thinking abilities (Littlemore, 2006), and abstract the core meaning or the schema of the TL words (Caramazza & Grober, 1976). This involves a very complicated human psychological process. In order to discover the most effective way to activate learners' metaphorical abilities, further study should be made.

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Appendix A. Examples of Sentences Used for the Three Condition Groups

<run>
1) A dog <u>ran</u> into the room.
2) The river <u>runs</u> into the sea.

<hit>
1) He <u>hit</u> the ball with a racket.
2) A good idea suddenly <u>hit</u> him.

<heavy>
1) This bag is very <u>heavy</u>.
2) Today's traffic is very <u>heavy</u>.

<sweet>
1) I was in a <u>sweet</u> mood.
2) The cake is too <u>sweet</u> for me.

Appendix B. List of Verbs and Adjectives

<verb>
break, carry, catch, cut, drive, hit, keep, lend, pull, run, set, turn, watch

<adjective>
bright, deep, fat, heavy, high, loud, sharp, strong, sweet, thick, wide

Appendix C. Examples of Analogical Inference Test

<congruent expressions>
She <u>ran</u> her eyes down the letter.
I feel <u>heavy</u> responsibility on the project.

<convergent expressions>
The tsunami <u>hit</u> the south coast.
She has a <u>sweet</u> personality.