

## Image Schema-Based Instruction in English Grammar

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Cognitive linguistics has been aimed at revealing the very nature of language for the last several decades. One of the field's most significant contributions has been the abstraction of the general patterns, or image schemas, underlying grammatical concepts. In this paper, we propose that English grammar-teaching methods adopting image schema theory offer strong benefits for language teaching. As schematic explanations given to learners are more visible and comprehensible than ordinary verbal-based ones, this method offers a clearer and more engaging way to understand the target grammar. We also present data collected from experiments conducted with more than 400 native Japanese-speaking students at one national and one private university that support the effectiveness of this method.

認知言語学は産声をあげてここ数十年の間、人間の言語の真の姿を明らかにすることに専心してきた。この学問分野がつまびらかにしてきた数々の言語現象のうち、最も有益な成果のひとつにイメージ図式理論の構築があげられる。イメージ図式とは文法および語彙構造のひな形となるものである。本論文は認知言語学のイメージ図式理論を応用した英文法教材の学習効果を一国立大学と一私立大学に学ぶ400人以上の日本人学部生を対象に行った実験結果をもとに実証的な知見から論じている。

Grammar learning is often seen as the least interesting part of language learning. Learners and educators alike may seek alternative or relatively “burden-free” methods to approach grammar. The purpose of this study was to investigate the learning effects of a visual grammar-teaching method based on image schema theory, which has been advanced in cognitive linguistics. In this paper, we begin with an overview of the theoretical framework, followed by a discussion of the applicability of cognitive linguistics to the subject of grammar teaching. We then discuss an experiment that was conducted in 2015 with 424 1st- and 2nd-year Japanese undergraduate students to measure the learning effects of image schema-based explanations of English grammar. The participants were randomly divided into two groups and studied the same three grammar items but with different explanations: one group with image schema-based explanations and the other with conventional verbal-based explanations. Finally, we discuss the experimental results obtained from a pretreatment test and a posttreatment test given to the participants.

### Image Schemas as Abstract Conceptual Patterns Cognitive Linguistics and Its Approach to Language

Researchers in cognitive linguistics claim that not only a specific part of the brain, but rather the whole human cognitive system, influences the structure of language. Practitioners of cognitive linguistics thus try to construct a model of the human language system by looking at language and its connections with human sensory and perceptual experience in the world. These researchers (Johnson, 1987, 2005; Lakoff & Johnson, 1999; Langacker, 2008) have considered the model to be a collection of patterns that provide a rich basis for every language. These abstract patterns, called *image schemas*, are mental representations merged with everyday sensory and perceptual experiences of physical objects.

### Image Schemas: The Case of the Preposition *In*

Humans possess physical bodies and thus have interactive experiences with external physical objects through the mediation of the sensory-perceptual system. Image schemas are patterns that arise from these interactions with physical objects (Evans, 2007, pp. 106-107), which are then generalized to describe nonphysical relationships.

Let us examine the following examples. When we have direct or indirect interactive experiences with objects, such as having a cat in the house, putting some apples in a basket, and arriving in a town, the interactions are all somewhat similar: we have something in or are putting something into something else. With repeated instances of sensory-perceptual experience with containers, we develop an abstract pattern, an *inclusive relationship*, as shown in Figure 1.

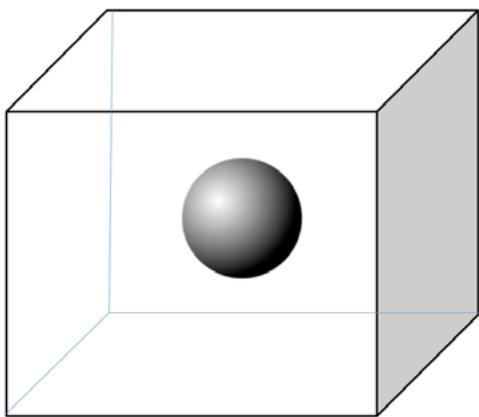


Figure 1. Image schema of an inclusive relationship.

Image schemas provide the basis for the meanings of lexical and grammatical concepts in a language (Johnson, 1987). The inclusive relationship schema in Figure 1 therefore provides the basis for the meaning of the preposition *in*:

- a. My cat is *in* the house.
- b. Put these apples *in* the basket.
- c. They are *in* love.
- d. Everyone was *in* a good mood.

When using these sentences, English speakers perceive an inclusive relationship between the things. Actually, *house* and *basket* are entities with an interior, boundary, and exterior, so that they can hold something inside of them. However, even where there is no boundary or exterior, as in examples *c* and *d*, this inclusive relationship seems to work, too. *Love* and *mood* can also contain things, even though they are intangible, abstract concepts. Most importantly, we subconsciously perceive an inclusive relationship even with such nontangible objects. It seems that we impose an *in-out* orientation even on nonphysical objects. In the case of examples *c* and *d*, we conceive of *love* and *mood* as substantial entities and see them as containers having an *in-out* orientation. What is metaphorically mapped between the tangible and nontangible domain is the image schema of an inclusive relationship as seen in Figure 1.

As illustrated in Figure 2, the image schema can be metaphorically mapped from the tangible *in* onto abstract concepts to provide the basis for abstract thoughts, namely, the nontangible *in*.

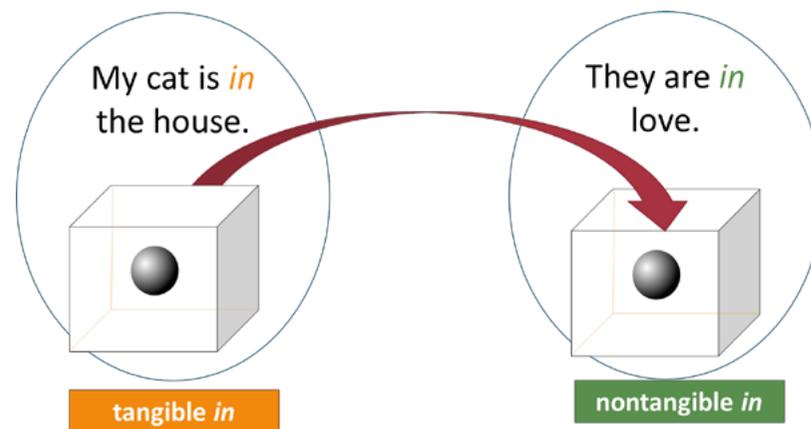


Figure 2. Image schema of the inclusive relationship carried over from *tangible in* onto *nontangible in*.

Considering this, it is clear that the image schema serves as the central meaning of *in*. Figure 3 shows the model of the meaning extension of the preposition *in* in which the inclusive relationship schema serves as a basis for every usage of *in*.

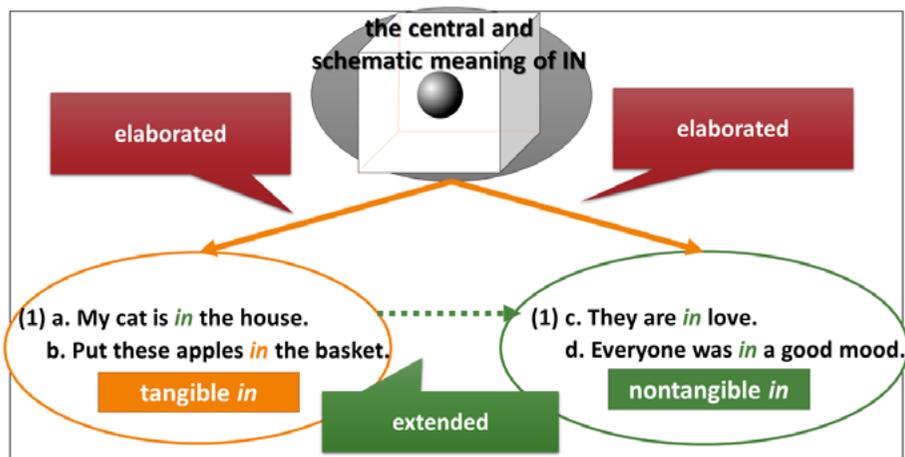


Figure 3. The central meaning of *in* and its elaborated examples.

The diagram in Figure 3 is one of the models proposed in cognitive linguistics to generally account for the phenomenon of meaning extension. For native English speakers, there is no difficulty in understanding that *good mood* and *love* can contain people as a house can contain a cat, but this is not the case for native Japanese-speaking students. Even though image schemas represent primordial and primitive kinesthetic patterns, not all are shared across languages. Image schemas are mental representations that are created, stored, and utilized within each language community.

In 2014, we administered a test to 111 Japanese-speaking 1st- and 2nd-year undergraduate students. We asked them to choose the correct preposition out of five (*in*, *on*, *at*, *off*, and *out of*) to complete sentences (see Appendix A). The questions were composed of two parts: choosing the correct prepositions to describe the relationship between tangible objects (e.g., “She was standing [ ] the snow”), and choosing the correct prepositions to describe the relationship between nontangible objects (e.g., “British agriculture is [ ] crisis”). The graph in Figure 4 indicates the proportion of errors with the preposition *in*. This shows that they understood the usage of the *tangible in* better than the *nontangible in*.

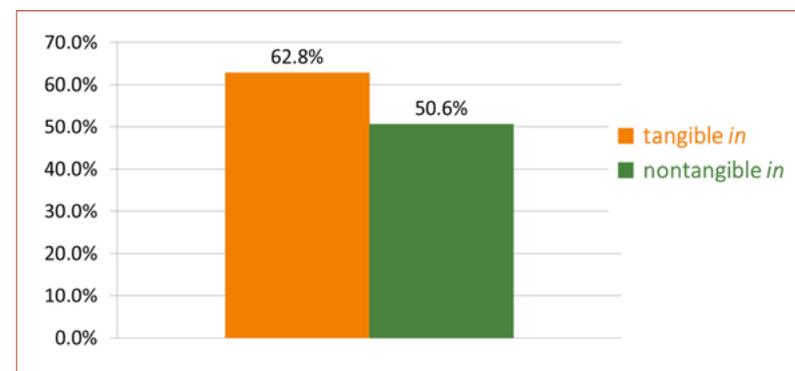


Figure 4. Correct answer rates of *in* on the test by Japanese university students.  $N = 111$ .

The results in Figure 4 point out that some participants had not acquired the central or schematic meaning of *in* and its extensional use, the nontangible *in*. Given the data, the fact that the students did not know that the image schema can be carried over metaphorically to the abstract concepts, or that they did not acquire the image schema itself, directly caused errors.

### *The Shortcomings of Conventional Grammar Textbooks and the Advantages of the Image Schema-Based Method*

The way prepositions are presented in conventional grammar textbooks suggests that students are not provided with ways of generalizing patterns. These textbooks do not generalize the patterns underlying all the usages of a preposition, and problems arise from a lack of integrated descriptions for every preposition. For example, the widely used grammar textbook written by Egawa (1991) demonstrates 12 meanings of the preposition *in* with verbal explanations (pp. 415-418). This suggests that learners are not supported in making generalizations of all of the various meanings of the preposition by themselves. On the other hand, as image schemas are schematized and integrated meanings of the lexical and grammatical concepts of a language, they may be a way for students to grasp the whole map of grammar items in a cohesive manner. Several studies have been made by other researchers to support the idea of using image schemas in grammar teaching. Kurtyka (2001) is perhaps one of the earliest studies that emphasized the significant role of image schemas in ESL. Even though he did not conduct any experiments, he was the first to stress, from a linguistic point of view, that visualization is

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an indispensable part of learning and that visual representations of meaning can provide a chance for learners to gain a better understanding of the semantics of prepositions and phrasal verbs. Taniguchi's (2011) investigation revealed the efficacy of showing image schemas in teaching the preposition *up*. After he showed the image schemas (including some variants) of *up* to his native Japanese-speaking students, they were able to correctly understand the meanings of unfamiliar idioms involving the word. Fujimori and Yoshimura (2013) also presented positive results in a similar experiment with Japanese-speaking students in which the experimental group who studied prepositions (*over* and *above*) with schematic visual animations received better scores on the posttest than the control group who studied the same prepositions with only the corresponding Japanese translations.

In 2014, we also conducted an experiment with the aforementioned 111 undergraduate students to measure the effectiveness of image schema-based explanations of five prepositions, *in*, *on*, *at*, *off*, and *out of*. The students were randomly divided into two groups. The experimental group studied the five prepositions with image schema-based explanations and the control group studied them with conventional verbal-based grammar textbooks, including Egawa's (1991) textbook. The experimental group ( $n = 52$ ) studied with image schema-based materials. The control group ( $n = 59$ ) studied with conventional materials. Figure 5 and 6 show the correct answer rates of the two groups on the pretreatment and posttreatment tests.

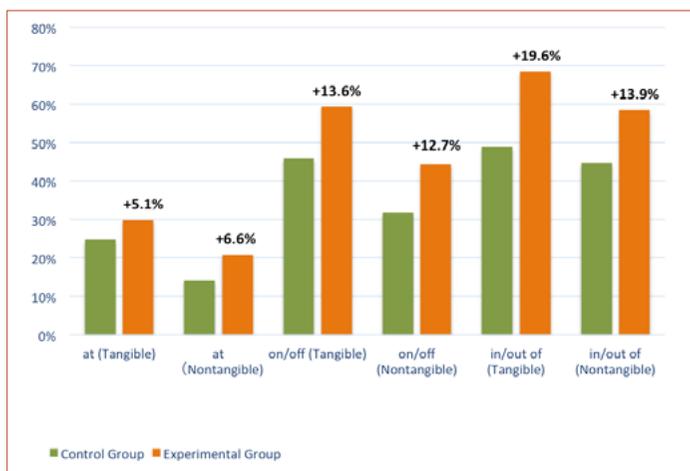


Figure 5. Correct answer rates on each set of prepositions on pretreatment test.  $N = 111$ ; “+” indicates the average percentage difference between the groups.

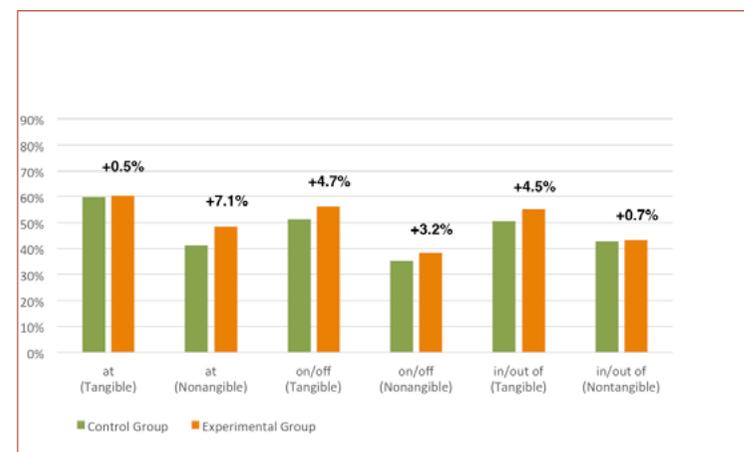


Figure 6. Correct answer rates on each set of prepositions in posttreatment test.  $N = 111$ .

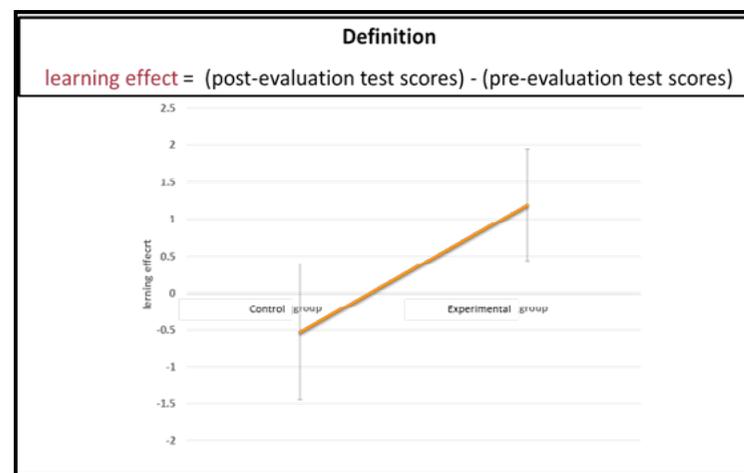


Figure 7. Significant difference in learning effect between the experimental group and the control group.

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We confirmed statistical significance between the experimental group and the control group ( $t(109) = -2.78, p < 0.01, d = 0.53$ ). Here, the greater the magnitude of  $t$  (either positively or negatively) and the smaller the  $p$  value (smaller than or equal to 0.05), the greater the evidence of a significant difference between the two groups. The  $d$  value measures the meaningfulness of such a difference (greater than or equal to 0.3 means a noticeable effect). We concluded that the experimental group acquired the meaning of the prepositions more effectively than the control group. These results indicate that the grammar teaching approach coupled with the image schema theory may have provided students with a more integrated and organized way of understanding grammar in their second language. However, this investigation was limited to the teaching of prepositions (including phrasal verbs). Thus, our research question here is whether or not image schema theory can be applied to other grammar items. To explore this, we conducted an experiment on other grammar items with more than 400 native Japanese-speaking students in 2015.

### Research Questions

Our research questions posed in this experiment were as follows:

- RQ1. Does image schema-based instruction work with other grammar items?
- RQ2. Is image schema-based instruction in English grammar more effective than conventional instruction?
- RQ3. Is image schema-based instruction more comprehensible to students than conventional instruction?

In order to obtain answers to these three questions, we designed an experiment as outlined below.

### Methodology

#### Participants

The experiment was conducted in 2015 with 424 1st- and 2nd-year undergraduate students from one national and one private university. We randomly divided the participants into two groups and found no significant differences between the two groups on the pretreatment test as shown in Figure 8. One group, consisting of 228 students, studied grammar with image schema-based materials (the IS group). The other group (the CV group), consisting of 196 students, studied the same grammar items with conventional materials. Figure 9 shows the demographics of the participants. Both the male vs. female and humanities vs. sciences ratios were well balanced.

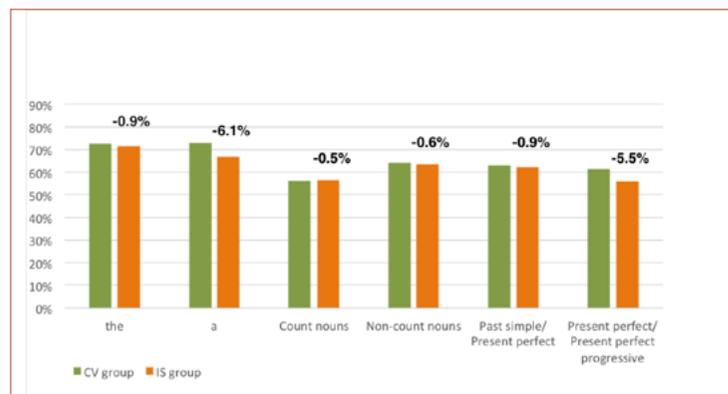


Figure 8. Correct answer rates on each grammar item on the pretreatment test.

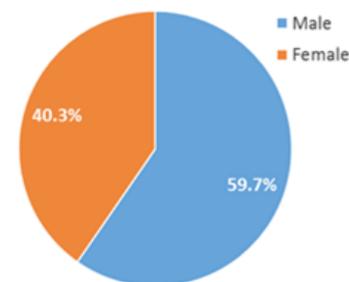


Figure 9. Participants by gender.  $N = 424$ .

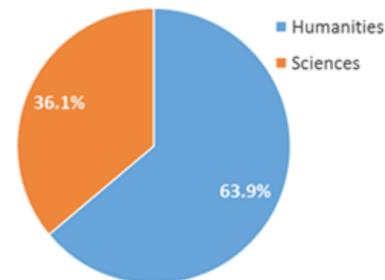


Figure 10. Participants by academic major.  $N = 424$ .

## Procedures

### Grammar Items

The explanations given to the participants were composed of three parts:

- 1: explanations on the difference between countable and noncountable nouns;
- 2: explanations on the difference between definite and indefinite articles; and
- 3: explanations on past tenses—the difference between past simple and present perfect and the difference between present perfect and present perfect progressive.

We selected these three grammar items because they are, in our experience, concepts with which Japanese-speaking students learning English generally feel uncomfortable. Indeed, the Japanese language does not differentiate between countable and noncountable nouns, or definite and indefinite information. The same is true of the past tense: many students do not understand the functional differences between past simple and present perfect or between present perfect and present perfect progressive.

### Study Time and Media Employed

Each of the participants studied on a PC or tablet via an e-learning system for their convenience (and due to a lack of space needed to assemble participants at one time). The study time for the two groups was the same: 15 minutes for each grammar item.

### Two Tests and Method of Analysis

Before and after the lessons, the participants took two different tests. The questions in the posttreatment test were different from those given on the pretreatment test (see Appendix A). Each test was composed of 33 questions about the selected grammar items. The questions were taken from several grammar and TOEIC textbooks. Finally, we used comparative *t*-test analysis to find the difference in learning effects between the two groups. We evaluated the learning effects by comparing the scores of the two groups in the posttreatment tests.

### Questionnaire

After the posttreatment test, the two groups were asked to answer two questions:

1. How easy was it to understand the method? (Each group was asked about the method they followed.)

2. Do you have any comments on the learning method?

To the first question, participants responded using a 5-point Likert scale, with 1 meaning *very comprehensible*, and 5 meaning *not at all comprehensible*. For the second question, we asked the participants to write any comments or impressions they had about the learning method they had used.

### Teaching Materials

The teaching materials used were as follows:

- The IS group studied three lessons about the selected grammar items with image schema-based explanations displayed in PowerPoint files.
- The CV group studied three lessons on the same items but with conventional verbal-based explanations in PDF files.

### Details of CV and IS Materials

#### CV Materials

For the CV group, we assembled materials from conventional grammar textbooks recommended for university-level English learners (see Appendix B). The main problem with the CV materials was the lack of comprehensive descriptions of each grammar item. For example, Sugiyama (1998, pp. 239-240) aims to demonstrate the difference between past simple and present perfect by comparing two sentences (*I have written a letter* and *I wrote a letter*) with Japanese translations. He also gives the following explanation: “the decisive difference of past simple from present perfect is that the former expresses a detached and irrelevant action and state from the present time, whereas present perfect connects the action to the present time” (author’s translation). In addition, the textbook seems to encourage learners to rely on the Japanese translation for each English example to get a better understanding of the functional differences between the past tenses.

#### IS Materials

In all IS lessons, we showed the participants the following three elements: the image schema of the targeted grammar item, several English examples as an instantiation of the image schema, and verbal explanations about the image schema. The IS materials utilized the animation system available on PowerPoint. All of the slides presented to the participants had moving image schemas as in Figure 11.

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**I lost my key but I found it in the fridge**

①

②

③

**I have lost my key**

①

②

③

Figure 11. Example of image schemas with animation.

Figure 12 displays a part of the lesson on countable and noncountable nouns. In the lesson, the participants viewed the image schemas of countable and noncountable nouns (the two circles with solid or dotted lines in the diagram) with appropriate sentences or phrases. A pair of clear pictures was also displayed one after another against the two-circle image schemas.

Image schema of countable nouns

Image schema of non-countable nouns

I ate **a** melon.  
There is **a** glass on the floor.

I ate **melon**.  
There is **glass** on the floor.

Figure 12. Image schemas of countable and noncountable nouns and their instantiations.

Figure 13 displays part of the lesson on the difference between the definite and indefinite articles *a* and *the*. The function of the indefinite article *a* is to indicate that the given entity represents one of many. Nevertheless, for many students the meanings of *a country* and *the country* seem to be identical. To explain this concept, we prepared a schematic image of *a*, as in Figure 13, where Japan is highlighted compared to the other countries. This helps the students see that there are other countries besides Japan surrounded by the sea.

Japan is **a** country surrounded by the sea.

Speaker

Image schema of "A"

Listener

Figure 13. Image schemas of indefinite article *a* and its elaborated example.

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Figure 14 describes the difference between past simple and present perfect with two image schemas. The participants saw the three past activities in past simple form described with dots that appeared one after another on the timeline. On the other hand, the two past activities in present perfect form carried over to the present. This dynamic explanation helped the participants see how the meanings of the two tenses are different.

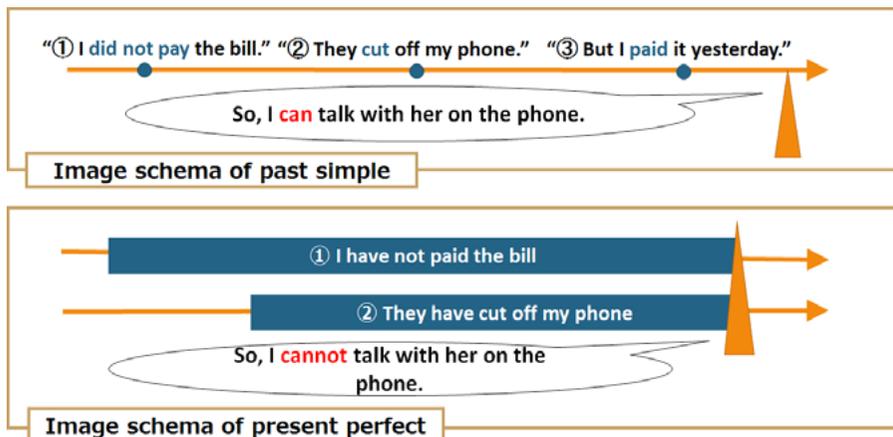


Figure 14. Image schemas of past simple and present perfect tenses.

The same idea was also employed to describe the difference between the present perfect and present perfect progressive tenses. In Figure 15, the activity in present perfect progressive carries over to the future, whereas the present perfect stops at the time of speech, so that the participants realize the difference between the tenses.

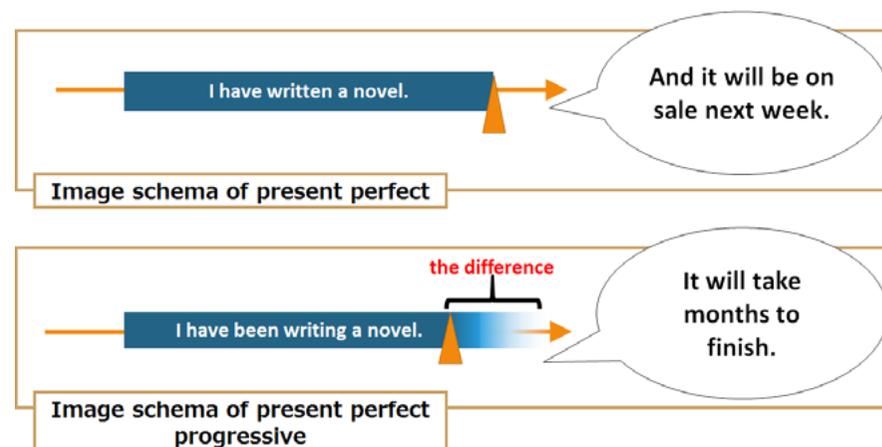


Figure 15. Image schemas of present perfect and present perfect progressive tenses.

## Results

### Correct Answer Rate for Each Grammar Item on the Posttreatment Test

Figure 16 illustrates the percentages of correct answers on the posttreatment test for each group by grammar item. The IS group's scores were higher than the CV group's, except for the definite article *the*.

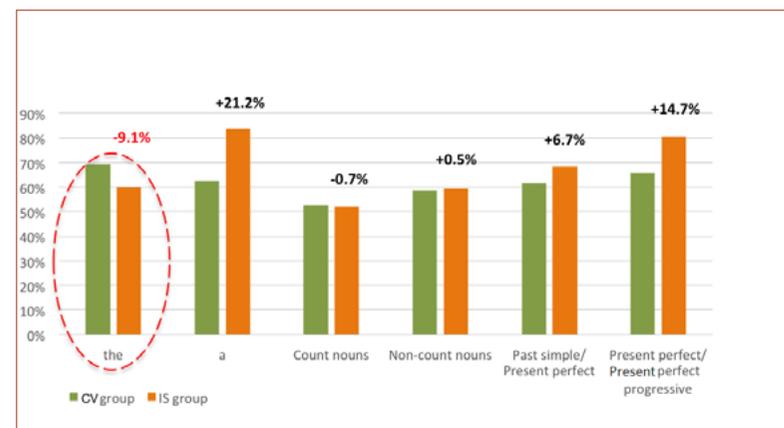


Figure 16. Correct answer rates on each grammar item on the posttreatment test.

### General Learning Effect and Significant Difference Between the IS and CV Groups

To measure the general effectiveness of the image schema-based teaching method, we used statistical testing to detect any difference in learning effect between the IS and CV groups. The graph in Figure 17 shows that the IS group experienced statistically significant advantages.

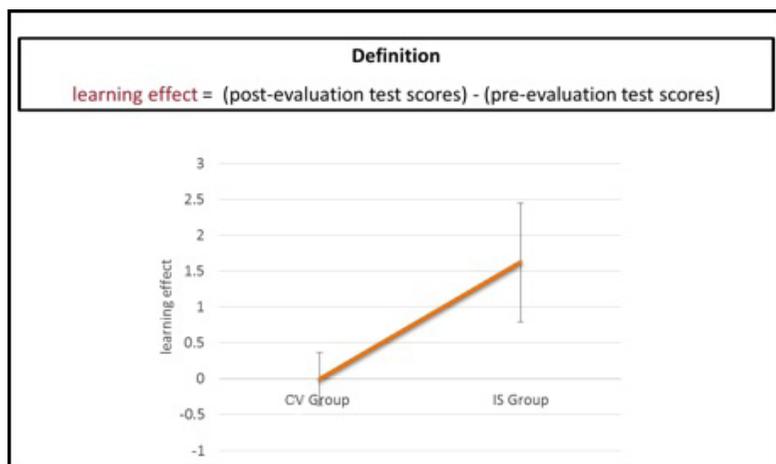


Figure 17. Significant difference in learning effect between IS and CV group.

The results showed the difference of learning effects:  $t(346) = -3.35, p < -0.01, d = 0.36$ . Here, we use statistical testing where  $t$  value and  $p$  value measure the difference between the CV group and IS group. Thus, we can conclude that the image schema based instruction was more effective overall than conventional instruction.

### Comprehensibility of the Methods

After the posttreatment test was completed, the participants were asked about their impressions of the instructional method they had used. Figure 18 shows the level of comprehensibility of each method according to the participants. Comparing the two bars, we see that the percentage of students who reported, “the method was very comprehensible” was 22.3% for the image schema-based method, while it was 8.1% for the conventional method. In total, 67% of the participants in the IS group had a positive impression of

the method used, while only 46.9% of the participants in the CV group had a positive impression of the method used.

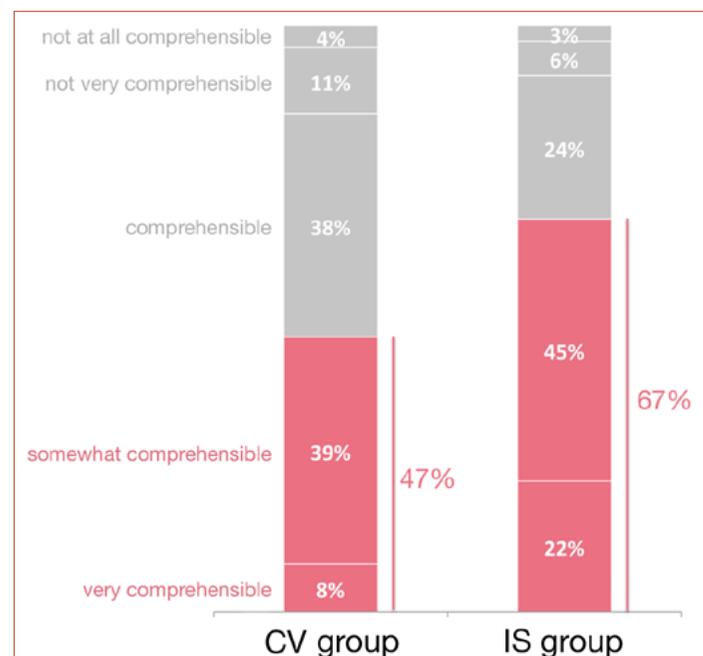


Figure 18. Participant assessment of comprehensibility of the methods.

### Discussion

The goal of this study was, through the use of image schemas, to foster the students’ understanding of English grammatical concepts that are absent in Japanese. Although we obtained confirmation by  $t$ -test analysis that overall the IS group demonstrated statistically significant advantages, the IS group scored lower than the CV group in choosing the correct usage of the definite article. From this result, it follows that the IS method was less successful at fostering the understanding of the definite article through the image schema used. There may be two possible reasons to account for this. First, it may have been due to the unbalanced exposure to the definite article image schema. In the definite and indefinite article lesson, the definite article image schema appeared two times, while the indefinite article image schema appeared four times. In other lessons, image schemas

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for each concept appeared 5.5 times on average. (For example, the countable noun and noncountable noun image schemas both appeared six times, and the past simple image schema and the present perfect image schema appeared five and six times, respectively.) Second, the discrepancy may have been caused by the number of example sentences shown with the definite article image schema. In the lesson on the definite and indefinite articles, the number of example sentences presented in the CV material was approximately twice that of the IS material: eight sentences in the IS material, and 15 in the CV material. If we consider sentences to be instantiations of image schema, it is evident that image schemas for each grammatical concept should have been shown a sufficient and equal number of times for optimal student comprehension.

### Student Feedback on the IS Method

Considering that 67% of the students felt the IS method was either very or somewhat comprehensible, it suffices to say that the IS method was positively accepted by the students in this study. There were also several students who wrote positive comments about the IS method. Some said the IS method stimulated their curiosity to learn more about grammar, and others said the animations were fun to watch because they gave the students a rhythmical process for understanding grammar.

### Conclusion

In summary, we have drawn the following conclusions:

1. In this study, we developed a new educational method of English grammar teaching by applying the image schema theory that is supported by cognitive linguistics.
2. We confirmed the validity of the learning effect of our experimental method by using a *t* test.
3. The participants who studied the function of the definite article with our new educational method did not score better than those who studied it with the conventional, verbal-based method. We suggested two possible reasons for this result.
4. The students who responded that they had a positive impression of our new educational method were 67%.

The above results indicate the potential positive effects of supplementing traditional in-class verbal instruction and conventional, verbal-based materials with image schemas to support learners. For educators wishing to create their own visualized, image schema-based materials, this study can offer several suggestions. First, the image schema

theory was developed through studies by Lakoff (1987) and Johnson (1987), and elaborated in Lakoff and Johnson (1999). These studies are highly theoretical, but useful for understanding the basics of image schema theory. Second, for practical purposes, Radden and Dirven (2007) is also worthy of study. Their textbook nicely introduces the notion of image schemas to university-level (English-speaking) students and offers a schematized way of analyzing grammar. Finally, Gibbs and Colston (2006) described the psychological reality of image schemas developed by infants.

To conclude, we provide two suggestions for further studies:

1. Further research is needed to improve the IS method on definite and indefinite articles and reorganize an experiment to examine their outcomes. Currently, we are planning to conduct another experiment with an online supplementary activity. In this experiment, the learners will receive image schema-based instructions on the target grammar items and practice these items orally with an English-speaking instructor.
2. A foreseeable extension of this research would be to include other languages, as every language has its own image schemas. Accordingly, image schema-based instruction should also assist learners of other languages.

### Acknowledgments

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### Bio Data

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## Appendix A

### Samples of the Questions Used in the Tests in 2014

Choose the correct answers from the given options.

- The bomb exploded (on/off/in/out of/at/分からない) 300 meters.
- He couldn't play (on/off/in/out of/at/分からない) a high level with a sore back.
- He was chosen (on/off/in/out of/at/分からない) a hundred applicants.
- He paid for the camera (on/off/in/out of/at/分からない) his savings.
- He was standing (on/off/in/out of/at/分からない) the snow.
- British agriculture is (on/off/in/out of/at/分からない) crisis.
- She's carrying several bags (on/off/in/out of/at/分からない) her shoulders.
- I told them we were also going to talk (on/off/in/out of/at/分からない) health care.
- He was thrown (on/off/in/out of/at/分からない) the horse.
- I was trying to keep her mind (on/off/in/out of/at/分からない) Alain.

### Samples of the Questions Used in the Pre- and Posttreatment Tests in 2015

Choose the correct answers from the given options.

- Paris is (a/the/わからない) capital of France.
- It's a fine bicycle, but (brakes/the brakes/わからない) don't work.
- She was appointed as (a/the/わからない) chairperson of the committee.
- After breakfast the baby had (egg/ eggs/わからない) all over his face.
- We had an octopus for lunch. / We had octopus for lunch. / わからない.



- Mr. Bird (lived/has lived/わからない) on this street all his life. He still finds it difficult to get along with his neighbors.
- Joan (broke/ has broken/わからない) the teapot, but it has been mended perfectly.
- I (have read/have been reading/わからない) your book, so I can return it to you.

## Appendix B

### *Textbooks Used in Compiling CV Instruction Materials*

- Egawa, T. (1991). *Eibunpou kaisetsu* [A new guide to English grammar] (3rd ed.). Tokyo: Kane-ko-Shobo.
- Sugiyama, C. (1998). *Eibunhou shoukai* [A comprehensive English grammar]. Tokyo: Gakken.
- Yasui, M. (1996). *Eibunhou souran* [A better guide to English grammar] (2nd ed.). Tokyo: Kaitaku-sha.