The Effectiveness of Core Meaning Based Instruction on Preposition Choice

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Abstract

This study examined the effectiveness of core-meaning-based instruction (CMBI) on teaching the temporal use of the English prepositions: *in*, *on*, *at* and *by*. Ninety-nine Japanese college learners of English participated in this study, and two types of instruction were administered to them: core-meaning-based instruction (CMBI) and translation-based instruction (TBI). Two treatment groups were given different hint-sheets as teaching materials, and the remaining control group received no instruction. In order to examine the effectiveness of instruction, multiple choice vocabulary quizzes were administered as pre- and post-tests. Even though the results of the analysis on overall tendency showed that CMBI was not more effective than TBI, further analyses for upper and lower score groups as well as four different prepositions indicated that there were cases where CMBI was significantly more effective than TBI. This study suggests the insufficiency of implicit instruction when CMBI is used in teaching English prepositions. In addition, this study provides some evidence that CMBI may produce a favorable effect on lower proficiency learners.

1. Introduction

Cognitive linguistics (CL) has become a new discipline that can be mainstreamed in the area of English as a Foreign Language (EFL) learning and teaching (Littlemore, 2009; Tanaka, Sato & Abe, 2006). Some researchers have applied the idea of CL to EFL learning and teaching to examine how EFL learners could benefit from the insights of CL. These attempts include instructions on metaphors (Deignan, Gabrys & Solska, 1997; Azuma, 2005), idioms (Kövecses & Szabó, 1996) and vocabulary instruction (Tanaka et al., 2006; Morimoto & Loewen, 2007). Studies regarding vocabulary learning suggest that the approaches based on cognitive linguistics can provide the EFL learners with a better way to overcome some problems in their daily learning, and better understanding of target words than the traditional approach.

The traditional approach assumed here is the use of an English-Japanese dictionary in learning polysemous words. The use of a dictionary has a potential problem in learning those words. In general, when learners encounter an unfamiliar word, they often use a dictionary. They look up only one translation appropriate to the context and memorize it. This is one common strategy that learners take, which Tanaka (2006) calls *search-translation-equivalent (STE) strategy.* In this strategy, learners make use of their first language (L1) as a device for learning second language (L2) words. However, according to Imai (1993) and Tanaka et al. (2006), this strategy produces negative effects on learning polysemous words. Learners tend not to pay attention to how senses of polysemous words are related to one another (Tanaka et al., 2006).

Imai (1993) pointed out that learners do not realize the limitation of the L1 = L2 equation. She investigated how the English polysemous verb *wear*, which is frequently used, is understood by American students and Japanese college students studying English as a second language.

The results revealed that they had very different perceptions about senses of the verb *wear*. The results revealed that the American students knew almost all senses of the word "wear", and they used their concrete prototypical senses or metaphorically extended senses for grouping the different senses into strongly cohesive clusters. Besides, all of these clusters were comprised an orderly structured category of the word. On the other hand, the results for Japanese students indicated there was influence from their mother language. She also pointed out that Japanese learners believed that there was a one-to-one correspondence in meaning between English and Japanese words. The STE strategy, thus, is not adequate for learning polysemous words. The use of a dictionary potentially makes it difficult for learners to learn the appropriate use of polysemous words when they believe in the L1 = L2 equation.

In spite of these problems, there is no consensus on how polysemous words should be taught in English classrooms (Tanaka et al., 2006). There are some possible reasons for this. Teachers seem to have an assumption that learners can learn various senses of a polysemous word incidentally without being explicitly taught (Morimoto & Loewen, 2007). In addition, it is impossible for teachers to teach each meaning of a polysemous word within a limited class time session (Morimoto & Loewen, 2007). Therefore, teachers tend to suggest that their students use an English-Japanese dictionary and make them memorize an additional translation every time it appears. This kind of instruction is called Translation-Based Instruction (TBI) in this study (Morimoto & Loewen, 2007; Yasuhara, 2011).

Given the importance and problems of learning polysemous words, an alternative approach is called for. Nation (2001) suggests that one useful way of learning polysemous words might be to define a word by looking for the concept that runs through all its senses. In addition, McCarthy (2001) emphasizes the importance of paying attention to the

central or focal meaning of a word because it may often become the basis of semantic extensions. Along their lines is the concept of "core meaning" (Tanaka, 1990) that is based on the insights from CL, especially cognitive semantics. In this study, core meaning refers to the common underlying meaning of a word, as opposed to the most frequent or the primary meaning.

2. Background
2.1 Core-schema approach

There are two mainstream approaches to polysemy in cognitive semantics. One is the *lexical network approach* (Lakoff, 1987; Tyler & Evans, 2004) and the other is the *core-schema approach* (Dewell, 1994; Tanaka, 1990). These two approaches are not in conflict with each other though they each have their own view on analyzing polysemous words. The former argues that various senses of a polysemous word form a network with the metaphorical senses extending from the central prototype. The latter suggests that the various senses of a polysemous word can be derived from a single overarching core schema. Also, semantic extension is the result of cognitive operations such as image-schema transformations (Lakoff, 1987) [1], vantage point shift (Langacker, 1987) [2] and focalization (Tanaka & Matsumoto, 1997) [3]. The present research focuses on the core-schema approach because it can be more efficient than lexical network approach from a practical perspective of language learning and teaching (Tanaka & Matsumoto, 1997; Tanaka et.al., 2006).

One key concept of the core-schema approach is core meaning (Tanaka, 1990). It originally comes from the idea of Bolinger (1977), and Oikawa (1993) summarizes it as *one form for one meaning and one meaning for one form*. Tanaka (2004) suggests that if a word form is the same, it has a common underlying meaning, and that behind each

polysemous word, there is a single overarching meaning which governs all its senses. He calls that common and overarching meaning the "core meaning."

According to Tanaka (2004), the core meaning is the great common meaning and the best exemplar of the usages, as well as a concept that catches the whole semantic coverage of a word. When core meaning is put into each context, various senses come out (see Figure 1). Thus, the core meaning is the context-free meaning behind every exemplar of a word.
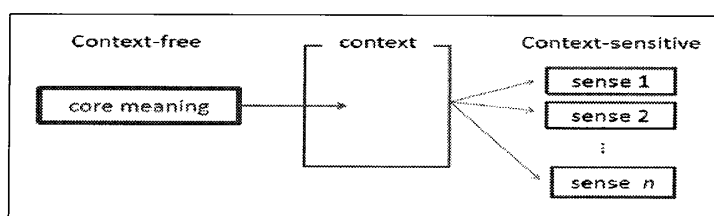

Figure 1. Concept of core meaning (Tanaka et al., 2006)

Core meaning has two modes of expression such as descriptive representation and image-schematic representation (Tanaka & Sato, 2009). As a descriptive representation, the core meaning of *in* is illustrated as internal space. As an image-schematic representation, on the other hand, the core meaning of *in* is typically explained in an illustration of a three-dimensional container which has some object in it. This image of physical space is applied to the expansion of other spatial relationships by the projection of the image: psychological space, social space, temporal space (Tanaka et al., 2006) [4]. The core image of *in* is shown on the left in Figure 2.
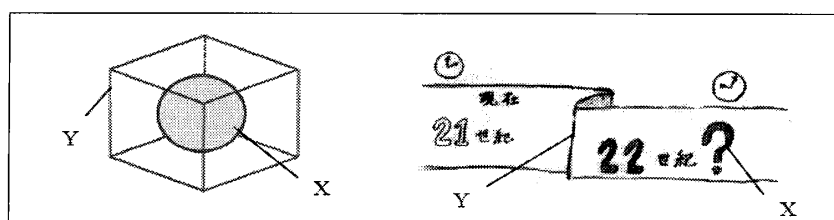

Figure 2. Core image of "in" (left) and Temporal use of "in" (right)
(Based on Tanaka et al. [2007] and reproduced by the author)

According to Tanaka et al. (2006), the main function of *in* is to show a spatial relationship between X as content and Y as container and this extends to the temporal use of *in* as shown on the right in Figure 2. This represents the use of *in* as in *Who knows what will happen in the 22nd century?* X is *content* (an unknown event), while Y is *container* (*temporal-spatial frame*). In this way, the various peripheral senses are extended through this concept with the projection of the core image. In this study, the target words are the prepositions *in, on, at* and *by* because they are high-frequency words and have strong polysemous nature [5].

2.2 Core-meaning-based instruction

Core-meaning-based instruction (CMBI) is a form of vocabulary instruction and can be defined as the process of learning with implicit instruction. The aim of CMBI is to provide learners with a basis on which to process peripheral meanings of a word.

There are four advantages to core-meaning-based instruction. The first advantage is the efficiency of vocabulary learning. In SLA theories, it is generally accepted that L2 learners form a hypothesis about the target language rules based on L2 inputs or their L1 knowledge. Then, they restructure their L2 system through hypothesis testing by the use of the language (Swain, 1985). This also applies to vocabulary learning (Morimoto & Loewen, 2007). This process can be seen as *decontextualization* (Tanaka et al., 2006). Learners acquire the lexical meaning of a word through a process of *generalization*: They extract *de-contextual* meanings from *context-sensitive* meanings (Tanaka, 2004). While this kind of process might occur efficiently in an English as a Second Language (ESL) environment, it would not always do so in an EFL environment where L2 exposure is limited. It is likely that learners' extraction of the core meaning is biased because of the limited amount of input. Also, learners might not generate core meaning by themselves because it is unrealistic to expect them to encounter all the senses of a

word in EFL classrooms. Even if they did so, it would place a tremendous burden on their memory. Therefore, as Nation (2001) stated, the presentation of core meanings seems to be more efficient and feasible than providing learners with various senses.

The second advantage of CMBI is concerned with the way of presenting the core meaning. The use of graphic image-schema makes it easier for learners to understand core sense intuitively as well as to remember it well (Nation, 2001). According to the dual-coding theory of Paivio (1978), the information is processed through two different channels such as verbal and nonverbal information. Also, in this theory, memory is enhanced by presenting verbal and visual information simultaneously. Tagashira (2007) suggested applying this theory to vocabulary learning.

The third advantage of CMBI is that learners do not have to rely entirely on their L1 equivalents in learning a word. It is generally believed that language learners often make use of their L1 as a part of their vocabulary learning strategy (Tanaka, 2006). As stated before in this paper, the use of L1 has some problems. In CMBI, it is assumed that learners can understand the meaning of a word at a conceptual level, and it could enable them to understand the L2 word without being constrained by their L1 equivalent of it (Tanaka, 2004).

The last advantage of CMBI is concerned with *Depth of Processing* Theory (Craik & Lockhart, 1972; Morimoto & Loewen, 2007; Tagashira, 2007). The assumption in this theory is that deeper processing of information leads to efficient and durable retention. In principle, CMBI involves deeper processing of words than Translation-Based-Instruction (TBI). Learners are shown not only the core meaning but also some related figurative senses. This will give them more opportunities to process information about the target words. Because of this deeper processing of target words, CMBI may consequently lead to better retention.

Polysemous words have not been a target of systematic teaching in English education (Morimoto & Loewen, 2007). More empirical research is required in this area. Core meaning is a potential pedagogical device though this remains to be empirically investigated. This study is one of the attempts to link EFL vocabulary instruction and cognitive semantic theory by proposing CMBI. The purpose of this study is to answer the following research questions.

1) Does the effectiveness of the instruction method (CMBI, TBI, or "no instruction") differ at all?
2) Does the effectiveness of the instruction method (CMBI, TBI, or "no instruction") differ corresponding to the proficiency level?
3) Does the effectiveness of the instruction method (CMBI, TBI, or "no instruction") differ corresponding to the preposition type?

3. Method
3.1 Participants and setting

This experiment was conducted at two universities in Japan in four English classes: At one there were three freshman reading classes and at the other one senior writing class. There were a total of 99 Japanese students majoring in English who participated in this study. All of them spoke Japanese as their L1 and they had received formal English education for approximately seven to nine years by the time of the study. They were divided into three groups: two served as treatment groups, with the first group (n = 35) receiving core-meaning-based instruction (CMBI) and the second group (n = 34) receiving translation-based instruction (TBI). Participants in two treatment groups were asked to read the contents of the hint-sheets, and also, no oral instruction was provided to them such as an explanation for how they interpret the contents of the hint-sheets. The remaining third group served as a control

(n = 30) and received no oral instruction on the target words. Besides, the researcher did not provide the control group with any hint-sheet.

3.2 Instruction methods and materials

The target words were the prepositions: *in*, *on*, *at* and *by*. These are frequently used with temporal expressions and learners often confuse the metaphorical use of prepositions. Two treatment groups were given the respective instruction method hint-sheets as implicit instruction. The CMBI hint-sheet (see appendix) consisted of core meaning with both descriptive and schematic representations in the center of the sheet. Sentences and illustrations of other usages were on the top of the sheet, while the target temporal use was emphasized on the bottom of the sheet with brief explanations. The aim was that this sheet would make learners understand the concept of core meaning, the core meaning itself and also the link between the core meaning and each metaphorically extended usage. The TBI hint-sheet consisted of the inventory of meanings with a focus on the temporal use of the four prepositions.
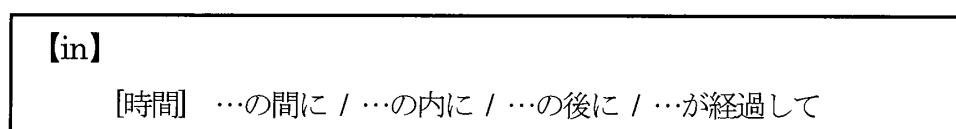
> 【in】
>
> 　　　[時間]　…の間に / …の内に / …の後に / …が経過して

Figure 3. Example of the TBI hint-sheet for the temporal use of "in" (Sanseido, 2001)

In order to investigate the effects of different styles of instruction, a multiple choice vocabulary test was carried out in two testing sessions (pre-test and post-test). It was used to assess the participants' receptive knowledge and understanding of the target words in the contexts. The participants were asked to choose one out of the four prepositions which was semantically appropriate to the contexts (see examples below). The total number of sentences for each pre- and post-test was 32, and there were 8 sentences for each of the target words.

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1) 誕生日に会ってくれる？

Will you meet me（　in　/　on　/　at　/　by　）my birthday?

2) クリスマスの時期になるといつもたくさんのパーティーに出かける。

（　In　/　On　/　At　/　By　）Christmastime we always go to a lot of parties.

Figure 4. Examples of multiple choice test items (produced by the author based on some English-Japanese dictionaries and web corpuses)

3.3 Procedure

Participants signed consent forms. Then they were given the pre-test and had 20 minutes to answer all 32 questions. After the pre-test, those who completed the test were divided randomly into three groups. One week after the pre-test, the post-test was administered. The participants of the CMBI and the TBI group were given the respective hint-sheets and asked to answer all questions while referring to the sheet. These two groups did not receive any explicit instruction on the target prepositions. On the other hand, for the control group, the participants did not receive any hint-sheet and were just asked to answer the questions. After the administration of the pre- and post-tests, they were scored immediately. In addition, based on an average score of the pre-test (15.64), the participants who achieved above the average were chosen for upper group (CMBI: n=20, TBI: n=17, Control: n=13) and below-average participants were chosen for lower group (CMBI: n=15, TBI: n=17, Control: n=17).

3.4 Data analysis

In order to compare the effects of CMBI and TBI, a two-way ANOVA was performed using PASW Statistics 18.0 with the test scores being the dependent variables and type of instruction (CMBI, TBI and Control) and test time (pre-test, post-test) being the independent variables. In this data analysis, instruction was a between-subjects factor and test time was a within-subjects factor.

4. Results

4.1 Results for research question 1

Table 1 shows the descriptive statistics of the multiple choice vocabulary test scores. The scores increased in all groups, and the gains for the CMBI group (+2.57) and TBI group (+2.47) were larger than those of the control group (+1.87).

Table 1

Descriptive statistics of the multiple choice vocabulary test scores

	CMBI (n=35)		TBI (n=34)		Control (n=30)	
	Mean	SD	Mean	SD	Mean	SD
Pre-test	16.77	3.89	15.14	4.36	15.00	4.46
Post-test	19.34	4.68	17.61	2.95	16.87	4.45

Table 2 summarizes the results of the ANOVA. The main effects for test time and instruction type were significant, $F(1, 96) = 32.742$, $p < .01$ and $F(2, 96) = 3.137$, $p < .05$. However, there was no significant interaction effect between test time and instruction type, $F(2, 96) = .287$, $p > .05$. Since the main effects for test time and instruction type were significant, a post-hoc pairwise comparison (Bonferroni) was carried out. No significant difference was found between the CMBI group and the control group (p = .064), nor between the CMBI group and the TBI group (p = .179).

Table 2

Results of two-way ANOVA for the multiple choice vocabulary test

	df	F	Sig.	η^2
Test time	1	32.742	.000	.254
Instruction type	2	3.137	.048	.061
Test time*Instruction type	2	.287	.752	.006

4.2 Results for research question 2

The descriptive statistics for the upper and lower proficiency groups are shown in Table 3. In the upper group, the scores increased in the CMBI group (+1.3) and the control group (+0.47). Only the scores of the TBI group declined (−0.05). In the lower group, the scores increased in all groups. The gain for the TBI group (+5.0) was larger than those of the CMBI group (+4.27) and the Control group (+2.94).

Table 3

Descriptive statistics of the multiple choice vocabulary test scores for the upper and lower groups

	CMBI (n=35)		TBI (n=34)		Control (n=30)	
	Mean	SD	Mean	SD	Mean	SD
Upper group						
Pre-test	19.50	1.96	18.70	2.34	19.15	2.97
Post-test	20.80	4.46	18.65	2.91	19.62	3.78
Lower group						
Pre-test	13.13	2.59	11.59	2.62	11.82	2.19
Post-test	17.40	4.37	16.59	2.69	14.76	3.78

The ANOVA results are summarized in Table 4. In the upper group, the main effects were not significant for test time and instruction type, $F(1, 47) = 1.314$, $p > .05$ and $F(2, 47) = 3.138$, $p > .05$, as was the interaction between test time and instruction type, $F(2, 47) = .733$, $p > .05$. CMBI has no effect as an instruction type and there was no different effect compared to TBI. In the lower group, the ANOVA results indicate a significant main effect for test time, $F(1, 46) = 58.493$, $p < .01$, but not for instruction type, $F(2, 46) = 2.495$, $p > .05$. The interaction between test time and instruction type was not significant, $F(2, 46) = 1.336$, $p > .05$.

Table 4

Results of two-way ANOVA for the multiple choice vocabulary test for upper and lower groups

	df	F	Sig.	η^2
Upper group (n=50)				
Test time	1	1.314	.258	.027
Instruction type	2	3.138	.256	.056
Test time*Instruction type	2	.733	.486	.030
Lower group (n=49)				
Test time	1	58.493	.000	.560
Instruction type	2	2.495	.094	.098
Test time*Instruction type	2	1.336	.273	.055

4.3 Results for research question 3

Table 5 shows the descriptive statistics for the multiple choice test scores for the prepositions, *in*, *on* and *at*. The preposition *by* was not included in this section because there was no significant interaction in the following ANOVA results.

Table 5

Descriptive statistics of the multiple choice test scores for the prepositions in, on and at

		CMBI (n=35)		TBI (n=34)		Control (n=30)	
		Mean	SD	Mean	SD	Mean	SD
In	Pre-test	5.46	1.70	5.29	1.62	4.67	1.77
	Post-test	5.83	1.82	4.00	1.90	5.50	1.89
On	Pre-test	3.63	1.54	3.24	1.30	3.33	1.77
	Post-test	5.54	2.05	4.88	1.67	3.57	1.63
At	Pre-test	4.00	1.41	3.50	1.33	3.70	1.44
	Post-test	3.60	1.44	4.59	1.42	3.67	1.44

For the preposition *in*, the CMBI group and the control group showed an

increase in the scores. The gain for the CMBI group was 0.37 and for the Control group, 0.83. On the other hand, the scores of the TBI group declined by 1.29. For the preposition *on*, all groups showed increases in the scores. The gains for the CMBI group (+1.91) were larger than those of the TBI group (+1.64) and the control group (+0.24). For the preposition *at*, the TBI group's scores increased (+1.09), while the scores of the CMBI and Control groups declined (CMBI: −0.4, Control: −0.03).

Table 6 summarizes the ANOVA results for the prepositions *in, on* and *at*. The preposition *by* was not included in this section because there was no significant interaction in this analysis. In the analysis of the preposition *in*, even though there was no significant main effect for test time, $F (1, 96) = .025$, $p > .05$, there was a significant main effect for instruction type, $F (2, 96) = 3.734$, $p < .05$. Since there was a significant interaction, $F (2, 96) = 11.563$, $p < .01$, a simple main effect test was carried out. A post-hoc pairwise comparison revealed that, as for post-test, there were no significant differences in the scores between the CMBI group and the control group ($p = 1.000$). However, there were significant differences between the CMBI group and the TBI group ($p = .000$).

The ANOVA results for the preposition *on* show that the main effects for test time and instruction type were significant, $F (1, 96) = 42.778$, $p < .01$ and $F (2, 96) = 5.532$, $p < .01$, as was the interaction between test time and instruction type, $F (2, 96) = 6.975$, $p < .01$. Since there was a significant interaction, a simple main effect test was carried out. Post-hoc pairwise comparisons revealed that, as for post-test, there were significant differences in the scores between the CMBI group and the control group ($p = .000$), but there was no significant difference between the CMBI group and the TBI group ($p = .393$).

According to the ANOVA results for the preposition *at*, the main effects for test time and instruction type were not significant, $F (1, 96) = 1.417$, $p > .05$ and $F (2, 96) = .939$, $p > .05$, respectively. However, the

interaction between test time and instruction type was significant, $F(2, 96) = 6.188$, $p < .01$. Since there was a significant interaction, a simple main effect test was carried out. Post-hoc pairwise comparisons revealed that, as for post-test, there were significant differences in the scores between the CMBI group and the TBI group (p = .015) but not between the CMBI group and the control group (p = 1.000).

Table 6
Results of a two-way ANOVA for the multiple choice test for the prepositions in, on and at

		df	F	Sig.	η^2
In	Test time	1	.025	.876	.000
	Instruction type	2	3.734	.027	.072
	Test time*Instruction type	2	11.563	.000	.194
On	Test time	1	42.778	.000	.308
	Instruction type	2	5.532	.005	.103
	Test time*Instruction type	2	6.975	.001	.127
At	Test time	1	1.417	.237	.015
	Instruction type	2	.939	.394	.019
	Test time*Instruction type	2	6.188	.003	.114

5. Discussion

This study conducted one experimental study to answer three research questions. On the whole, no statistically significant differences were found between the CMBI and the TBI groups; however, some results showed a significant effect of these instructions compared to the control group. There are a number of possible explanations and findings for these results.

First, it should have been noted that implicit instruction could have failed to promote an understanding of core meaning. Arakawa and Moriyama (2009) point out that a teacher should present core meanings

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explicitly and support learners so that they can find and grasp its image. It is not enough to only present learners with core meanings in a top-down way. In addition, as Ellis (2005) suggests, it is important to combine both explicit and implicit instruction in a balanced manner according to the features of each target item. Explicit instruction was not included in either CMBI or TBI for this study. Therefore, if the instruction had been administered in a well-balanced manner both implicitly and explicitly, learners might have been able to ensure more understanding and internalization of core meanings, which could have differentiated the effectiveness of CMBI from TBI.

Second, when the difference of proficiency level of the target prepositions was focused on, in the upper proficiency group, there were no significant differences between the pre-test and post-test, and also among the three instruction types. As a similar tendency has been shown in Yasuhara (2011), learners might have already constructed their images of the target prepositions through their previous inputs by the time the experiment was administered. If so, as Yasuhara (2011) suggests, there was not much point in giving translations or image-schema to upper proficiency learners. She suggests that the effect of CMBI would emerge if learners were given an explicit instruction as to how to apply core meaning as the device to extend on to related metaphorical meanings.

On the other hand, in the lower proficiency group, although there was no significant difference between CMBI and TBI, the results of the CMBI group showed a significant improvement in scores compared to those of the upper proficiency group. Similar tendencies were seen in Oikawa (1993) and Yasuhara (2011). This might be because learners could accept CMBI as a new instruction and relearn the meaning of those words effectively. The core meaning might have some instructional benefit to learners of lower proficiency.

Finally, the picture emerging from the results of research question

3 was rather mixed. In the case of *in*, CMBI showed no significant difference compared to the control group, but the instructional effect was larger than TBI. Tanaka and Matsumoto (1997) administered a brief questionnaire to ask the Japanese meaning of the preposition *in* to university English learners. They recognized the meaning of *in* as *naka-ni* or *naka-de* which are similar to *inside* in English. This concept for *in* is almost the same as the descriptive representation of the core meaning. It is assumed that the participants in this study could also learn the image schema of *in* through CMBI, and its understanding was promoted by connecting their existing knowledge and core meaning in an organized manner. In other words, a positive transfer occurred in the participants' learning in this case. As a result of this positive transfer, the learners may have been able to extend the meaning from core meaning on to other related metaphorical meanings with relatively little effort. On the other hand, because the translation in TBI consists of four concrete temporal usages, there might have been a wide discrepancy between the translations and the learners' existing knowledge. Also, the participants still might have believed in the L1 = L2 equation. In that case, presenting different Japanese translations for one English word might have been confusing for them. In other words, the STE strategy did not work well for them in this study.

Regarding the preposition *on*, a remarkable result was obtained. Even though the CMBI for this preposition had a significant effect compared to the control group, there was not much statistical difference between CMBI and TBI. In addition, the results for *on* showed the largest increase in scores from pre-test to post-test among the four prepositions: on (+1.91), in (+0.37), at (-0.4) and by (+0.68). This implies that CMBI for *on* worked the most effectively. Moreover, this fact implies the effect of core meaning varies according to the types of prepositions. The results for the preposition *at* shown below may explain the reason for this.

A closer look at the results of *at* showed that TBI had a significant effect while CMBI did not. It can be assumed that hints with higher concreteness (TBI) worked effectively for learners rather than hints with high abstraction (CMBI). Core meaning is a product of the result of abstraction which is repeated up to a limit (Tanaka et al, 2006), so it might affect participants' outcome for the CMBI group. In fact, the core meaning of *at* is a highly abstract semantic concept. It is represented as *no-tokoro-ni* in Japanese, which indicates *location* in English (Tanaka & Matsumoto, 1997; Tanaka et al., 2007). It might be difficult for learners to make a semantic link between the word *no-tokoro-ni (location)* and a temporal usage of this preposition. Moreover, there might be an incompatibility between the image-schematic representation (in Figure 5) and the descriptive representation. In other words, it may not be easy to recognize these two forms of representation as a thing expressing the same concept or meaning. In sum, it can be suggested that the instructional effect of core meaning may vary with the type of preposition, and this is due to the difference in the level of abstraction for each core meaning.
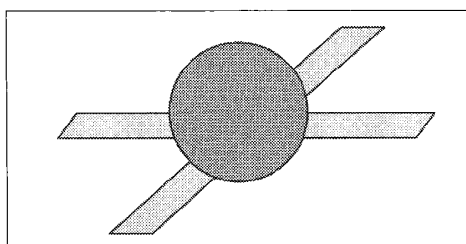

Figure 5. Core image of "at" (Based on Tanaka et al. [2008] and reproduced by the author)

6. Conclusion

This study investigated the relative effectiveness of core-meaning-based instruction on preposition choice by Japanese university learners of English. The focus was placed on the temporal use of prepositions. Although the results turned out to be rather mixed, overall, core-

meaning-based instruction was not shown to be more effective than translation-based instruction for multiple choice vocabulary tests. However, the results of this study provide some interesting findings: (1) Explicit instruction might be needed when core meaning is used as an instruction method; (2) the core meaning tends to be effective for lower proficiency learners; (3) as for core meanings which seem to be close to the learner's preconceived meaning, the understanding of core meaning itself and semantic extension to metaphorical senses may be promoted; (4) the level of abstraction can affect understanding and acquisition of the core meaning.

Even though the results of this study were less than conclusive, core-meaning-based instruction may still be one of many beneficial learning and instructional tools for teaching in the classroom. For example, as Morimoto & Loewen (2007) as well as Arakawa & Moriyama (2009) stated, one of the options that seems to be effective in the classroom is to provide learners with various example sentences which contain the target word. Then, ask learners to discuss the underlying common meaning and to draw its image-schema. After they complete the task, the teacher invites the whole class to compare the image-schema drawn by each group and to discuss the underlying common meaning. The important point in the last part of this task is to present the proper core meaning which has been suggested from past research. This kind of task is more helpful to promote deeper processing of the material than the core-meaning-based instruction done in the present study.

Although this study has shown that the concept of core meaning from the field of cognitive semantics can serve as a pedagogical device for L2 polysemous words, there remains much to be investigated. Given the mixed results of the study, more research which is concerned with the contents of multiple choice vocabulary tests would be called for. In the case of questions for each preposition, for example, it might be shown

more reliable results if there were more questions in the test. Moreover, it also needs to consider that how each usage of prepositions in the test was close to or far from the core meaning. The reason is that some temporal senses might be more abstract or have less semantic overlap with core meaning than others. Besides, some interesting results could be seen if the verification of difficulty level in each question, such as the percentage of correct answers, were examined. It is also worth investigating about learners' ability or competence for semantic extension. The reason is that learners might not be able to apply a core meaning to understand peripheral meanings by themselves. In addition, the lack of metaphorical thinking on the part of the learner might be an obstacle. Since the metaphor is a device for creating and extending meaning, some researchers have suggested the importance of metaphor and metaphor thinking in language education (McCarthy, 2001; Azuma, 2005; Littlemore, 2009). More empirical research would be needed on the subject of improvement of metaphorical thinking in order to promote on the part of the learner the ability of meaning extension based on core meaning.

Notes

1. Because an image schema arises from embodied experience, which is ongoing, image schemas can undergo transformations from one image schema into another (Evans, 2007), and new senses of preposition arise due to the image-schema transformations.

2. The position that a construer adopts for the conceptualization of spatial scene is called vantage point. Any spatial scene can be viewed or conceptualized from a number of vantage points, and shift in these different vantage points could give rise to different construal (or polysemous nature) of the same spatial scene (Langacker, 1987).

3. Focalization is a cognitive operation which highlights the most salient

aspect of core-schema, and also it leaves other aspects in the shade (Tanaka & Matsumoto, 1997).

4. The example sentences for each space are as follows: *I'll keep that in mind* (psychological space); *students in the radical group* (social space); *she came in time* (temporal space).

5. Due to the limit of the available pages, detailed description of three other prepositions (*on, at* and *by*) was left out. Please refer to Tanaka et al. (2007) for the core meanings of three other prepositions.

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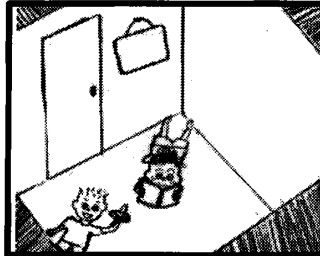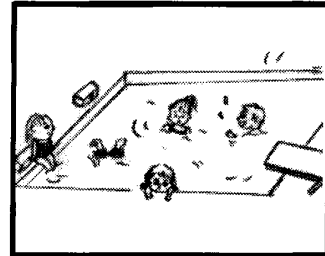
Appendix

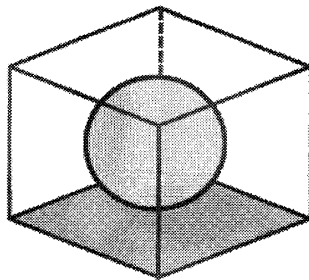前置詞の意味　学習用シート

【in】

(1)　a face **in** the mirror
（鏡の中の顔）
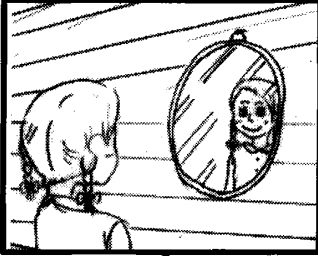
(2)　boys **in** the room
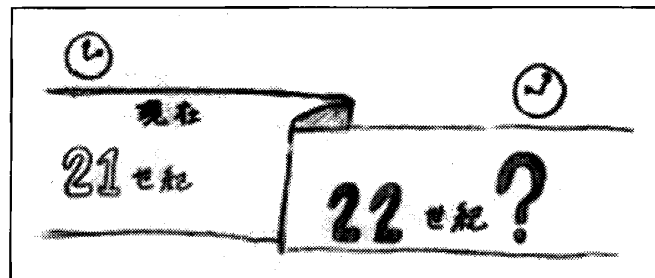（部屋の中にいる少年たち）

(3)　swim **in** the pool
（プールで泳ぐ）

in に共通するイメージ

《…の中に（空間内を表す）》

「時を表す表現」の in にも、この共通のイメージが使われています。

例）Who knows what will happen **in** the 22 nd century?
（22世紀に何が起こるかなんてわかりっこないよ。）

⇒22世紀という「時間の中（空間内）」

*Illustrations are reproduced by the author based on Tanaka et al. (2007) and Ross & Maurice (1999).