Developing a Pedagogical Cognitive Grammar:
Focusing on the English Prepositions *in, on, and at*

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**Abstract**

In recent years, several researchers have examined how second and foreign language learners can benefit from the insights of cognitive linguistics. There are, however, two fundamental issues: learnability and teachability. This paper investigates those two issues, learnability and teachability, as they relate to a cognitive linguistics approach to teaching the English prepositions *in, on, and at* to Japanese learners of English. The results of two studies are presented in this paper. The first study investigates whether Japanese learners of English can obtain positive gains through a cognitive linguistics approach, which uses a central image schema and a semantically motivated network. The results suggest that a cognitive linguistics approach is pedagogically more effective than the traditional approach to teaching English prepositions, in which instructors make no attempt to elucidate the motivated nature of polysemy. The second study reports the results of a qualitative analysis of the opinions of the teachers at junior high and senior high schools about the new approach. The teachers think that a cognitive linguistics approach has potential, although they also experience anxiety about using a new approach. Based on the results of the two studies, this paper discusses the necessity to develop worksheets and teaching manuals that the teachers can easily use without possessing linguistic knowledge.

1. Introduction

There is no doubt that linguistic theories have revealed various facts about the language, but the classroom grammar used in teaching English as a second and foreign language has not benefited from those findings, despite the appearance of new linguistic theories. In the 1980s, a new linguistic paradigm, called cognitive linguistics, led to dramatic developments in the field. Cognitive linguistics (Lakoff, 1987; Langacker, 1987; Talmy, 2000) considers language to be a general reflection of human cognitive abilities, as something that cannot be isolated from other human activities.
In recent years, some researchers have examined how second and foreign language learners could benefit from cognitive linguistics insights in their acquisition of polysemous words (e.g., Cho, 2002, 2010; Csábi, 2004; Lowie & Verspool, 2004; Morimoto & Loewen, 2007; Tyler, 2008; Tyler & Evans, 2004). There are, however, two fundamental issues that arise when we apply a new teaching method to everyday teaching: learnability and teachability. Learnability is related to whether a new method is effective for learning a foreign language. In other words, the concept addresses whether learners can experience gains through a new approach. The second issue is related to whether teachers are comfortable in teaching using a new approach. If teachers experience difficulties in applying the new approach to everyday teaching, the approach will not be useful, even if it is effective. Teachers are not linguists and usually do not have profound knowledge about linguistic theories. If these two fundamental questions were not answered, a new educational approach would not be able to penetrate into English education programs at junior high and senior high schools. This study focuses on the English prepositions in, on, and at, and investigates whether a teaching approach based on cognitive linguistics insights can be effective in foreign language learning.

2. Polysemous Words in Cognitive Linguistics

Some researchers in the field of cognitive linguistics have focused on polysemous words, which have not been sufficiently discussed previously. In cognitive linguistics, all of the senses of a polyseme are considered to be semantically motivated and to form a network. Many cognitive linguists have put it to the test in connection with a word class that is known to be a paragon of polysemy, namely prepositions (e.g., Beitel, Gibbs, & Sanders, 2001; Dewell, 1994; Goddard, 2002; Herskovits, 1988; Kreizer, 1997; Lakoff, 1987; Tyler & Evans, 2001, 2003). These studies have shown that it is indeed feasible to find direct or indirect semantic connections between the diverse senses of a preposition and to allot a place to each of the different senses of a preposition in a radial network extending from a central, prototypical sense.

English prepositions encode various atemporal relations such as spatial, temporal, and metaphorical ones. Various senses of one polysemous word in one language, however, are not usually encoded by one linguistic unit in another language, but by several units. Bowerman and Choi (2001) use the following examples and explain in detail the differences in coding patterns across several languages.

(1) a. cup on table   b. band aid on leg
    c. picture on wall   d. handle on door
    e. apple on twig   f. apple in bowl

(Bowerman and Choi, 2001, 485)
In Japanese, the prototypical spatial senses of *on* and *in*, exemplified by (1a) and (1f), respectively, would be expressed by means of a topological nominal, such as *ue* and *naka*, combined with a postposition. The Japanese equivalents of (1b-e), however, would make use of postpositions only. Bowerman and Choi note that these less prototypical senses “are covered instead by a general locative word or inflection … that indicates only that there is some spatial relationship between the Figure and the Ground” (p. 484).

Analogous to the two coding patterns in Japanese and based on Cho (2002) and Cho (2010), this study distinguishes between two types of spatial relations: “topological” relations (encoded in Japanese by a topological nominal plus postposition), and “functional” relations (encoded by a postposition only). While in English both types of meaning are expressed by means of prepositions, the semantic difference is signaled in Japanese through the choice of either pattern.

### 3. Learnability and Teachability of a Cognitive Linguistics Approach

Cognitive linguistics has attracted some researchers and practitioners in the field of second language acquisition or language teaching, and they have investigated whether a new teaching approach based on the findings of cognitive linguistics is effective. Most of the previous studies, however, have focused only on whether the new approach is effective. To obtain positive effects, studies have tended to spend much time on teaching one grammatical item. Kishimoto (2007), for example, conducted a teaching experiment with junior high school students, in which the instructor gave instruction on one grammatical item, countable and uncountable nouns in English, for approximately 20 minutes in every class for two and a half months. It is unusual to spend more than one third of the class time teaching one grammatical item such a long period of time. Kishimoto focuses only on “learnability” but does not address the “teachability” of a new teaching approach. The study by Tyler (2008) is another example of weighting too much on the learnability issue. Tyler conducted an experiment to investigate whether a cognitive linguistics approach is effective in teaching the English preposition *over*. Her experiment spent three days teaching one English preposition through various teaching tasks. The results, of course, suggested that her cognitive linguistics approach was effective in teaching preposition *over*, but the traditional approach was also effective.

To examine these two fundamental issues, this paper will first investigate the learnability of a new teaching approach, which is whether learners gain positive effects by classroom instruction inspired by insights from cognitive linguistics. The second study focuses on the teachability of the new approach, and whether junior high and senior high school teachers can use the new approach without difficulties.
4. Method

4.1 Study for learnability

The first study is designed to answer the first research question. This study investigates whether learners experience gains through a cognitive linguistics approach to teaching English prepositions in a classroom setting.

4.1.1 Participants

The participants in the present study were from five intact classes and consisted of 133 Japanese college students who were taking an English course as their mandatory course once a week. Their first language was Japanese, and they had not had any prior experience in an English speaking country for more than three months. Their proficiency levels ranged from 200 to 450 on the TOEIC test.

4.1.2 Procedures and materials for instruction

Two instructors participated in this study. Both were experienced EFL teachers. A total of five intact classes were divided into the two groups: the traditional approach and the cognitive linguistics approach. All five classes spent 40 minutes teaching English prepositions based on either the traditional approach or the cognitive linguistics approach.

For the study, we developed a worksheet based on the findings of Cognitive linguistics. The cognitive linguistic instruction was divided into five phases. The first phase raised learners' awareness of a central image schema for prepositions. The instructor explained that all of the usages of English preposition over were related to one another under one central image schema (Dewell, 1994; Tyler and Evans, 2003). Then, the learners were presented central image schemas of the prepositions in, on, and at, followed by example sentences. In the third phase, a total of nine sentences (three for each preposition) were presented, and the learners were asked to draw images for each prepositional usage. After completing the task, the instructor brought the learners' attention to the central image schemas again. The instructor explained how the images that the learners drew for each prepositional usage were derived from the central image schema through cognitive operations. Then, the learners worked on exercises of English prepositions (see Appendix A for the sentences in the instructional phase).

The traditional approach spent the same amount of time as the cognitive linguistics approach. The total time for the instruction was 40 minutes, and the instructor used an English-Japanese dictionary for learners and a study guide for senior high school students. First, the instructor explained that English prepositions encoded various atemporal relations. Then, the instructor presented 16 example sentences and explained all of the usages. Next, the learners worked on exercises and checked the answers in groups using a dictionary. The traditional
approach used more sentences for the instruction and exercises than did the cognitive linguistics approach (see Appendix B for the sentences in the traditional approach).

To discover the effects of both approaches, all the five classes took a pretest, one week before the instruction, and a posttest, six weeks after the instruction. The sentences used in both tests were the same, but the order of the sentences was different. None of the sentences in the tests and no similar sentences were used in the instructional phase in both approaches. In the tests, the target sentences were presented with pictures as in Figure 1, and the participants were asked to fill in the blank with an appropriate word.

She goes to church (   ) Sundays.

*Figure 1. Sample item of a testing material*

The total number of the items in the tests was 30 including dummy items (see Appendix C for the sentences in the test material). The number of items used for analysis was 26: 6 for topological, 10 for functional, 5 for temporal, and 5 for metaphorical relations (Cronbach’s $\alpha = .93$).

### 4.1.3 Results and discussion

Table 1 shows the descriptive statistics for total percentile score by each instructional type. The participants were from five intact classes, and on the pretest, the mean score for the cognitive linguistics classes was lower than for the classes using the traditional approach. The instruction was introduced during a part of everyday activities, and this study did not set up an experimental setting for the research; therefore the results were a natural outcome.

<table>
<thead>
<tr>
<th></th>
<th>Cognitive ($n = 56$)</th>
<th>Traditional ($n = 77$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Pretest</td>
<td>68.62</td>
<td>10.70</td>
</tr>
<tr>
<td>Posttest</td>
<td>78.17</td>
<td>9.94</td>
</tr>
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</table>

This study analyzed the results using ANOVA and found significant interactional effects between teaching approach and test time ($F = 20.32, df = 1, p < .05$)
Table 2 presents the descriptive statistics for the percentile scores for each meaning and instructional type.

<table>
<thead>
<tr>
<th></th>
<th>Cognitive (n = 56)</th>
<th>Traditional (n = 77)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Topological</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>80.36</td>
<td>16.85</td>
</tr>
<tr>
<td>Posttest</td>
<td>94.64</td>
<td>11.51</td>
</tr>
<tr>
<td>Temporal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>78.93</td>
<td>14.98</td>
</tr>
<tr>
<td>Posttest</td>
<td>85.00</td>
<td>17.99</td>
</tr>
<tr>
<td>Functional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>59.11</td>
<td>15.29</td>
</tr>
<tr>
<td>Posttest</td>
<td>73.39</td>
<td>12.40</td>
</tr>
<tr>
<td>Metaphorical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>56.07</td>
<td>23.33</td>
</tr>
<tr>
<td>Posttest</td>
<td>59.64</td>
<td>23.04</td>
</tr>
</tbody>
</table>

To detect the instructional effects, a multivariate analysis of variance was performed on the score of each meaning type and a significant interactional effect between the type of instruction and the test time ($F(4, 259) = 5.04, p < .05$). This study further analyzed the instructional effects on each meaning type. Figure 2 (a-d) shows learners' gains for each meaning type. As Figure 2 (a) and (c) show, topological and functional relations obtained significant gains through the cognitive linguistics approach ($p < .05$). Metaphorical relations showed significant interactional effects between teaching approach and test time. As Figure 2 (d) shows, the cognitive linguistics group obtained positive effects, whereas the traditional group obtained negative effects. Temporal relations did not show any significant interactional effect ($p = n.s.$).
The results of the first analysis suggest that cognitive linguistics approach is pedagogically more effective than traditional approach. The second analysis has revealed that the positive effects were observed for topological and functional relations in the cognitive linguistic group, and the negative effects were observed in the traditional group for metaphorical relations.

4.2 Study for teachability

The first study has revealed that the learners gained more positive effects through the cognitive linguistics approach than the traditional approach. This gives rise to the second research question. The second study investigates whether the teachers are comfortable teaching using the cognitive linguistics approach proposed in the first study. In other words, the second study discusses whether the teachers of junior high or senior high schools can use this effective approach to their students in their daily teaching.

4.2.1 Participants

A total of 57 onsite teachers participated in this study. The participants teach English classes as full-time teachers either at junior high or senior high schools. They took courses to renew their teachers’ licenses in 2009 and 2010.

4.2.2 Flow of the courses

The course for renewing teachers’ licenses was offered as a one-day elective course. The course consisted of four sessions as follows:
Language and Cognition (75 minutes)
Countable and Uncountable Nouns in English (80 minutes)
Image Schemas of English Prepositions and Semantic Networks (80 minutes)
Events and Structures in English (80 minutes)

Each session concluded with introspective comments by participants. They wrote down their observations and thoughts about their experience on a blank sheet. The participants also answered a questionnaire after the entire course.

4.2.3 Material for Analysis

This study analyzed data from two types of material. One is a questionnaire that the participants responded to after they participated in the entire course. This questionnaire was based on a 4-item Likert scale conducted by the university for all of the courses it offered. The other questionnaire solicited introspective comments from the participants on each topic. This open-ended questionnaire was administered by the instructor after each session was completed.

4.2.4 Analysis

The data from the questionnaire were analyzed by use of a percentile score by university staff. The introspective comments collected after the third session on English prepositions were further analyzed in this study. All comments were entered except those with indecipherable writing. Two participants were excluded because some parts of their writing were difficult to read. This study analyzed the data using SPSS Text Analytics for Surveys 3.0, focusing on the relationships between high-frequency phrases and words. This software enables researchers to analyze text data, such as open-ended questionnaires. First, we analyze the data based on the parts of speech and then we analyze the relationships between the keywords and other words and phrases. Based on the frequency counts, this study takes the following as the keywords: “class (jugyou)”, “understanding (rikai)”, “image (imeji)”, and “difficult (muzukashi)”.

4.2.5 Results and Discussion

For this study, first we analyze the questionnaire. Table 3 shows the results from 2009 and 2010.
Table 3

Percentile Score of the Questionnaire

<table>
<thead>
<tr>
<th>Year</th>
<th>Question</th>
<th>Very Good</th>
<th>Good</th>
<th>Poor</th>
<th>Very Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>Satisfaction of Course Content</td>
<td>86.67</td>
<td>13.33</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Good Effects on Teaching</td>
<td>80.00</td>
<td>20.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2010</td>
<td>Satisfaction of Course Content</td>
<td>74.08</td>
<td>22.22</td>
<td>3.70</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Good Effects on Teaching</td>
<td>70.38</td>
<td>25.92</td>
<td>3.70</td>
<td>0.00</td>
</tr>
</tbody>
</table>

From the results of the questionnaires, we can conclude that the participants were satisfied with the content of the course. They also thought that they would be able to use the methods introduced in the course in their everyday teaching.

To investigate the applicability of the new approach in detail, the next analysis was conducted based on the introspective comments from the participants, as in Figure 3. The participants wrote about their observations and thoughts during the session on A4 paper.

![Figure 3. Introspective comments from the participants](image)

This study first analyzed the data, a total of 19,582 letters, based on the part of speech and their frequencies and then plotted the results in circle networks, as shown in Figure 4. The frequencies of each word and phrase are represented by the size of the dot, and the strength of the connections between words and phrases is indicated by the width of the line.
Figure 4. Web circle map of co-occurrence of responses

Figure 4 (a) suggests that “classes” highly co-occurred with “understanding”, “image”, “expansion”, “explanation”, and “meaning”. The teachers consider the proposed approach as understandable for their students for teaching English prepositions. This is represented in the following comments:

My students will understand the semantic networks of English prepositions. This approach will reduce their psychological burden in learning a new language.
Teaching semantic networks and images of English prepositions will make students understand English sentences better than before.

The word “difficult” occurred as one of the high-frequency words. As in Figure 4 (b), this keyword highly co-occurred with “understanding”, “image”, “prepositions”, and “meaning”. The results suggest that the teachers experienced some anxiety in using the new approach. This is represented in the following comments:

Students at a junior high school do not know many English words and expressions. It will be difficult to make those students understand these semantic networks.

The course content itself was very interesting to me, but at the same time, I felt difficulties in understanding it. I will review the content again by myself.

The results from the second study suggest that teachers consider the cognitive linguistics approach to have high potential, but they express some anxieties about whether they can actually teach prepositions using the new approach. The course on prepositions lasted for only 80 minutes. It will be necessary to organize teacher training sessions and to develop a full worksheet and teaching manual for the teachers.

5. Conclusion

This paper investigated the issues of learnability and teachability in a cognitive linguistics approach to teaching the English prepositions in, on, and at to Japanese learners of English by reviewing two studies. The first study investigated the effectiveness of a cognitive linguistics approach that uses a central image schema and a semantically motivated network compared to a traditional approach. The results suggested that a cognitive linguistics approach was more effective for topological and functional relations. In contrast the traditional approach had negative effects on metaphorical relations. The second study reported the results of a qualitative analysis of the comments from teachers who took the courses for renewing their teacher’s licenses. The results suggested that teachers considered this new approach to be promising but also revealed the anxieties of the teachers. They felt some difficulties in using the new approach in their everyday teaching. Based on the results from two studies, the new teaching approach proposed in this paper basically has advantages in both learnability and teachability. This study addressed only three static prepositions. Further studies are necessary to include all English prepositions, such as over, across, and into, which are dynamic prepositions.

Cognitive linguistics alone will not change the current pedagogical grammar dramatically; rather, it will re-organize the items in more learner-friendly fashion. As Littlemore (2009) claims,
“some aspects of language are not arbitrary and that there are sometimes reasons why we say things the way we do” (p. 148). Cognitive linguistics has revealed these semantic motivations of a language on various linguistic phenomena. Understanding these motivations will make second and foreign language learners understand the target language much better, and sometimes free them from just memorizing form-meaning connections of the target language.

Developing the pedagogical cognitive grammar has just begun. Other grammatical items, from a lexical to a discourse level, should be covered in this new paradigm. We also need to collaborate with teachers at junior high and senior high schools to gather sufficient feedback from practitioners. This new movement will make it possible for the classroom grammar to finally benefit from the findings of linguistic theories.

Notes
1. Langacker (1987) divides relational predications into two categories: atemporal and temporal relations. Atemporal relations, such as adjectives, adverbs and prepositions, are defined as relations lacking a positive temporal profile. In other words, summary scanning, rather than sequential scanning, characterizes the processing of the relation. In this sense, English prepositions are atemporal relations. When we discuss the usages of English prepositions, on the other hand, prepositions can encode not only spatial relations between two entities but temporal relations between an event and a temporal domain, such as a concert in January or I get up at seven o’clock every morning. In this sense, English prepositions have temporal relations.
2. Original comments were written in Japanese. The authors translated into English for this paper.

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References


Language Learning, 77, 724-765.

Appendices

Appendix A: Sentences in Cognitive linguistics Approach
In my opinion, violent movies should not be shown on TV.
Mother was mad at me for watching TV so much.
Put the toys in the box!
We are in love.
What is the highest mountain in the world?
Turn the knob on the door.
I met her at the party.
Who’s at the door?
She has lived in the village for ten years.
There’s some milk in the fridge.
We are in trouble.
There’s no one in the room.
Look! That car is on fire.
Please put the book on the shelf.
What are you going to do on New Year’s Eve?
The kids are jumping on the bed.
I was surprised at the news.
Turn left at the traffic light.
Nick often works at night.

School begins in April.
She talked in a loud voice.
We got on the bus.
He was born on May 5.
We got up at 6 o’clock.
I have two pencils in my pen case.
The train will be leaving in a few minutes.
Hanako is in her pajamas.
It’s very nice here in the fall.
Are you free on June 11?
Mary met Mike on her way home.
What’s that black thing on the ceiling?
I can’t eat much. I’m on a diet.
Come and see me at 2:30.
I’ll drop you at the station.
He is at work.
Appendix B: Sentences in Traditional Approach

In my opinion, violent movies should not be shown on TV. Mother was mad at me for watching TV so much.

“I can see Tom in the garden, but where’s George?” “He’s at the cinema.”

I have two pencils in my pen case. She has lived in the village for ten years. The train will be leaving in a few minutes.

School begins in April. We are in trouble. There’s no one in the room.

I’ll be at home on Friday morning. Mary met Mike on her way home. Please put the book on the shelf. Where will you be on New Year’s Eve?

I can’t eat much. I’m on a diet. Come and see me at 2:30. I’ll drop you at the station.

We visit our parents at Christmas. Who’s that at the door? Nick often works at night.

We are in love. What is the highest mountain in the world? It’s on page 237.

We live on rice. They talked on the phone for two hours. Please look at this picture.

Appendix C: Testing Materials for Instructional Effects

Makoto and Hiroko had their wedding at a church. Sylvia and Yuji has decided to meet at a museum.

Taro is waiting for a bus at the bus stop. The boy threw a ball at the girl. A boy is sitting on the roof.

She’s laughing at his funny face. School begins at 8:30. He ate his lunch at noon.

They are playing in the playground. He is buried in the sand. There are lovely flowers in the dress.

He is crying in pain. Kaori dressed in black.
He works as a Santa Clause in the Christmas season.
I graduated from the university in 2005.
Mary is singing in the rain.
Mike lives on Gold Street.
There is an apple on the branch.
Tom visited Hawaii on business.
There is some food on the table.

Jun looked at herself in the mirror.
There is a lion in the cage.
Look at the picture on the wall.
This toy robot runs on batteries.
She goes to church on Sundays.
The church stands on the hill.