

# Identifying Determining Factors of EFL Learners' Stage of the Acquisition on English Prepositions

Takumi MUROI<sup>a\*</sup>, Yuichi ONO<sup>b</sup>

<sup>a</sup>*Master's Program in Education, University of Tsukuba, Japan*

<sup>b</sup>*Faculty of Humanities and Social Sciences, University of Tsukuba, Japan*

\*s1920080@s.tsukuba.ac.jp

**Abstract:** In the instruction of English prepositions, the unidirectionality hypothesis which derives from cognitive linguistics has been widely assumed. However, there are few researches about the validity of this assumption from the viewpoint of data-based or knowledge-based methodology. This paper conducts the survey on the knowledge of various uses of preposition *over* and analyze the results by employing the decision tree to identify the crucial factors to predict the score which determine Japanese EFL learners' proficiency levels of an English preposition *over*. The results of our analysis show that there are three important question items which predict participants' scores on the acquisition of *over*, and the usages of *over* in these items do not follow the unidirectionality hypothesis as is assumed in the literature. This suggests that any instructional method to enhance Japanese EFL learners' knowledge of prepositions assuming the unidirectionality hypothesis needs to be reconsidered in terms of acquisitional order.

**Keywords:** Knowledge-Based Approach, Decision Tree, English Prepositional Acquisition, Japanese EFL learners

## 1. Introduction

It is generally agreed that the data-based validation is necessary to describe the learners' knowledge in order to devise an instructional design to teach grammar of a foreign language. Although the techniques for analyzing big data have transformed many areas in our lives, the use of data mining in education, particularly in language learning, has only recently emerged (Mark, Soobin, Hansol & Bindin, 2019). Learning analytic or data-driven approaches also have a big potential for enhancing learners' learning process and outcomes in Second Language (L2) learning and constructing a more personalized learning environment.

For Japanese learners of English as a Foreign Language (EFL), the accurate use of English prepositions is one of the most difficult area to acquire. Many experimental studies indicate the benefit of a cognitive linguistic approach in the instruction of English prepositions. Studies by Cho (2002) and Tyler and Vyvyan (2003) suggest that learners acquire prepositions prototypical usage first, or in the order of spatial usage, temporal and abstract. In other words, these studies crucially assume the unidirectionality hypothesis in learning English prepositions. However, Kano (2019) challenges this assumption in his qualitative research and claims that Japanese EFL learners' acquisitional order of English prepositions does not follow the process suggested by cognitive linguistics or the unidirectionality hypothesis. Beyond the hypothesis derived from cognitive linguistics, more research from the viewpoint of data-based validation is needed to identify learners' acquisitional order of English prepositions, since this should lead to the effectiveness of the instruction on English prepositions to EFL learners.

This study aims to investigate the factors which determine acquisition process on English prepositions by analyzing the data from the score of Japanese EFL learners in a multiple-choice questionnaire research and analysis by employing the decision tree analysis.

## 2. Research Design: Purpose and Procedure

### 2.1 Purpose

This research consists of the following two research questions given below.

- (I) To identify the factors which determine the Japanese EFL learners' stage of improvement in acquisition of English prepositions by analyzing the data.
- (II) To suggest a suitable instructional order of English prepositions to Japanese EFL learners beyond the hypothesis which derives from cognitive linguistics.

### 2.2 Procedure

In order to examine whether Japanese EFL learners understand the appropriate usage of English prepositions, a multiple-choice questionnaire was conducted.

#### 2.2.1 Participants

A total of 186 students at a national university and a private university in Ibaraki prefecture, Japan, participated in this study.

#### 2.2.2 The questionnaire

The questionnaire consists 80 multiple-choice questions contain target English prepositions such as *over*, *under*, *above*, and *below*. 15 out of 80 questions contain other types of prepositions such as *in*, *on* and *for* to obtain the data on overall prepositional knowledge. To help participants, especially, participants with lower proficiency level to get a grasp of the situation described in each question item, Japanese translations were added to each of them. In each question, participants were asked to choose one most appropriate usage from the four choices.

#### 2.2.3 Methods

The decision tree analysis with Python 3.7.3 was used to identify the question items which determine participants' level of acquisition of a target preposition *over* based on scores in the questionnaire. In the current pilot study, we picked up and analyzed 33 items out of 80.

## 3. Results

### 3.1 Results of the questionnaire

The descriptive statistics is given below in Table 1.

Table 1  
*Mean and Standard Deviation*

	Mean	SD
<i>over</i> (33 items)	13.0963	6.2695
overall (80 items)	37.2043	13.8297

### 3.2 Results of analysis

The results of decision tree and distribution of participants in each endpoint node is shown in Figure 1. Items Q005, Q006, and Q007 are predicted as the factors which determine the participants' acquisitional level based on the scores in the questionnaire.

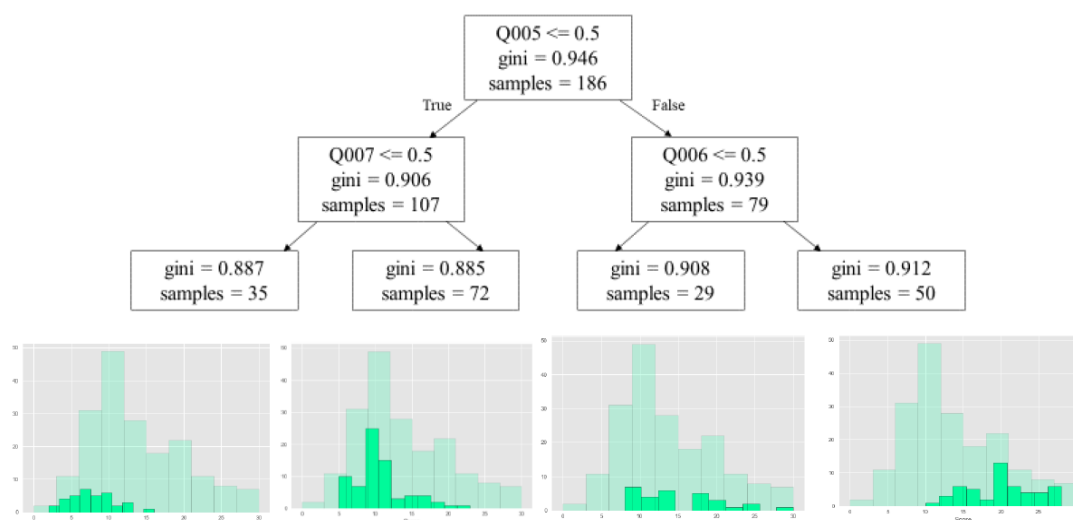


Figure 1. Decision Tree and Distribution of Participants.

Table 2

The Question Items in Each Node of Decision Tree

Question Number	Question Item	Usage
Q005	Let's talk about it over lunch!	Temporal
Q006	Many strikes over the last few years have not ended successfully.	Temporal
Q007	People aged 65 and over can receive the service.	More, adv

The usages of over are the temporal usage in Q005 and Q006, and the usage in Q007 is abstract adverbial usage which has the meaning of more.

#### 4. Discussion and Future Research

The results of the current study show that the temporal and abstract usages can play a decisive role for predicting the stage of acquisition of the English preposition *over*. In our future research, we need to expand the number of participants, types of preposition, and uses of a particular preposition. Moreover, it is necessary to investigate the hidden factors why these uses divide proficiency levels of learners from a linguistic point of view, since this application provides a more appropriate teaching method for prepositional acquisition for Japanese EFL learners. Anyway, it is highly worthwhile to work on a knowledge-based/data-based approach to examine learners' level of proficiency.

#### References

- Cho, K. (2002). A cognitive linguistic approach to the acquisition of English prepositions. *Jacet Bulletin*, 35, 63-78.
- Kano, T. (2019, May). Issues of image-based instruction: Focusing on errors of Japanese EFL learners. *Poster presented at ELSJ international spring forum 2019*, Tokyo.
- Mark, W., Soobin, Y., Hansol, L., & Bindin, Z. (2019). Recent Contributions of Data Mining to Language Learning. *Research Annual Review of Applied Linguistics*, 39, 93-112.
- Tyler, A., & Vyvyan, E. (2003). *The Semantics of English Prepositions: Spatial scenes, embodied meaning and cognition*. Cambridge University Press, Cambridge.