博士論文

The Acquisition of the WH-Movement Operation in English by Japanese EFL Learners

日本人英語学習者における英語の WH 移動操作の習得

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by

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by Japanese EFL Learners

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ABBREVIATIONS

The following is a list of the abbreviations used in this dissertation.

ACC: Accusative Case

COMP: Complementizer

DAT: Dative Case

DEC: Declarative

GEN: Genitive Case

NOM: Nominative Case

passive: Passive Morpheme

past: Past Tense

polite: Polite Form

Q: Question Particle

TOP: Topic Marker

ABSTRACT

The goal of this dissertation is to investigate the relationship between L2 acquisition and the involvement of the principles of Universal Grammar (UG) by Japanese EFL learners. In previous studies, there are three hypotheses on the relationship between them; (i) the No UG Access Hypothesis, (ii) the Full UG Access Hypothesis, and (iii) the Transfer Hypothesis. To investigate which hypothesis is supported by data from Japanese EFL learners, I focused on the *wh*-movement operation in English, which Japanese does not have overtly.

There are two research questions. One is to investigate whether syntactic asymmetries affect the acquisition of the *wh*-movement operation by Japanese EFL learners. The other is to investigate whether the UG principles are active for the *wh*-movement operation by Japanese EFL learners. To address these research questions, I conducted (i) an interrogative formation test, (ii) a translation test, and (iii) a grammaticality judgment test, to Japanese EFL learners, and obtained the following results.

First, I focused on junior high school EFL learners, who typically learn the *wh*-movement operation for the first time, and examined the acquisition of the *wh*-interrogative construction with short distance *wh*-movement. I found that the Japanese EFL learners showed (i) two types of argument/adjunct asymmetries and (ii) two types of subject/object asymmetries in the level of acquisition.

Second, I verified whether these asymmetries are a general tendency for Japanese EFL learners, using Japanese college and university EFL learners. I found that the Japanese EFL learners showed (i) an argument/adjunct asymmetry and (ii) two types of subject/object asymmetries in the level of acquisition of the short distance *wh*-movement operation.

Third, I focused on the *wh*-interrogative construction with long distance *wh*-movement, and investigated whether Japanese EFL learners would show the *that*-trace effect. I found that only advanced level learners showed this effect. Thus, for the advanced level learners, the

Empty Category Principle (ECP), which is assumed to be part of UG, is active in the acquisition of *wh*-interrogatives with long distance *wh*-movement.

Fourth, I compared the result of the Japanese EFL learners with other Asian (Chinese, Korean, and Mongolian) EFL learners. These Asian EFL learners showed the same tendency as Japanese EFL learners. Thus, part of the UG principles is in operation for the advanced Asian EFL learners. Furthermore, I pointed out surprising *that*-trace effects by native speakers of English. There are three types of surprising *that*-trace effect: (i) the *that*-object trace effect, (ii) the *that*-adjunct trace effect, and (iii) the *that*-adverb-trace effect in English.

Fifth, and finally, I focused on another type of *wh*-interrogatives, namely, multiple *wh*-interrogatives, and investigated whether Japanese EFL learners would show the superiority effect. I found that only advanced level learners showed this effect. Thus, for the advanced level learners, Attract-F, which is part of UG, is active in the acquisition of multiple *wh*-interrogatives.

These results suggest that (i) Japanese EFL learners showed some asymmetries in their acquisition of the *wh*-movement operation, and (ii) part of the UG principles is active for the advanced Japanese EFL learners, while it is not for the beginner and the intermediate Japanese EFL learners. Given these facts, I conclude that L2 grammar regarding the *wh*-movement operation in English by Japanese EFL learners, is constrained not only by L1 knowledge, but also by UG. Therefore, the results of my dissertation support the Transfer Hypothesis rather than the No UG Access Hypothesis or the Full Access Hypothesis.

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CHAPTER 1: INTRODUCTION

1.1. Goal

The goal of this dissertation is to investigate the relationship between second language (L2) acquisition and the involvement of the principles of Universal Grammar (UG) by Japanese English as a Foreign Language (EFL) learners. For this purpose, I focused on movement operations in English. There are two types of movement in language. Both types of movement are assumed to leave an empty category ([*e*]) (Chomsky 1981a). However, the landing sites of the movement are different, as shown in (1-1).

(1-1) a. [$_{IP}$ John [$_{VP}$ found Mary]].

b. [$_{IP}$ Mary$_i$ was [$_{VP}$ found [e_i]]].

c. [$_{CP}$ Who$_i$ [$_{IP}$ did John [$_{VP}$ find [e_i]]]?

Chomsky (1981b) calls the position which is potentially a recipient of a theta-role *argument position* (A-position), and calls the movement from an A-position to another A-position (in SPEC of IP) *A-movement* (*NP-movement*), as shown in (1-1b). On the other hand, there is another type of movement which involves SPEC of CP. This position is a non-argument position (Ā-position). This kind of movement, as shown in (1-1c), is called *Ā-movement* (*Wh-movement*). Let us consider the structure of the passive construction and the *wh*-interrogative construction in English and Japanese.

(1-2) *The Passive Construction*

a. Mary was found [*e*].

b. Mary-ga [*e*] mitsuke-rare-ta.
Mary-NOM find-passive-past
'Mary was found.'

The passive verb found in (1-2a) does not assign accusative Case to the underlying object NP *Mary*. The object NP must move to the IP-SPEC position where it can be assigned nominative Case. The mechanism of Japanese passive in (1-2b) is the same as English. Since the affix *rare* is a passive morpheme, *mitsukerareta* 'found' does not assign accusative Case to *Mary*. Therefore, the object NP moves to the IP-SPEC position, just like English. However, there is a clear syntactic difference in the *wh*-interrogative construction between English and Japanese, as shown in (1-3).

(1-3) *The Wh-interrogative Construction*

a. Who did John find [*t*]?

b. John-wa dare-o mitsuke-mashi-ta ka?
John-TOP who-ACC find-polite-past Q
'Who did John find?'

As shown in (1-3a), in English, the *wh*-phrase *who* undergoes movement to the clause initial position leaving a trace ([*t*]) in the original position. On the other hand, as shown in (3b), in Japanese, the *wh*-phrase *dare* 'who' remains in the position from which it originates. Thus, English and Japanese have different strategies (*wh*-movement/*wh*-in-situ) in the *wh*-interrogative construction. Given these facts, I focused on the acquisition of the

wh-movement operation by Japanese EFL learners.

1.2. Background

Since the late 1970s, many syntactic researchers focused on subject/non-subject asymmetries. Perlmutter (1971) found a subject/object asymmetry with respect to the *wh*-interrogative construction with long distance *wh*-movement, namely the *that*-trace effect, as shown in (1-4).

(1-4) a. Who do you think that John saw [*t*]?

b. Who do you think John saw [*t*]?

c. * Who do you think that [*t*] saw Bill?

d. Who do you think [*t*] saw Bill?

Furthermore, short distance *wh*-movement induces a subject/object asymmetry. Koopman (1983) found a T-C movement asymmetry, as shown in (1-5).

(1-5) a. What did Mary buy [*t*]?

b. * What Mary bought [*t*]?

c. * Who [*t*] did buy the book? (* unless *did* is focused)

d. Who [*t*] bought the book?

As for these asymmetries, many researchers (Koopman 1983; Lasnik and Saito 1984, 1992; Rizzi 1990; among others) explained them by using part of UG principles, namely the Empty Category Principle (ECP).

According to the theory of UG, a set of universal principles characterizes the

grammars of all possible natural languages. That the principles of UG are available to children when acquiring a first language (L1) is fairly uncontroversial. In L2 acquisition, there are three hypotheses in terms of access to UG, shown in (1-6), (1-7) and (1-8).

(1-6) *The No UG Access Hypothesis*

UG is unavailable in L2 acquisition. L2 grammar is constrained by L1 knowledge which the learners had already acquired.

(Clahsen and Muysken 1986; Bley-Vroman 1990; among others)

(1-7) *The Full Access Hypothesis*

UG is available in L2 acquisition. L2 grammar is constrained by UG, and it is uninfluenced by L1 knowledge.

(White 1989, 1992; among others)

(1-8) *The Transfer Hypothesis*

UG access is possible in L2 acquisition. L2 grammar is constrained by both L1 knowledge and UG.

(Cook 1988; Yuan 1994; among others)

Based on the syntactic asymmetries in *wh*-interrogatives, I will examine the acquisition of the *wh*-interrogative construction in English by Japanese EFL learners, and investigate which hypothesis will be supported by data from Japanese EFL learners in their acquisition of *wh*-interrogatives.

1.3. Literature Review

Since the late 1980's, in the field of L2 acquisition, some researchers have investigated the relationship between universal grammar and second language acquisition, and EFL learners' developmental sequences of the *wh*-interrogatives (White 1989, 2003; Pienemann *et al.* 1988; among others). Furthermore, some L2 acquisition researchers report that the EFL learners showed an argument/adjunct asymmetry and a subject/object asymmetry in the level of acquisition with respect to the *wh*-interrogative construction (White 1988; Kim 1999; Lee 2008; Kim 2010; Lee 2010; among others). In another type of *wh*-movement, O' Grady *et al*. (2003) focused on the acquisition of the relative clause construction by English speakers who were learning Korean, and found (i) that they showed a subject/object asymmetry, and (ii) that subject relatives are typically easier than object relatives. In Subsection 1.3.1 and Subsection 1.3.2, I summarize one of the previous studies with respect to the *wh*-interrogative construction with short distance *wh*-movement and long distance *wh*-movement, respectively.

1.3.1. Summary of Lee (2008)

Lee (2008) conducted a grammaticality judgment task with 41 Korean EFL learners in order to investigate the argument/adjunct asymmetry in the acquisition of inversion in *wh*-questions. The grammaticality judgment task was prepared as a listening test, and the participants were asked to indicate whether each sentence sounded grammatical in English on a Likert scale, which rates a sentence's grammaticality on a scale from -2 (sounds completely wrong) to +2 (sounds perfectly correct). In the test sentences, *what* and *who* were chosen for argument questions, and *how* and *why* for adjunct question. For each type of *wh*-question, inverted (grammatical) and uninverted (ungrammatical) sentences were

used in Lee's research. (1-9)-(1-10) show some examples of the test sentences, and (1-11) provides the result of the judgment task.

(1-9) *Examples of Test Sentences (Inverted/Grammatical)*

a. Who are you meeting in the cafeteria?

b. What are you reading in the library?

c. Why are you jumping on the bed?

d. How are you going to the campground?

(1-10) *Examples of Test Sentences (Uninverted/Ungrammatical)*

a. Who you are meeting in the cafeteria?

b. What you are reading in the library?

c. Why you are jumping on the bed?

d. How you are going to the campground?

(1-11) *Average Scores in Lee's (2008) Study*

	who	*what*	*why*	*how*
Inverted/Grammatical	0.74	1.27	0.81	1.20
Uninverted/Ungrammatical	-0.09	0.00	-0.48	-0.54

The analysis shows that a statistically significant difference was not found between argument questions and adjunct questions in the inverted *wh*-question judgment task. However, there was a statistically significant difference between them with respect to the uninverted *wh*-question judgment task. For Korean EFL learners, it was more difficult to notice the ungrammaticality of the uninverted adjunct *wh*-question than that of the uninverted argument *wh*-question. This result indicates that Korean EFL learners showed

an argument/adjunct asymmetry in the acquisition of *wh*-interrogatives, and that subject-aux inversion in argument *wh*-interrogatives was easier than that in adjunct *wh*-interrogatives for them.

1.3.2. Summary of Kim (2010)

Kim (2010) investigated whether Korean ESL learners would show the *that*-trace effect based on a grammaticality judgment task. 72 native speakers of English and 72 Korean ESL learners participated in the experiment. The 72 Korean ESL learners were classified into two groups based on the age of their arrival in the United States (36 early arrival learners and 36 late arrival learners). The survey was prepared as a 9-point scale acceptability judgment task, and the participants were asked to indicate whether each sentence sounded grammatical in English on a Likert scale, which rates a sentence's grammaticality on a scale from 1 (very bad) to 9 (very good), by circling the appropriate number on the scale. The test sentences had four constructions (2 extraction position (subject/object) x 2 type of *that* (+*that*/-*that*)). (1-12) shows the four types of the test sentences, and (1-13) shows the results of the grammaticality judgment task.

(1-12) a. Who did Bill think that saw you?

b. Who did Bill think that you saw?

c. Who did Bill think saw you?

d. Who did Bill think you saw?

(1-13) *Average Scores in Kim's (2010) Study*

	Average				
	Age of Arrival	Type (1-12a)	Type (1-12b)	Type (1-12c)	Type (1-12d)
Native Control (N=72)	-	4.20	5.61	5.31	5.43
Korean Early (N=36)	8.5	3.91	4.52	3.69	4.44
Korean Late (N=36)	12.9	4.42	4.93	3.36	4.36

Kim (2010) did not find a statistically significant difference between type (1-12a) and type (1-12c) for either of the Korean ESL learner groups. Therefore, this indicates that they did not show the *that*-trace effect. Thus, Kim (2010) concludes that the ECP does not operate for them.

1.4. General Research Questions

The above section shows the previous studies related to this dissertation. However, these studies have a potential problem. They used a Likert scale (5-point/9-point scale) for the grammaticality judgment survey. I assume, however, that the spectrum of a grammaticality judgment is continuous, and would not take discrete jumps (5-point/9-point scale), just like a pain of a patient, as suggested by Gould *et al*. (2001). To avoid problems arising from a Likert scale-based analysis, I used a writing test and a grammaticality judgment test based on the Visual Analogue Scaling evaluation method. Using a writing test, I examined the acquisition of the *wh*-interrogatives with short distance *wh*-movement in the first half of the dissertation. In the latter half of the dissertation, I investigated the relationship between the acquisition of *wh*-interrogatives and the involvement of the principles of UG. (1-14) shows the general research questions of my dissertation.

(1-14) *General Research Questions*

a. Do syntactic asymmetries affect the acquisition of the *wh*-movement operation by Japanese EFL learners?

b. Are the UG principles active for the *wh*-movement operation by Japanese EFL learners?

If the answer to the research question in (1-14a) is *Yes*, Japanese EFL learners will show an argument/adjunct asymmetry, or a subject/object asymmetry in the level of acquisition of the construction with *wh*-movement operation. On the other hand, if the answer is *No*, they will not have asymmetries in the level of acquisition.

If the answer to the research question in (1-14b) is *Yes*, the result will support the Full Access Hypothesis shown in (1-7). On the other hand, if the answer is *No*, the result will support the No UG Access Hypothesis shown in (1-6). If the answer is partially *Yes/No*, the result will support the Transfer Hypothesis shown in (1-8).

To address these research questions, I conducted (i) a *wh*-interrogative formation test, (ii) a translation test, (iii) a grammaticality judgment test with long distance *wh*-movement, and (iv) a grammaticality judgment test with multiple *wh*-interrogatives.

1.5. Organization

This dissertation consists of 10 chapters. Chapter 2 provides a five-minute English test to measure participants' EFL proficiency. Chapter 3 and Chapter 4 examine the acquisition of short distance *wh*-movement operation which Japanese EFL learners learn in school, and investigate whether (i) junior high school EFL learners and (ii) college and university EFL learners will show some asymmetry in the level of acquisition, respectively. Chapter 5 examines the long distance *wh*-movement operation, and investigates whether

Japanese EFL learners will show the *that*-trace effect in English. I then compare the tendency of Japanese EFL learners with other Asian (Chinese/Korean/Mongolian) EFL learners in Chapter 6, and point out the surprising *that*-trace effect by native speakers of English in Chapter 7. Chapter 8 examines the multiple *wh*-interrogative construction, and investigates whether Japanese EFL learners will show the superiority effect in English. I discuss the results from Chapters 3-8 in Chapter 9, and conclude this dissertation in Chapter 10.

CHAPTER 2: ENGLISH PROFICIENCY TESTS

2.1. Introduction

Various tests have been created in order to measure learners' English proficiency, such as the Test of English for International Communication (TOEIC), the Test of English as a Foreign Language (TOEFL), and the Test in Practical English Proficiency by the Society of Testing English Proficiency (STEP) known as *EIKEN*. However, it takes at least 60 minutes to administer the majority of them, which causes a great amount of exhaustion for test takers. In the field of L2 acquisition, some major tests have been widely used as part of experiments to identify participants' L2 proficiency, and it is a serious problem that participants are exhausted before the actual experiment.

To avoid this problem, in this study, I used two types of five-minute tests to measure Japanese EFL learners' English proficiency. In this chapter, I provide the details of the English proficiency tests which I used in my dissertation. Section 2.1 and Section 2.2 show the Minimal English Test (MET) for college and university Japanese EFL learners, and the junior Minimal English Test (jMET) for junior high school Japanese EFL learners, respectively.

2.2. The Minimal English Test

In order to measure college and university Japanese EFL learners' English proficiency, Maki *et al*. (2003) developed the original version of the Minimal English Test (MET), which is a five-minute English test, and requires the test taker to write a correct English word with four letters or fewer into each of the 72 blank spaces of the given sentences, while listening to the CD. The MET is based on Lessons 1 and 2 of the textbook for first year university students written by Kawana and Walker (2002) and the CD that

accompanies it. The CD reads out the sentences at a speed of 125 words per minute. Part of the MET is shown in (2-1). The MET is provided in Appendix 1.

(2-1) *Part of the Minimal English Test (MET)*

Student ID:_____ Name:_____ Date: _____

Please fill an English word with 4 letters or less into each blank space, while listening to the CD.

1. The majority of people have at least one pet at ( )[1] time in their ( )[2].
2. Sometimes the relationship between a pet ( )[3] or cat and its owner is ( )[4] close
3. that ( )[5] begin to resemble ( )[6] other in their appearance and behavior.

…

17. And ( )[33] your virtual pet ( )[34],
18. you ( )[35] reserve a permanent resting place ( )[36] the Internet in a virtual pet cemetery.

19. Sports are big business. Whereas Babe Ruth, the ( )[37] famous athlete of ( )[38] day,
20. was well-known ( )[39] earning as ( )[40] as the President of the United States, the average
21. salary ( )[41] today's professional baseball players is ( )[42] times that of the President.

…

35. As for the ( )[69] young aspirants who do ( )[70] succeed,
36. one wonders if they ( )[71] regret having ( )[72] their childhood.

Since 2003, the Maki Group has found statistically significant correlations between the scores on the MET and the scores on the English Section of the University Entrance Examinations (Center Test, CT) in Japan from 2002 to 2009[1]. I summarize the correlation coefficients in (2-2). For more details of the MET, see Goto *et al*. (2010).

[1] I follow Yanai (1998) in interpreting values of correlation coefficients. She assumes the following correspondence between correlation coefficients and their characteristics, shown in (I).

(I) *The Correspondence Between Correlation Coefficients and Their Characteristics*

Correlation Coefficients	**Characteristics**
$0 \leq r < \|.2\|$	almost no correlation
$\|.2\| \leq r < \|.4\|$	weak correlation
$\|.4\| \leq r < \|.7\|$	moderate correlation
$\|.7\| \leq r < \|.9\|$	strong correlation
$\|.9\| \leq r < \|1.0\|$	extremely strong correlation

(2-2) *The Correlation Coefficients Between the Scores on the MET and the Total Scores on the CT*

Year	2002	2003	2004	2005	2006	2007	2008	2009
Correlation Coefficient	.68	.72	.72	.61	.62	.66	.65	.59
Observations	154	629	657	600	610	895	563	877

The original MET developed by Maki *et al*. (2003) had a potential problem, however. It was not able to provide an explanation to the question of why the target words were four letters or fewer. To solve this problem, Maki *et al*. (2012) developed a new version of the MET, the MET 6B, which was designed along the rules in (2-3).

(2-3) a. Every 6th word is left blank.

b. Proper noun except country name in parentheses is ignored.

Rule (2-3a) guarantees that the MET 6B has the form of a cloze test, where every 6th word is left blank, no matter how many letters the word may consist of. The MET 6B is a five-minute simple test which requires the test taker to write a correct English word into each of the 65 blank spaces of the given sentences, written on one piece A4 paper, while listening to the CD on which the sentences are recorded. The CD reads out the sentences at a speed of 125 words per minute. Part of the MET 6B is shown in (2-4). The MET 6B is provided in Appendix 2.

(2-4) *Part of the Minimal English Test 6B (MET 6B)*

Student ID:_____ Name:_____ Date: _____

Please fill an English word into each blank space, while listening to the CD.

1. The majority of people have ( )[1] least one pet at some ( )[2] in their life.
2. Sometimes the ( )[3] between a pet dog or ( )[4] and its owner
3. is so ( )[5] that they begin to resemble ( )[6] other in their appearance
4. and ( )[7]. On the other hand, owners ( )[8] unusual pets
5. such as tigers ( )[9] snakes sometimes have to protect ( )[10] from their own pets

….

17. And ( )[30] your virtual pet dies, you ( )[31] reserve a permanent resting place
18. ( )[32] the Internet in a virtual ( )[33] cemetery.

19. Sports are big business. ( )[34] Babe Ruth, the most famous athlete of ( )[35] day,
20. was well-known for earning ( )[36] much as the President of ( )[37] United States,

…

35. when they grow ( )[62]. As for the many young ( )[63] who do not succeed,
36. one ( )[64] if they will regret having ( )[65] their childhood.

Since then, the Maki Group has found statistically significant correlations between the scores on the MET 6B and the scores on the CT. I summarize the correlation coefficients in (2-5).

(2-5) *The Correlation Coefficients Between the Scores on the MET6B and the Total Scores on the CT*

Year	2011	2012	2013
Correlation Coefficient	.60	.57	.60
Observations	217	127	142

For the classification of the participants based on L2 proficiency in Chapter 4, I used the MET. As for the other chapters (Chapter 5, 6, and 8), I used the MET 6B[2].

[2] I administered the survey in Chapter 4 in 2010. The Maki Group created the MET 6B in 2011. Therefore, in Chapter 4, I did not use the MET 6B, which is used in the other chapters.

2.3. New Horizon Version of the junior Minimal English Test

In order to measure junior high school EFL learners' English proficiency, I used *New Horizon* version of the junior Minimal English Test (jMET(H)). The jMET(H) originated from the MET, which are shown in Section 2.2. The jMET(H) is based on the passages adopted from the three textbooks widely used in junior high schools in Japan called *New Horizon English Courses 1, 2* and *3* by Kasashima *et al*. (2006a, 2006b, 2006c). The jMET(H) was designed along the rules in (2-3), which are repeated in (2-6).

(2-6) a. Every 6th word is left blank.

b. Proper noun except country name in parentheses is ignored.

The jMET(H) contains 9 independent dialogues, which are written in 37 lines. There are 67 questions in the jMET(H), and it takes about 5 minutes to complete it. Participants are required to write an English word into each blank space of the given sentences, while listening to the CD, which accompanies the textbook. The CD reads out the sentences at a speed of 120 words per minute. Part of the jMET(H) is shown in (2-7). The jMET(H) is provided in Appendix 3.

(2-7) *Part of New Horizon Version of the junior Minimal English Test (jMET(H))*

Student ID:_____ Name:_____ Date: _____

Please fill an English word into each blank space, while listening to the CD.

1. This is my family. This ( )[1] my sister Lisa.
2. She lives in ( )[2]. She likes Japan very much. ( )[3] husband Koji teaches Japanese.

...

32. Thanks to ( )[56] help, our village has another ( )[57]. It is near my house.
33. ( )[58] I have already started going ( )[59] school again.
34. I have a ( )[60] of things to learn. My ( )[61] also go to
35. the same ( )[62]. There is a class for ( )[63].
36. They are learning to read ( )[64] write. We are very glad ( )[65] have a chance
37. to study ( )[66] at home. It is fun. ( )[67] you all very much.

The Maki Group has found that the scores on the jMET(H) had statistically significant correlations with (i) the scores on the Term Test, and (ii) the scores on the Achievement Test. I summarize the correlation coefficients in (2-8).

(2-8) *The Correlations Coefficients Between the Scores on the jMET(H) and the Total Scores on the Other Tests*

Year		2012	2013
Correlation Coefficient	Term Test	.76	.78
	Achievement Test	.75	.75
Observations		299	274

Then, Maki *et al*. (to appear) found that there was a statistically significant moderate correlation between the scores on the jMET(H) and the grades of the STEP tests (n=197, r=.64, p<.001). For the classification of the participants based on L2 proficiency in Chapter 3, I used the jMET(H).

CHAPTER 3: ASYMMETRIES IN THE SHORT DISTANCE WH-MOVEMENT OPERATION BY JUNIOR HIGH SCHOOL EFL LEARNERS IN JAPAN

3.1. Introduction

There is a clear syntactic difference in the *wh*-interrogative construction between English and Japanese. The *wh*-phrase in English overtly moves to CP-SPEC, while in Japanese, the *wh*-phrase remains in the position from which it originates. Thus, the two general strategies involved in the *wh*-construction are *wh*-movement and *wh*-in-situ, shown in (3-1). As shown in (3-1a), in English, the *wh*-phrase *who* undergoes movement to the clause initial position leaving a trace in the original position. On the other hand, as shown in (3-1b), in Japanese, the *wh*-phrase *dare* 'who' remains in the position from which it originates.

(3-1) a. Who did John find [*t*]?[3] (English)

b. John-wa dare-o mitsuke-mashi-ta ka?
John-TOP who-ACC find-polite-past Q
'Who did John find?' (Japanese)

However, both (3-1a) and (3-1b) have the same interpretation at the level of semantics. Therefore, it has been assumed that the *wh*-movement operation takes place in the Logical

[3] The construction induces a subject/non-subject asymmetry. Koopman (1983) points out a T-C movement asymmetry with respect to the *wh*-interrogative construction with short distance *wh*-movement, shown in (I).

(I) a. What did Mary buy?
b. * What Mary bought?
c. * Who did buy the book? [* unless did is focused]
d. Who bought the book?

For subject *wh*-extraction, the sentence does not need the *do*-support operation.

Form component in Japanese (Nishigauchi 1990). In the field of L2 acquisition, previous research within the generative grammar framework has focused on knowledge of constraints on *wh*-movement in languages, and has attempted to parametrically distinguish *wh*-movement languages from *wh*-in-situ languages (Hawkins and Chan 1997).

Given this fact, in this chapter, I focus on the *wh*-interrogative construction in English with the *do*-support operation, which Japanese EFL learners learned in school, and examine whether there would be statistically significant differences in the level of acquisition among 5 types of construction; (i) *yes/no* question, (ii) subject *wh*-extraction, (iii) object *wh*-extraction, (iv) pseudo adjunct *wh*-extraction, and (v) adjunct *wh*-extraction.

The organization of this chapter is as follows. Section 3.2 presents the procedure of this study. Section 3.3 reports the result of analysis, and finally Section 3.4 summarizes the findings of this study.

3.2. Procedure

In this section, I present the procedure of this study. Subsection 3.2.1 provides a research question and the prediction. Subsection 3.2.2 and Subsection 3.2.3 show the overview of the material and the details of the participants, respectively.

3.2.1. Purpose

In this chapter, I examine the acquisition of the *yes/no*-interrogative construction and four types of *wh*-interrogative constructions (subject, object, pseudo adjunct, and adjunct *wh*-extraction) by Japanese junior high school EFL learners. Since Japanese EFL learners typically learn these interrogative constructions for the first time in junior high school, I focused on this school level. In this study, there are three research questions, as shown in (3-2).

(3-2) *Research Questions*

a. Between the *yes/no*-interrogative construction and the *wh*-interrogative construction, is there any difference in the level of acquisition?

b. Between argument *wh*-extraction and adjunct *wh*-extraction, is there any difference in the level of acquisition?

c. Between subject *wh*-extraction and object *wh*-extraction, is there any difference in the level of acquisition?

First, if the answer to the research question in (3-2a) is *Yes*, the difficulty in acquisition of interrogatives involves the number of operations. Second, if the answer to the research question in (3-2b) is *Yes*, Japanese EFL learners will show an argument/adjunct asymmetry in the level of acquisition. Third, if the answer to the research question in (3-2c) is *Yes*, Japanese EFL learners will show a subject/object asymmetry in the level of acquisition. On the other hand, if the answer to the research questions in (3-2a)-(3-2c) are *No*, as for Japanese EFL learners, there will be no significant difference in the acquisition of interrogatives among five types of constructions. My predictions of this study are shown in (3-3).

(3-3) *Predictions*

a. There is a statistically significant difference in the level of acquisition between *yes/no* interrogatives and *wh*-interrogatives. For Japanese EFL learners, it is more difficult to generate *wh*-interrogatives than *yes/no* interrogatives which have only the *do*-insertion operation.

b. Japanese EFL learners show an argument/adjunct asymmetry in the level of acquisition. For them it is more difficult to generate *wh*-interrogatives with adjunct extraction than argument extraction, just like the result of Lee (2008).

c. Japanese EFL learners show a subject/object asymmetry in the level of acquisition. For them it is more difficult to generate *wh*-interrogatives with object extraction than subject extraction which does not have the *do*-support operation.

To examine the research questions in (3-2), I administered an interrogative formation test to 145 Japanese junior high school EFL learners.

3.2.2. Materials

In this subsection, I provide the detail of the main materials of this study. In order to investigate the acquisition of the interrogative construction by Japanese junior high school EFL learners, I created an interrogative formation test. The test sentences contain the *yes/no*-interrogative construction and four types of the *wh*-interrogative construction, some of which are shown in (3-4). All the sentences are provided in Appendix 4.

(3-4) a. *Yes/No Question (Do-Insertion)*

Question: Ron found Pam.

(*make an interrogative sentence whose answer is 'Yes, he did.'*)

Answer: Did Ron find Pam?

b. *Subject Wh-Extraction (Argument$_{(Subject)}$, who)*

Question: <u>Ron</u> found Pam.

(*make an interrogative sentence which asks the underlined part.*)

Answer: Who found Pam?

c. *Object Wh-Extraction (Argument$_{(Object)}$, who/what)*

Question: Ron found <u>Pam</u>.

(*make an interrogative sentence which asks the underlined part.*)

Answer: Who did Ron find?

d. *Pseudo Adjunct Wh-Extraction (Adjunct$_{(Time/Date)}$, when)*

Question: Ron found Pam <u>two days ago</u>.

(*make an interrogative sentence which asks the underlined part.*)

Answer: When did Ron find Pam?

e. *Adjunct Wh-Extraction (Adjunct$_{(Reason)}$, why)*

Question: Ron found Pam <u>because she rode the bus</u>.

(*make an interrogative sentence which asks the underlined part.*)

Answer: Why did Ron find Pam?

I created two types of test sheets for the counterbalanced design. The test sentences have 5 types of structures shown in (3-4), which constitute minimal pairs. I used 6 verbs which take a human subject and a human object (*see, find, help, catch, hit, save*), and 6 verbs which take a human subject and an inanimate object (*read, eat, write, buy, wash, play*) in the test sentences[4]. All the verbs used are amongst those taught at junior high school in Japan. Therefore, there are 12 examples in each type of structure, and each test sheet

[4] The Japanese junior high school EFL learners showed animacy effect. The rate of accuracy on animate object is .2630, and the rate of accuracy on inanimate object is .3628. Therefore, for them, animate object *wh*-extraction is more difficult than inanimate object *wh*-extraction (p<.001).

contains 6 examples (3 verbs that take a human object, and 3 verbs that take an inanimate object) based on the Latin square method. Both types of test sheets consisted of 30 questions in total.

Some remarks on the test are in order. First, the time limit for the interrogative formation test is 30 minutes. Second, the answers with spelling mistakes were not counted as wrong, but those with mistakes on dislocation, tense, and agreement were. Third, and finally, all the sentences in the interrogative formation test were graded either as correct or wrong.

3.2.3. Participants

I administered the interrogative formation test to 145 Japanese EFL learners who were learning English as a second language in Japanese junior high school. (3-5) shows the subjects' background.

(3-5) *Subjects' Background*

Observations	145
Ratio of Gender (Female: Male)	82:63
Age Range	12-15
Average Age	13.67
Average Score on the jMET(H)	32.08
Standard Deviation on the jMET(H)	9.55

The participants took the jMET(H) which is a five-minute English proficiency test shown in Section 2.3 at the same time. Based on the deviation value of the jMET(H), the participants were classified into 3 EFL level groups. I show the classification of the participants in (3-6).

(3-6) *Three Types of EFL Level Groups*

		Beginner	Intermediate	Advanced
jMET(H)	Score Range	8-27	28-36	37-59
	Average Score	21.88	31.67	43.42
	Deviation Value	DV<45	45≤DV<55	55≤DV
Observations		48	52	45

3.3. Results

Section 3.3 reports the result of analysis. The collected data was analyzed by a repeated measure of ANOVA and a multiple comparison (Bonferroni). In all analyses, the significant level was set at α<.05. I address research questions (3-2a), (3-2b), and (3-2c) in Subsection 3.3.1, Subsection 3.3.2, and Subsection 3.3.3, respectively. Subsection 3.3.1 compares *yes/no*-interrogatives and four types of *wh*-interrogatives. Subsection 3.3.2 presents the results concerning with an argument/adjunct asymmetry in *wh*-interrogatives, whereas the results concerning with a subject/object asymmetry are discussed in Subsection 3.3.3.

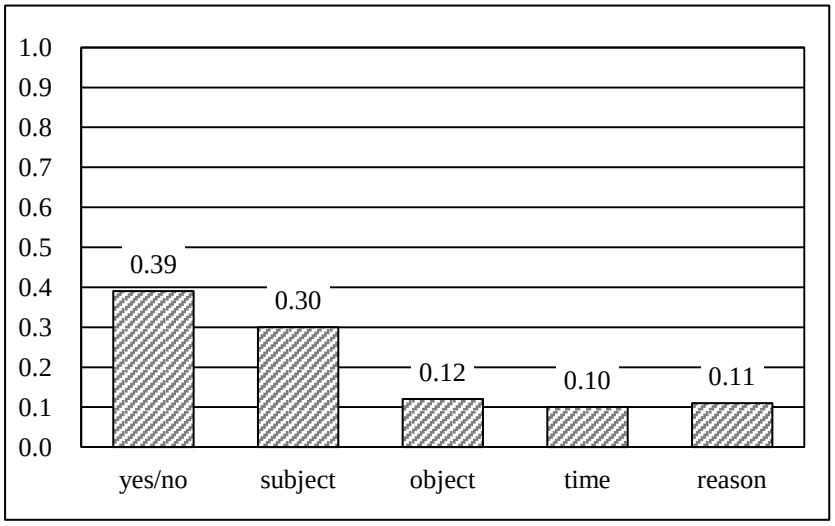
3.3.1. Comparison Between Yes/No-Interrogatives and Wh-Interrogatives

This subsection addresses research question (3-2a). I examine whether there will be a statistically significant difference in the level of acquisition between *yes/no*-interrogatives and *wh*-interrogatives. The descriptive statistics of the 5 types of interrogative constructions is shown in (3-7), and it is more clearly represented by (3-8), (3-9), and (3-10).

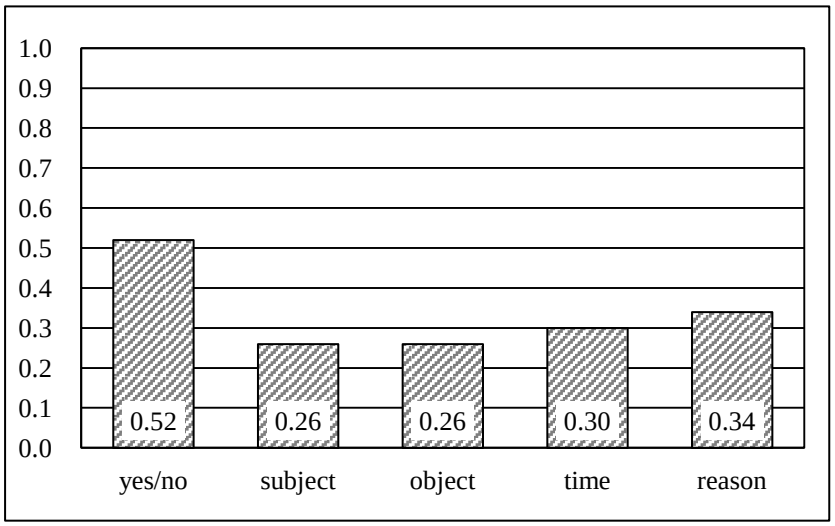
(3-7) *Descriptive Statistics*

		Yes/no	*Argument*		*Adjunct*	
			Subject	*Object*	*Time*	*Reason*
Beginner	Rate of Accuracy	.3889	.2986	.1181	.1007	.1146
	Standard Deviation	.2904	.3350	.2478	.2567	.2553
Intermediate	Rate of Accuracy	.5192	.2564	.2628	.3045	.3397
	Standard Deviation	.3424	.3898	.3483	.3774	.3820
Advanced	Rate of Accuracy	.7259	.2667	.5630	.6444	.6593
	Standard Deviation	.3484	.3947	.3765	.3902	.3793

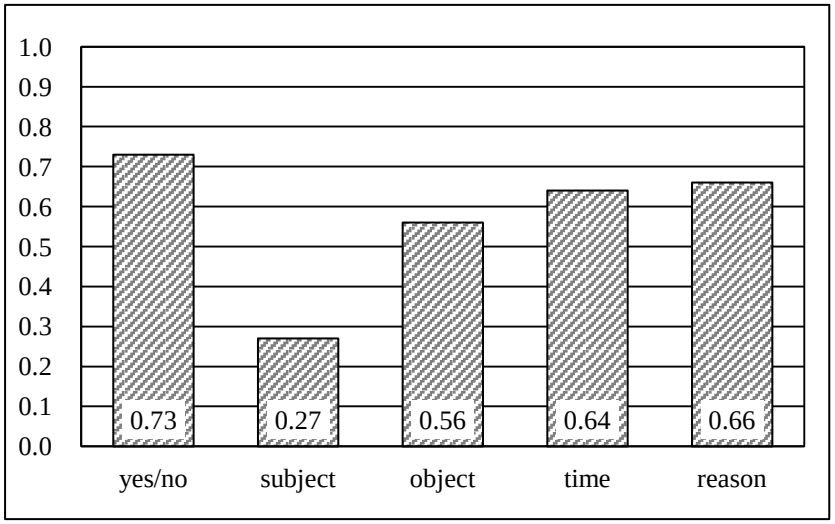
(3-8) *Beginner EFL Learners (N=48)*



(3-9) *Intermediate EFL Learners (N=52)*



(3-10) *Advanced EFL Learners (N=45)*



By a repeated measure of 3x5 (EFL level type and interrogative construction type) ANOVA, I found a statistically significant (i) main effect for factor interrogative construction type ($F_{(4,139)}$=22.76, p<.001), and (ii) main effect for factor EFL level type ($F_{(2,142)}$=27.97, p<.001). And then, there was a statistically significant interaction between two factors ($F_{(4,140)}$=7.55, p<.001).

By a multiple comparison (Bonferroni), I found several statistically significant differences between *yes/no* interrogatives and four types of *wh*-interrogatives, as shown in (3-11).

(3-11) a. As for the beginner EFL learners, the rate of accuracy on *yes/no*-interrogatives had statistically significant differences with (i) that on *wh*-interrogatives with object extraction ($F_{(4,139)}$=10.56, p<.001), (ii) that on *wh*-interrogatives with pseudo adjunct (*time*) extraction ($F_{(4,139)}$=10.56, p<.001), and (iii) that on *wh*-interrogatives with adjunct (*reason*) extraction ($F_{(4,139)}$=10.56, p<.001).

b. As for the intermediate EFL learners, the rate of accuracy on *yes/no*-interrogatives had statistically significant differences with (i) that on *wh*-interrogatives with subject extraction ($F_{(4,139)}$=9.52, p<.003), (ii) that on *wh*-interrogatives with object extraction ($F_{(4,139)}$=9.52, p<.001), (iii) that on *wh*-interrogatives with pseudo adjunct (*time*) extraction ($F_{(4,139)}$=9.52, p<.001), and (iv) that on *wh*-interrogatives with adjunct (*reason*) extraction ($F_{(4,139)}$=10.56, p<.001).

c. As for the advanced EFL learners, the rate of accuracy on *yes/n*o-interrogatives had statistically significant differences with (i) that on *wh*-interrogatives with subject extraction ($F_{(4,139)}$=10.62, p<.001), and (ii) that on *wh*-interrogatives with object extraction ($F_{(4,139)}$=10.62, p<.007).

Thus, each EFL level group showed different tendencies. As for the beginner EFL learners, it was easier to generate *yes/no*-interrogatives than three types of *wh*-interrogatives except subject *wh*-extraction. As for the intermediate EFL learners, it was more difficult to generate four types of *wh*-interrogatives than *yes/no*-interrogatives. It was easier for the advanced EFL learners to generate *yes/no*-interrogatives than *wh*-interrogatives with argument (subject and object) extraction.

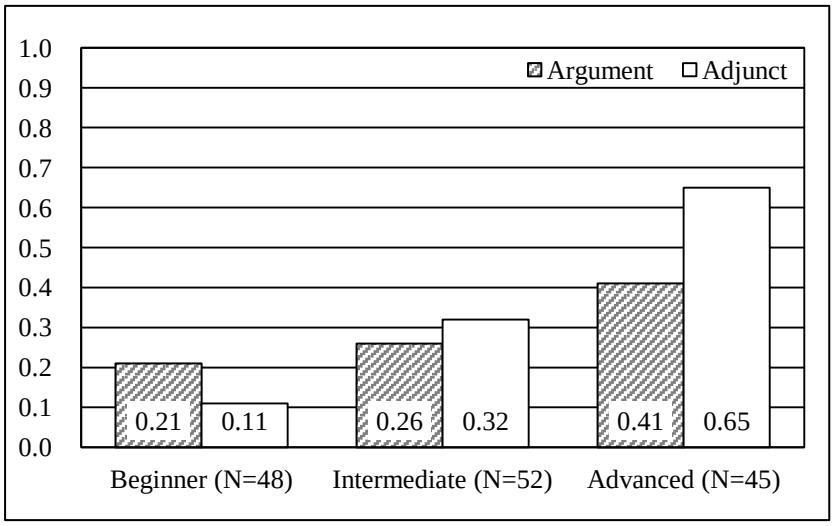
3.3.2. Argument/Adjunct Asymmetry

This subsection addresses research question (3-2b). I examined whether Japanese EFL leaners would show an argument/adjunct asymmetry in the level of acquisition with respect to the *wh*-interrogative construction. The descriptive statistics on the two types of *wh*-interrogatives is shown in (3-12), and it is more clearly represented by (3-13).

(3-12) *Descriptive Statistics*

		Argument	*Adjunct*
Beginner	Rate of Accuracy	.2083	.1076
	Standard Deviation	.2091	.2461
Intermediate	Rate of Accuracy	.2596	.3221
	Standard Deviation	.2576	.3668
Advanced	Rate of Accuracy	.4148	.6519
	Standard Deviation	.2400	.3732

(3-13) *Comparison Between Argument Wh-Extraction and Adjunct Wh-Extraction*



By a repeated measure of 3x2 (EFL level type and interrogative construction (argument/adjunct) type) ANOVA, I found a statistically significant (i) main effect for factor interrogative construction type ($F_{(1,142)}$=6.86, p<.010), and (ii) main effect for factor EFL level type ($F_{(2,142)}$=27.59, p<.001). And then, there was a statistically significant interaction between two factors ($F_{(2, 142)}$=14.33, p<.001).

By a multiple comparison (Bonferroni), I found statistically significant differences between argument and adjunct *wh*-extraction, as shown in (3-14).

(3-14) a. As for the beginner EFL learners, there is a statistically significant difference in the rate of accuracy between argument *wh*-extraction and adjunct *wh*-extraction ($F_{(1, 142)}$=5.26, p<.023).

b. As for the advanced EFL learners, there is a statistically significant difference in the rate of accuracy between argument *wh*-extraction and adjunct *wh*-extraction ($F_{(1, 142)}$=27.36, p<.001).

Thus, the Japanese EFL learners showed two types of argument/adjunct asymmetries in the level of *wh*-interrogative acquisition. As for the beginner EFL learners, it was more difficult to generate *wh*-interrogatives with adjunct extraction than argument extraction. On the other hand, it was more difficult to generate *wh*-interrogatives with argument extraction than adjunct extraction for the advanced EFL learners.

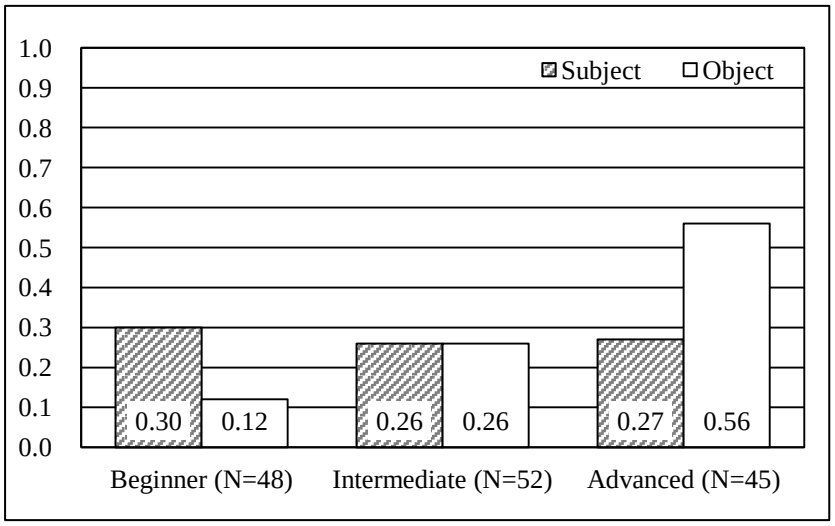
3.3.3. Subject/Object Asymmetry

This subsection addresses research question (3-2c). I focused on argument *wh*-interrogatives, and examined whether Japanese EFL leaners will show a subject/object asymmetry in the level of acquisition with respect to the *wh*-interrogative construction. The descriptive statistics on the two types of *wh*-interrogatives is shown in (3-15), and it is more clearly represented by (3-16).

(3-15) *Descriptive Statistics*

		Subject	*Object*
Beginner	Rate of Accuracy	.1181	.1076
	Standard Deviation	.2478	.2461
Intermediate	Rate of Accuracy	.2628	.3221
	Standard Deviation	.3483	.3668
Advanced	Rate of Accuracy	.5630	.6519
	Standard Deviation	.3765	.3732

(3-16) *Comparison Between Subject Wh-Extraction and Object Wh-Extraction*



By a repeated measure of 3x2x2 (EFL level type, interrogative construction (argument/adjunct) type, and trace position (subject/object) type) ANOVA, I found a statistically significant (i) main effect for factor interrogative construction type ($F_{(1,142)}$=6.86, p<.010), (ii) main effect for factor EFL level type ($F_{(2,142)}$=27.59, p<.001), and (iii) interaction among three factors ($F_{(2, 142)}$=8.55, p<.001). However, there was no statistically significant main effect for factor trace type ($F_{(1,142)}$=1.92, p<.168).

By a multiple comparison (Bonferroni), I found statistically significant differences between subject and object *wh*-extraction, as shown in (3-17).

(3-17) a. As for the beginner EFL learners, there is a statistically significant difference in the rate of accuracy between subject *wh*-extraction and object *wh*-extraction ($F_{(1, 142)}$=5.80, p<.017).

b. As for the advanced EFL learners, there is a statistically significant difference in the rate of accuracy between subject *wh*-extraction and object *wh*-extraction ($F_{(1, 142)}$=14.53, p<.001).

Thus, the Japanese EFL learners showed two types of subject/object asymmetries in the level of *wh*-interrogative acquisition. As for the beginner EFL learners, it was more difficult to generate *wh*-interrogatives with object extraction than subject extraction. On the other hand, it was more difficult to generate *wh*-interrogatives with subject extraction than object extraction for the advanced EFL learners.

3.4. Conclusion

In this study, I examined whether Japanese junior high school EFL learners would show a difference in the level of acquisition among 5 types of the interrogative constructions in English. The research questions in (3-2) and the predictions in (3-3) are repeated in (3-18) and (3-19), respectively.

(3-18) *Research Questions*

a. Between the *yes/no*-interrogative construction and the *wh*-interrogative construction, is there any difference in the level of acquisition?

b. Between argument *wh*-extraction and adjunct *wh*-extraction, is there any difference in the level of acquisition?

c. Between subject *wh*-extraction and object *wh*-extraction, is there any difference in the level of acquisition?

(3-19) *Predictions*

a. There is a statistically significant difference in the level of acquisition between *yes/no* interrogatives and *wh*-interrogatives. For Japanese EFL learners, it is more difficult to generate *wh*-interrogatives than *yes/no* interrogatives which have only the *do*-insertion operation.

b. Japanese EFL learners show an argument/adjunct asymmetry in the level of acquisition. For them it is more difficult to generate *wh*-interrogatives with adjunct extraction than argument extraction, just like the result of Lee (2008).

c. Japanese EFL learners show a subject/object asymmetry in the level of acquisition. For them it is more difficult to generate *wh*-interrogatives with object extraction than subject extraction which does not have the *do*-support operation.

First, the answer to the research question in (3-18a) is partially *Yes*, and the prediction in (3-19) is partially *True*. Through the analysis, I found that the intermediate Japanese EFL learners showed statistically significant differences in the rate of accuracy on the interrogative formation test between *yes/no*-interrogatives and *wh*-interrogatives with four types of *wh*-extraction. However, the beginner EFL learners did not show a statistically significant difference between *yes/no*-interrogatives and *wh*-interrogatives with subject *wh*-extraction. Furthermore, the advanced EFL learners did not show a statistically significant difference between *yes/no*-interrogatives and *wh*-interrogatives with adjunct (*time* and *reason*) *wh*-extraction.

Second, the answer to the research question in (3-18b) is almost *Yes*, and the prediction in (3-19b) is partially *True*. Through the analysis, I found that for the beginner EFL leaners, the *wh*-interrogative construction with argument *wh*-extraction was easier than adjunct *wh*-extraction. This result supports the result of Lee (2008). However, the advanced EFL learners showed the opposite tendency from the beginner EFL learners. For them, the *wh*-interrogative construction with adjunct *wh*-extraction was easier than argument *wh*-extraction. This result does not bear out my prediction (3-19b).

Third, and finally, the answer to the research question in (3-18c) is almost *Yes*, and the prediction in (3-19c) is partially *True*. Through the analysis, I found that for the beginner EFL leaners, the *wh*-interrogative construction with subject *wh*-extraction was easier than object *wh*-extraction. This result bears out my prediction (3-19c). However, the advanced EFL learners showed the opposite tendency from the beginner EFL learners. For them, the *wh*-interrogative construction with object *wh*-extraction was easier than subject *wh*-extraction.

In the next chapter, I examine whether Japanese college and university EFL learners will show the same tendency as the Japanese junior high school EFL learners, and whether these asymmetries will be a general tendency for Japanese EFL learners.

CHAPTER 4: A STUDY OF THE SHORT DISTANCE WH-MOVEMENT OPERATION BY COLLEGE AND UNIVERSITY EFL LEARNERS IN JAPAN

4.1. Introduction

In the previous chapter, I found that the Japanese junior high school EFL learners showed (i) an argument/adjunct asymmetry, and (ii) a subject/object asymmetry in the level of acquisition with respect to the *wh*-interrogative construction. Given these results, in this chapter, I will examine whether these asymmetries are a general tendency for Japanese EFL learners. To address this question, I will conduct a translation test with respect to (i) the *wh*-interrogative construction and (ii) the relative clause construction to Japanese college and university EFL learners.

The syntactic difference in the *wh*-interrogative construction between English and Japanese was shown in Section 3.1. The general strategies involved in the *wh*-construction are overt *wh*-movement and *wh*-in-situ. As for the relative clause construction, there are several differences between these languages. The examples in (4-1) are relative clauses in English and Japanese.

(4-1) a. Paul saw the man [who John found [*t*]]. (English)

b. Paul-wa [John-ga [*t*] mitsuke-ta] hito-o mi-ta.
Paul-TOP John-NOM find-past man-ACC see-past
'Paul saw the man who John found.' (Japanese)

(4-1a) contains an object relative clause in the object domain. The head *the man* is the object of the verb inside the relative clause, and a relativizer (*wh*-word) appears at the edge

of the relative clause[5]. On the other hand, because Japanese is a head-final language, the position of the relative clauses is prenominal, and there is no relativizer to demarcate the beginning/end of the clause.

Given these facts, in this chapter, I will examine whether Japanese college and university EFL learners will show (i) an argument/adjunct asymmetry and a subject/object asymmetry in the acquisition of the *wh*-interrogative construction with short distance *wh*-movement, and (ii) a subject/object asymmetry in the acquisition of the relative clause construction.

The organization of this chapter is as follows. Section 4.2 presents the procedure of this study. Section 4.3 reports the result of analysis, and Section 4.4 summarizes the findings of this study.

4.2. Procedure

In this section, I mention the procedure of this study. Subsection 4.2.1 provides a research question and the prediction. Subsection 4.2.2 and Subsection 4.2.3 show the overview of the material and the details of the participants, respectively.

4.2.1. Purpose

In this study, in order to verify whether the result in Chapter 3 is a general tendency for Japanese EFL learners, I examine whether Japanese college and university EFL learners will show asymmetries in acquisition of the *wh*-interrogative construction with short distance *wh*-movement and the relative clause construction. There are 3 research questions, shown in (4-2).

[5] As for the object relative clause, the relativizer may be optionally deleted.

(4-2) a. As for the *wh*-interrogative construction, is there any difference in the level of acquisition between argument *wh*-extraction and adjunct *wh*-extraction?

b. As for the *wh*-interrogative construction, is there any difference in the level of acquisition between subject *wh*-extraction and object *wh*-extraction?

c. As for the relative clause construction, is there any difference in the level of acquisition between subject *wh*-extraction and object *wh*-extraction?

First, if the answer to the research questions in (4-2a) and (4-2b) is *Yes*, the results of this study will support the result of Chapter 3, and Japanese EFL learners show some asymmetries in the acquisition of the *wh*-interrogative construction with short distance *wh*-movement. On the other hand, if the answer to the research questions in (4-2a) and (4-2b) is *No*, college and university EFL learners show a different tendency from junior high school EFL learners. Second, if the answer to the research question in (4-2c) is *Yes*, Japanese EFL learners also show a subject/object asymmetry in another type of short distance *wh*-movement. If the answer is *No*, they do not show an asymmetry in the acquisition of the relative clause construction. (4-3) shows the predictions of this study.

(4-3) a. Japanese college and university EFL learners show an argument/adjunct asymmetry in acquisition of the *wh*-interrogative construction, just like junior high school EFL learners.

b. Japanese college and university EFL learners show a subject/object asymmetry in acquisition of the *wh*-interrogative construction, just like junior high school EFL learners.

c. Japanese EFL learners show a subject/object asymmetry in acquisition of the relative clause construction, just like the result of O'Grady *et al*. (2003).

To examine the research questions in (4-2), I administered a translation test to 178 Japanese college and university EFL learners.

4.2.2. Materials

In this subsection, I provide the detail of the main materials of this study. In order to investigate the acquisition of the interrogative construction by Japanese junior high school EFL learners, I created a translation formation test. The participants translated Japanese sentences into English. The test sentences contain the *wh*-interrogative construction and the relative clause construction, some of which are shown in (4-4) and (4-5). All the test sentences are provided in Appendix 5.

(4-4) *The Wh-Interrogative Construction*

a. *Subject Wh-Extraction (Argument$_{(Subject)}$, who)*

Question: Dare-ga Pam-o mitsuke-mashi-ta ka?

who-NOM Pam-ACC find-polite-past Q

Answer: Who found Pam?

b. *Object Wh-Extraction (Argument$_{(Object)}$, who/what)*

Question: Ron-wa dare-o mitsuke-mashi-ta ka?

Ron-TOP who-ACC find-polite-past Q

Answer: Who did Ron find?

c. *Pseudo Adjunct Wh-Extraction (Adjunct$_{(Time/Date)}$, when)*

Question: Itu Ron-wa Pam-o mitsuke-mashi-ta ka?

when Ron-TOP Pam-ACC find-polite-past Q

Answer: When did Ron find Pam?

d. *Adjunct Wh-Extraction (Adjunct$_{(Reason)}$, why)*

Question: Naze Ron-wa Pam-o mitsuke-mashi-ta ka?

why Ron-TOP Pam-ACC find-polite-past Q

Answer: Why did Ron find Pam?

(4-5) *The Relative Clause Construction*

a. *Subject Wh-Extraction from the Subject Domain (SS)*

Question: [Pam-o mitsuke-ta hito-wa] Richard-o tasuke-ta.

Pam-ACC find-past man-TOP Richard-ACC help-past

Answer: The man who found Pam helped Richard.

b. *Object Wh-Extraction from the Subject Domain (OS)*

Question: [Ron-ga mitsuke-ta hito-wa] Richard-o tasuke-ta.

Ron-NOM find-past man-TOP Richard-ACC help-past

Answer: The man who Ron found helped Richard.

c. *Subject Wh-Extraction from the Object Domain (SO)*

Question: Richard-wa [Pam-o mitsuke-ta hito-o] tasuke-ta.

Richard-TOP Pam-ACC find-past man-ACC help-past

Answer: Richard helped the man who found Pam.

d. *Object Wh-Extraction from the Object Domain (OO)*

Question: Richard-wa [Ron-ga mitsuke-ta hito-o] tasuke-ta.

Richard-TOP Ron-NOM find-past man-ACC help-past

Answer: Richard helped the man who Ron found.

I created two types of test sheets for the counterbalanced design. The test sentences have eight types of structure, which constitute minimal pairs. There are eight examples in each

type of structure, and each test sheet contains four examples based on the Latin square method. Both types of test sheets consisted of 68 questions in total (32 test sentences and 36 filler sentences).

Some remarks on the test are in order. First, the time limit for the interrogative formation test is 40 minutes. Second, the answers with spelling mistakes were not counted as wrong, but those with mistakes on dislocation, tense, and agreement were. Third, and finally, all the sentences in the interrogative formation test were graded either as correct or wrong.

4.2.3. Participants

I administered the interrogative formation test to 178 Japanese EFL learners who were learning English as a second language in Japanese college and university. (4-6) shows the subjects' background.

(4-6) *Subjects' Background*

Observations	178
Ratio of Gender (Female: Male)	176:2
Age Range	18-22
Average Age	18.99
Average Score on the MET	37.30
Standard Deviation on the MET	10.00

The participants took the MET which is a five-minute English proficiency test shown in Section 2.2 at the same time. Based on the deviation value of the MET, the participants were classified into 3 EFL level groups. I show the classification of the participants in (4-7).

(4-7) *Three Types of EFL Level Groups*

		Beginner	Intermediate	Advanced
MET	Score Range	8-27	28-36	37-59
	Average Score	21.88	31.67	43.42
	Deviation Value	DV<45	45≤DV<55	55≤DV
Observations		46	73	59

4.3. Results

Section 4.3 reports the result of analysis. The collected data was analyzed by a repeated measure of ANOVA and a multiple comparison (Bonferroni). In all analyses, the significant level was set at α<.05. I address research questions (4-2a), (4-2b), and (4-2c) in Subsection 4.3.1, Subsection 4.3.2, and Subsection 4.3.3, respectively. Subsection 4.3.1 presents the results concerning an argument/adjunct asymmetry in *wh*-interrogatives, whereas the results concerning a subject/object asymmetry are discussed in Subsection 4.3.2. Subsection 4.3.3 reports the result of a subject/object asymmetry in relative clauses.

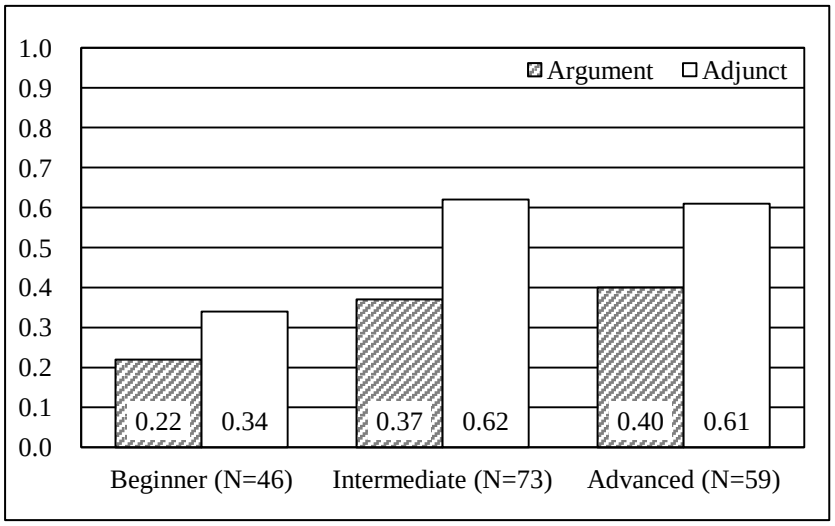
4.3.1. An Argument/Adjunct Asymmetry in Wh-Interrogatives

This subsection addresses research question (4-2a). I examined whether the participants would show an argument/adjunct asymmetry in the level of acquisition with respect to the *wh*-interrogative construction. The descriptive statistics on the two types of *wh*-interrogatives is shown in (4-8), and it is more clearly represented by (4-9).

(4-8) *Descriptive Statistics*

		Argument	*Adjunct*
Beginner	Rate of Accuracy	.2228	.3370
	Standard Deviation	.2326	.3763
Intermediate	Rate of Accuracy	.3682	.6182
	Standard Deviation	.2871	.3423
Advanced	Rate of Accuracy	.4047	.6081
	Standard Deviation	.2874	.3838

(4-9) *Comparison Between Argument Wh-Extraction and Adjunct Wh-Extraction*



By a repeated measure of 3x2 (EFL level type and interrogative construction (argument/adjunct) type) ANOVA, I found a statistically significant (i) main effect for factor interrogative construction type ($F_{(1,175)}$=41.60, p<.001), and (ii) main effect for factor EFL level type ($F_{(2,175)}$=12.20, p<.001). However, there was no statistically significant interaction between two factors ($F_{(2, 175)}$=1.77, p<.174).

By a multiple comparison (Bonferroni), I found statistically significant differences between argument and adjunct *wh*-extraction, as shown in (4-10).

(4-10) a. As for the beginner EFL learners, there is a statistically significant difference in the rate of accuracy between argument *wh*-extraction and adjunct *wh*-extraction ($F_{(1, 175)}$=4.05, p<.046).

a. As for the intermediate EFL learners, there is a statistically significant difference in the rate of accuracy between argument *wh*-extraction and adjunct *wh*-extraction ($F_{(1, 175)}$=30.87, p<.001).

b. As for the advanced EFL learners, there is a statistically significant difference in the rate of accuracy between argument *wh*-extraction and adjunct *wh*-extraction ($F_{(1, 175)}$=27.36, p<.001).

Thus, the Japanese college and university EFL learners showed an argument/adjunct asymmetry in the level of *wh*-interrogative acquisition. For them, it was more difficult to generate *wh*-interrogatives with argument extraction than adjunct extraction.

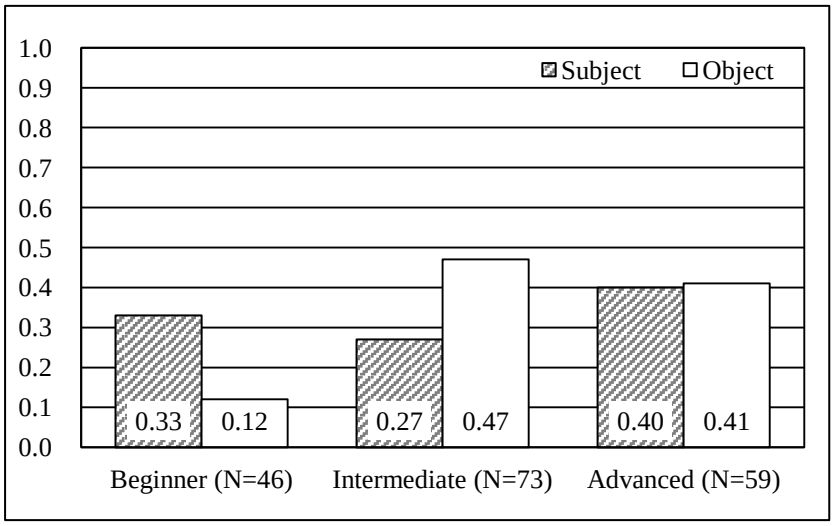
4.3.2. A Subject/Object Asymmetry in Wh-Interrogatives

This subsection addresses research question (4-2b). I focused on argument *wh*-interrogatives, and examined whether the participants would show a subject/object asymmetry in the level of acquisition with respect to the *wh*-interrogative construction. The descriptive statistics on the two types of *wh*-interrogatives is shown in (4-11), and it is more clearly represented by (4-12).

(4-11) *Descriptive Statistics*

		Subject	*Object*
Beginner	Rate of Accuracy	.3261	.1196
	Standard Deviation	.3608	.2282
Intermediate	Rate of Accuracy	.2705	.4658
	Standard Deviation	.3836	.4110
Advanced	Rate of Accuracy	.3983	.4110
	Standard Deviation	.4103	.4172

(4-12) *Comparison Between Subject Wh-Extraction and Object Wh-Extraction*



By a repeated measure of 3x2x2 (EFL level type, interrogative construction (argument/adjunct) type, and trace position (subject/object) type) ANOVA, I found a statistically significant (i) main effect for factor interrogative construction type ($F_{(1,175)}$=41.60, p<.001), (ii) main effect for factor EFL level type ($F_{(2,175)}$=12.20, p<.001), and (iii) interaction among three factors ($F_{(2, 175)}$=7.68, p<.001). However, there was no statistically significant main effect for factor trace type ($F_{(1,175)}$=.025, p<.874).

By a multiple comparison (Bonferroni), I found statistically significant differences between subject and object *wh*-extraction, as shown in (4-13).

(4-13) a. As for the beginner EFL learners, there is a statistically significant difference in the rate of accuracy between subject *wh*-extraction and object *wh*-extraction ($F_{(1, 175)}$=7.01, p<.009).

b. As for the intermediate EFL learners, there is a statistically significant difference in the rate of accuracy between subject *wh*-extraction and object *wh*-extraction ($F_{(1, 175)}$=9.94, p<.002).

Thus, the Japanese college and university EFL learners showed two types of subject/object asymmetries in the level of *wh*-interrogative acquisition. For the beginner EFL learners, it was more difficult to generate *wh*-interrogatives with object extraction than subject extraction. On the other hand, for the intermediate EFL learners, it was more difficult to generate *wh*-interrogatives with subject extraction than object extraction.

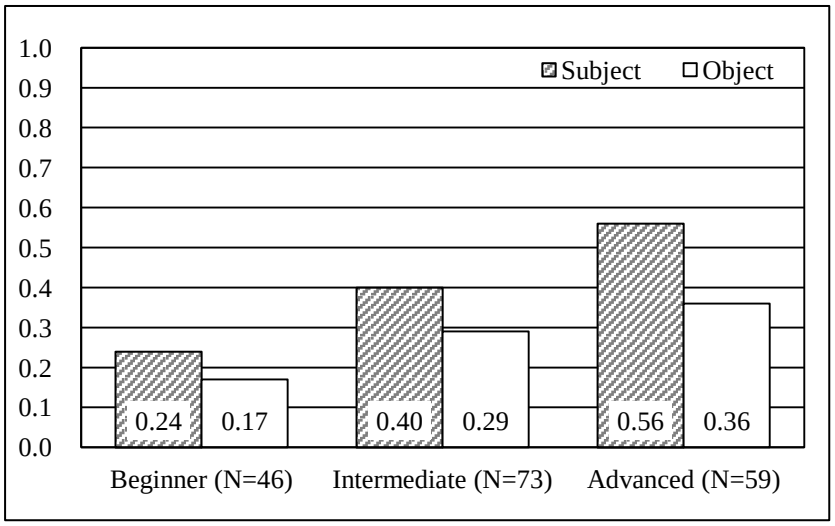
4.3.3. Subject/Object Asymmetry in Relative Clauses

This subsection addresses research question (4-2c). I focused on another type of short distance *wh*-movement, namely, the relative clause construction. The descriptive statistics on the four types of relative clauses is shown in (4-14), and it is more clearly represented by (4-15) and (4-16).

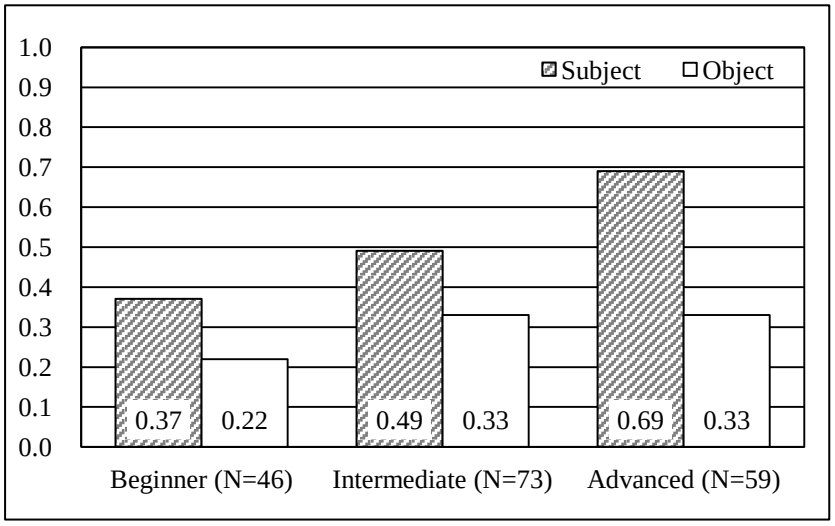
(4-14) *Descriptive Statistics*

		Subject Domain		*Object Domain*	
		Subject	*Object*	*Subject*	*Object*
Beginner	Rate of Accuracy	.2446	.1685	.3696	.2228
	Standard Deviation	.3555	.3208	.3603	.3425
Intermediate	Rate of Accuracy	.4041	.2911	.4897	.3288
	Standard Deviation	.4117	.3975	.3918	.3816
Advanced	Rate of Accuracy	.5593	.3602	.6907	.3347
	Standard Deviation	.4135	.4001	.3160	.3644

(4-15) *Comparison Between Subject Wh-Extraction and Object Wh-Extraction from the Subject Domain*



(4-16) *Comparison Between Subject Wh-Extraction and Object Wh-Extraction from the Object Domain*



By a repeated measure of 3x2x2 (EFL level type, operation domain (subject/object) type, and trace position (subject/object) type) ANOVA, I found a statistically significant (i) main effect for factor operation domain type ($F_{(1,175)}$=13.40, p<.001)[6], (ii) main effect for factor trace type ($F_{(1,175)}$=42.27, p<.001), and (iii) main effect for factor EFL level type ($F_{(2,175)}$=8.22, p<.001). However, there was no statistically significant interaction among three factors ($F_{(2, 175)}$=1.43, p<.242)

By a multiple comparison (Bonferroni), I found statistically significant differences between subject and object *wh*-extraction, as shown in (4-17).

(4-17) a. As for the object domain, the beginner EFL learners showed a statistically significant difference in the rate of accuracy between subject *wh*-extraction and object *wh*-extraction ($F_{(1, 175)}$=5.97, p<.016).

[6] In this survey, I found a statistically significant difference between subject domain and object domain (Rate of accuracy$_{(Subject)}$=.3483, Rate of accuracy$_{(Object)}$=.4143, p<.001). Therefore, this result indicates that the Japanese EFL learners showed a subject/object asymmetry in the operation domain on relative clauses.

b. As for the subject domain, the intermediate EFL learners showed a statistically significant difference in the rate of accuracy between subject *wh*-extraction and object *wh*-extraction ($F_{(1, 175)}$=6.00, p<.015).

c. As for the object domain, the intermediate EFL learners showed a statistically significant difference in the rate of accuracy between subject *wh*-extraction and object *wh*-extraction ($F_{(1, 175)}$=11.41, p<.001).

d. As for the subject domain, the advanced EFL learners showed a statistically significant difference in the rate of accuracy between subject *wh*-extraction and object *wh*-extraction ($F_{(1, 175)}$=15.05, p<.015).

e. As for the object domain, the advanced EFL learners showed a statistically significant difference in the rate of accuracy between subject *wh*-extraction and object *wh*-extraction ($F_{(1, 175)}$=45.08, p<.001).

Thus, the Japanese EFL learners showed a subject/object asymmetry in the acquisition of the relative clause construction. For them, subject *wh*-extraction was easier than object *wh*-extraction.

4.4. Conclusion

In this study, in order to verify whether the result in Chapter 3 is a general tendency for Japanese EFL learners, I examined whether Japanese college and university EFL learners would show asymmetries in acquisition of the *wh*-interrogative construction with short distance *wh*-movement and the relative clause construction. The research questions in (4-2) and the predictions in (4-3) are repeated in (4-18) and (4-19), respectively.

(4-18) a. As for the *wh*-interrogative construction, is there any difference in the level of acquisition between argument *wh*-extraction and adjunct *wh*-extraction?

b. As for the *wh*-interrogative construction, is there any difference in the level of acquisition between subject *wh*-extraction and object *wh*-extraction?

c. As for the relative clause construction, is there any difference in the level of acquisition between subject *wh*-extraction and object *wh*-extraction?

(4-19) a. Japanese college and university EFL learners show an argument/adjunct asymmetry in acquisition of the *wh*-interrogative construction, just like junior high school EFL learners.

b. Japanese college and university EFL learners show a subject/object asymmetry in acquisition of the *wh*-interrogative construction, just like junior high school EFL learners.

c. Japanese EFL learners show a subject/object asymmetry in acquisition of the relative clause construction, just like the result of O'Grady *et al*. (2003).

First, the answer to the research question in (4-18a) is *Yes*, and the prediction in (4-19a) is *True*. I found that the Japanese college and university EFL learners showed an argument/adjunct asymmetry in the level of *wh*-interrogative acquisition. For them, it was more difficult to generate *wh*-interrogatives with argument extraction than adjunct extraction. The tendency found in this study is the same as the result of the advanced Japanese junior high school EFL learners.

Second, the answer to the research question in (4-18b) is *Yes*, and the prediction in (4-19b) is *True*. I found that the Japanese college and university EFL learners showed two types of subject/object asymmetries in the level of *wh*-interrogative acquisition. As for the

beginner EFL learners, it was more difficult to generate *wh*-interrogatives with object extraction than subject extraction, just like the beginner level junior high school students. On the other hand, it was more difficult to generate *wh*-interrogatives with subject extraction than object extraction for the intermediate EFL learners, just like the advanced level junior high school students.

Third and finally, the answer to the research question in (4-18b) is *Yes*, and the prediction in (4-19b) is *True*. I found that the Japanese college and university EFL learners showed a subject/object asymmetry in the acquisition of the relative clause construction. For them, subject *wh*-extraction was easier than object *wh*-extraction. This result supports the result of O'Grady *et al*. (2003).

Therefore, Japanese EFL learners typically showed (i) an argument/adjunct asymmetry and (ii) a subject/object asymmetry in acquisition of the construction with short distance *wh*-movement. If when Japanese EFL learners learned the *wh*-interrogative construction and the relative clause construction in school, they will understand the mechanism of short distance *wh*-movement, and the UG principles on *wh*-movement become active for them, then, they will not show these asymmetries, and they should be able to generate correct *wh*-sentences. In the next chapter, I will examine the relationship between the acquisition of *wh*-movement in L2 and UG principles on *wh*-movement. Then, I will consider what the results in Chapters 3-4 may suggest for English education in Section 9.

CHAPTER 5: A STUDY OF THE LONG DISTANCE WH-MOVEMENT OPERATION WITH THE *THAT*-TRACE EFFECT BY JAPANESE EFL LEARNERS

5.1. Introduction

In the previous chapter, I focused on acquisition of the *wh*-interrogative construction and the relative clause construction with short distance *wh*-movement. Japanese EFL learners learn them in (junior) high school. If the principles of UG for *wh*-movement in English were active for them in their acquisition of these constructions, they should be able to make correct *wh*-sentences, and will not show any asymmetry in their acquisition. In this chapter, I will focus on the *wh*-interrogative construction with long distance *wh*-movement, and examine whether the Empty Category Principle (ECP) proposed by Chomsky (1981a) may be active for Japanese EFL learners.

The organization of this chapter is as follows. Section 5.2 provides the background for this study, and Section 5.3 presents the procedure of this study. Section 5.4 reports the result of analysis, and finally, Section 5.5 summarizes the findings of this study.

5.2. Background

In this study, I focus on long distance *wh*-interrogatives with the *that*-trace effect. Perlmutter (1971) reports a subject/object asymmetry in the interrogative construction. (5-1) shows a typical paradigm of the (non-)*that*-trace effect in English[7].

[7] The same structures in (5-1a) and (5-1c) are shown in (I-a) and (I-b), respectively. In Japanese, if the complementizer *to* does not appear, these sentences are ungrammatical. Therefore, Japanese does not exhibit the *that*-trace effect.

(I) a. Anata-wa John-ga dare-o mi-ta (to/*φ) omoi-masu ka?
you-TOP John-NOM who-ACC see-past COMP think-polite Q
'who do you think John saw?' (object *wh*-extraction)

b. Anata-wa dare-ga Bill-o mi-ta (to/*φ) omoi-masu ka?
you-TOP who-NOM Bill-ACC see-past COMP think-polite Q
'who do you think saw Bill?' (subject *wh*-extraction)

(5-1) a. Who do you think that John saw [*t*]?

b. Who do you think John saw [*t*]?

c. * Who do you think that [*t*] saw Bill?

d. Who do you think [*t*] saw Bill?

(5-1c) is clearly ungrammatical, which involves subject extraction from an embedded clause with the complementizer (COMP) *that*. Under the definition of the ECP, a trace must be properly governed[8]. However, the trace in (5-1c) is not lexically/antecedent governed (Lasnik and Saito 1984). Therefore, (5-1c) is ruled ungrammatical as an ECP violation. Lasnik and Saito (1992) elaborate the account of the *that*-trace phenomenon in the following fashion. They propose (5-2) and (5-3), and explain the contrast between (5-1c) and (5-1d).

(5-2) Only X^0 categories can be proper governors.

(5-3) a. A [+wh] COMP has a [+wh] feature.

b. *That* in a [-wh] COMP has a [-wh] feature.

c. A null head in a [-wh] COMP does not have either a [+wh] feature or a [-wh] feature.

d. A trace does not have either a [+wh] feature or a [-wh] feature.

The more precise structures of (5-1c) and (5-1d) are shown in (5-4a) and (5-4b),

[8] The definition of proper government proposed by Chomsky (1981a) is shown in (II).

(II) α properly governs β iff α governs β and
a. α is a lexical category X^0 (lexical government), or
b. α is coindexed with β (antecedent government).

respectively.

(5-4) a. Who$_1$ do you think [$_{CP}$ t_1' [$_{C'}$ that [$_{IP}$ t_1 saw Bill]]]?

b. Who$_1$ do you think [$_{CP}$ t_1' [$_{C'}$ ø [$_{IP}$ t_1 saw Bill]]]?

In (5-4a), *that* in COMP has a [-wh] feature, and the intermediate trace t_1' in CP-SPEC does not have either a [+wh] feature or a [-wh] feature. Therefore, these two are not in SPEC-head agreement, so that the COMP cannot have the same index as the subject trace. Thus, the COMP cannot function as a proper governor for it, and (5-4a) is ruled out as an ECP violation. On the other hand, in (5-4b), the null head in COMP and the intermediate trace t_1' in CP-SPEC both have neither a [+wh] feature nor a [-wh] feature. Therefore, they are in SPEC-head agreement, so that the COMP can have the same index as the subject trace. Thus, the former, being an X^0 category, can function as a proper governor for it, so that (5-4b) is not ruled out by the ECP, and is correctly predicted to be grammatical.

5.3. Procedure

In this section, I present the procedure of this study. Subsection 5.3.1 provides a research question and the prediction. Subsection 5.3.2 and Subsection 5.3.3 show the overview of the material and the details of the participants, respectively.

5.3.1. Purpose

In this study, I examine whether the ECP will be active for Japanese EFL learners in judgment of long distance *wh*-interrogatives in English. (5-5) is a research question of this study.

(5-5) *Research Question*

Do Japanese EFL learners show the *that*-trace effect?

If the answer to research question (5-5) is *Yes*, the ECP, which is part of UG, is active for their L2 acquisition. On the other hand, if the answer is *No*, it is masked. It will be predicated on the basis of previous study (Kim 2010) that Japanese EFL learners will not distinguish between (5-1c) and (5-1d). My prediction is shown in (5-6).

(5-6) *Prediction*

Japanese EFL learners will not show the *that*-trace effect. In other words, the ECP will be masked in their acquisition of the *wh*-interrogative construction.

To examine the research question in (5-5), I administered a grammaticality judgment task with respect to long distance *wh*-interrogatives to 94 Japanese EFL learners.

5.3.2. Material

In this study, I created a grammaticality judgment test containing long distance *wh*-interrogatives. There are four types of target sentences which constitute minimal pairs. (5-7) shows part of the test sentences. All the target sentences are provided in Appendix 6.

(5-7) *Examples of Test Sentences*

a. Who do you think that Ron found? (object extraction with *that*)

b. Who do you think Ron found? (object extraction without *that*)

c. Who do you think that found Pam? (subject extraction with *that*)

d. Who do you think found Pam? (subject extraction without *that*)

There are eight examples in each type of sentence. For the counterbalanced design, I created two types of test sheets. In each questionnaire, I used 74 sentences (16 target sentences, 46 filler sentences, and 10 benchmark sentences) based on the Latin square method.

As a measurement scale of the grammaticality judgment, I used the Visual Analogue Scaling (VAS) evaluation method proposed by Gould *et al*. (2001)[9], because I assume that the spectrum of a grammaticality judgment is continuous, and would not take discrete jumps (5-point/9-point scale), just like a pain of a patient, as Gould *et al*. (2001) suggest. I used the 100mm line scale shown in (5-8) after showing one example of a totally unnatural sentence and another example of a completely natural sentence.

(5-8) *VAS Evaluation Method of this Study*

How would you judge the naturalness of the sentence as English? Place a vertical mark [|] on the line below to indicate how natural you feel the sentence is.

Totally unnatural 0 ——————————————— 100 Completely natural

5.3.3. Participants

I administered the grammaticality judgment task to 94 Japanese EFL learners who were learning English as a second language in Japan. (5-9) shows the subjects' background.

[9] According to Gould *et al*. (2001), the VAS is defined as in the following. A VAS is a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot be directly measured. Operationally, a VAS is usually a horizontal line, 100 mm in length, anchored by word descriptions at each end. When responding to a VAS item, respondents specify their level of agreement to a statement by indicating a position along a continuous line between the two end-points. The VAS score is determined by measuring in millimeters from the left hand end of the line to the point that the respondent marks. And then, they pointed out that a patient's pain does not take discrete jumps, as a characterization of none, mild, moderate and severe.

(5-9) *Subjects' Background*

Observations	94
Ratio of Gender (Female: Male)	73:21
Age Range	18-20
Average Age	18.23
Average Score on the MET 6B	28.03
Standard Deviation on the MET 6B	6.94

The participants took the MET 6B which is a five-minute English proficiency test shown in Section 2.2 at the same time. Based on the deviation value of the MET 6B, the participants were classified into 3 EFL level groups. I show the classification of the participants in (5-10).

(5-10) *Three Types of EFL Level Groups*

		Beginner	Intermediate	Advanced
MET 6B	Score Range	12-24	25-31	32-50
	Average Score	20.79	28.36	36.18
	Deviation Value	DV<45	45≤DV<55	55≤DV
Observations		33	33	28

I conducted the same grammaticality judgment test to 39 native speakers of English as a control group of this study (ratio of female: male 18:21, age range 18 to 42 years old, and average age 22.62 years old).

5.4. Results

Section 5.4 reports the results of analysis. The collected data was analyzed by a repeated measure of ANOVA and a multiple comparison (Bonferroni). In all analyses, the significant level was set at α<.05. The results of native speakers of English and Japanese EFL Learners are shown in Subsection 5.4.1 and Subsection 5.4.2, respectively.

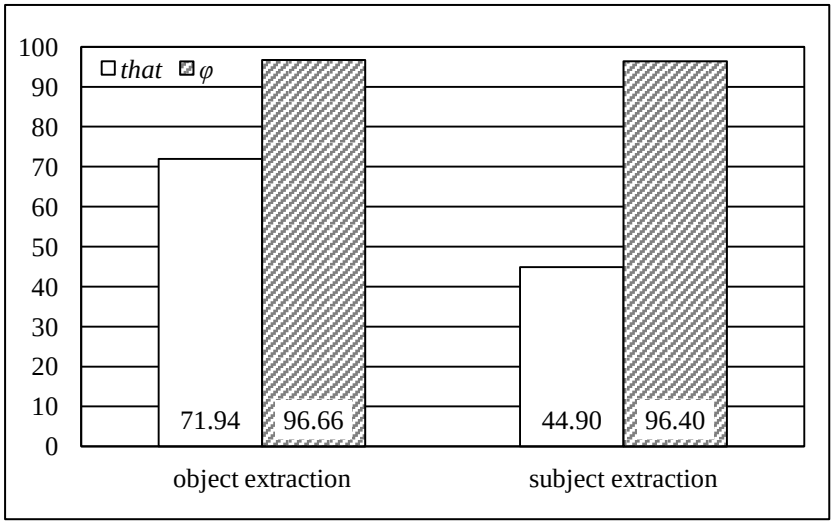
5.4.1. Native Speakers of English

In this subsection, I report the result from the native speakers of English. The descriptive statistics is shown in (5-11), and it is more clearly represented by (5-12).

(5-11) *Descriptive Statistics*

	Object Extraction		Subject Extraction	
	that	*φ*	*that*	*φ*
Average Score	71.94	96.66	44.90	96.40
Standard Deviation	22.06	6.56	27.76	8.53

(5-12) *Native Speakers of English (N=39)*



By a repeated measure of 2x2 (extraction (subject/object) type and complementizer (*that/φ*) type) ANOVA, I found a statistically significant (i) main effect for factor extraction type ($F_{(1, 38)}$=121.39, p<.001), and (ii) main effect for factor complementizer type ($F_{(1, 38)}$=33.82, p<.001). Then, there was a statistically significant interaction between two factors ($F_{(1, 38)}$=32.20, p<.001).

By multiple comparisons, as for subject *wh*-extraction, the native speakers of English

showed a statistically significant difference in the average scores between complementizer *that* and *φ* ($F_{(1, 38)}$=118.03, p<.001)[10]. The average score on subject *wh*-extraction with complementizer *that* has a statistically significant difference (i) with the average score on object *wh*-extraction with *that*, and (ii) with the average score on object *wh*-extraction without *that* (p<.001). These results indicate that the native speakers of English showed the *that*-trace effect shown in (5-1).

5.4.2. Japanese EFL Learners

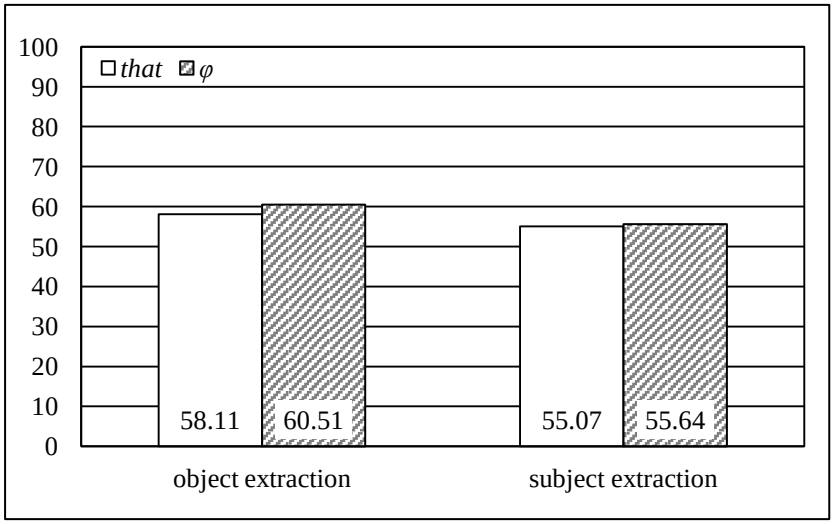
In this subsection, I report the result from the Japanese EFL learners. The descriptive statistics is shown in (5-13), and it is more clearly represented by (5-14), (5-15), and (5-16).

(5-13) *Descriptive Statistics*

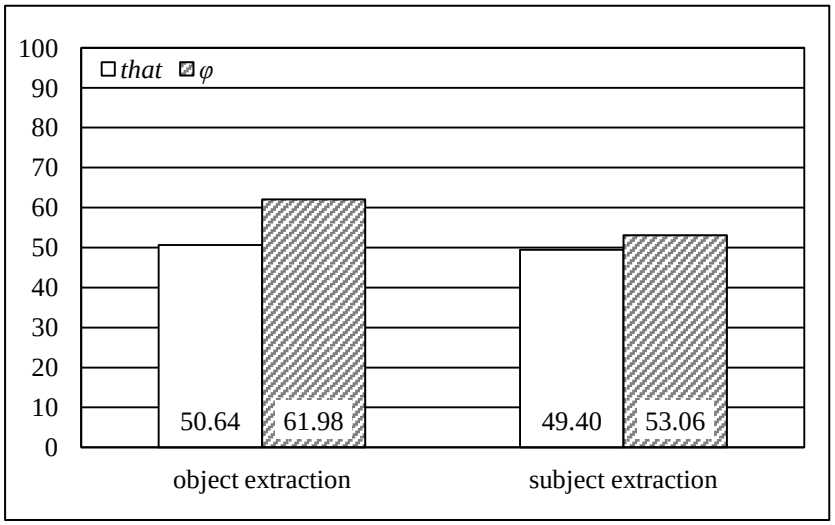
		Object Extraction		Subject Extraction	
		that	*φ*	*that*	*φ*
Beginner	Average Score	58.11	60.51	55.07	55.64
	Standard Deviation	19.71	22.03	22.89	24.30
Intermediate	Average Score	50.64	61.98	49.40	53.06
	Standard Deviation	25.38	22.93	25.56	29.61
Advanced	Average Score	57.47	57.48	51.14	60.94
	Standard Deviation	21.57	21.95	19.50	18.80

[10] As for object *wh*-extraction, they also showed a statistically significant difference in the average scores between complementizer *that* and *φ* ($F_{(1, 38)}$=48.55, p<.001). This result indicates that the native speakers of English showed not only the *that*-trace effect in subject *wh*-extraction, but also this effect in object *wh*-extraction. I will pick up this phenomenon in Chapter 7, as the surprising *that*-trace effect.

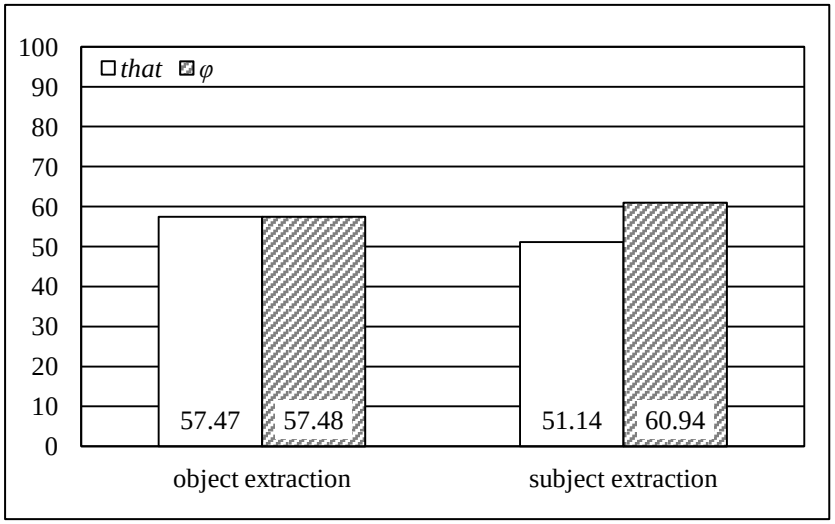
(5-14) *Beginner EFL Learners (N=33)*



(5-15) *Intermediate EFL Learners (N=33)*



(5-16) *Advanced EFL Learners (N=28)*



By a repeated measure of 3x2x2 (EFL level type, extraction (subject/object) type, and complementizer (*that/φ*) type) ANOVA, I found a statistically significant (i) main effect for factor complementizer type ($F_{(1, 91)}$=5.55, p<.021), and (ii) an interaction among the three factors ($F_{(2, 91)}$=3.48, p<.035). However, there was no statistically significant (i) main effect for factor extraction type ($F_{(1, 91)}$=2.44, p<.121), and (ii) main effect for factor EFL level type ($F_{(2, 91)}$=.413, p<.663).

By multiple comparisons, I found statistically significant differences shown in (5-17).

(5-17) a. As for object *wh*-extraction, the intermediate EFL learners showed a statistically significant difference between complementizer *that* and *φ* ($F_{(1, 91)}$=11.05, p<.001).

b. As for subject *wh*-extraction, the advanced EFL learners showed a statistically significant difference between complementizer *that* and *φ* ($F_{(1, 91)}$=3.97, p<.049).

These results indicate that only advanced EFL learners showed the *that*-trace effect.

5.5. Conclusion

In this study, I examined whether the ECP would be active for Japanese EFL learners in judgment of long distance *wh*-interrogatives in English. The research question in (5-5) and the prediction in (5-6) are repeated in (5-18) and (5-19), respectively.

(5-18) *Research Question*

Do Japanese EFL learners show the *that*-trace effect?

(5-19) *Prediction*

Japanese EFL learners will not show the *that*-trace effect. In other words, the ECP will be masked in their acquisition of the *wh*-interrogative construction.

The answer to the research question is partially *Yes*, and the prediction is *False*. I found that only advanced EFL learners showed the *that*-trace effect. Therefore, the ECP, which is assumed to be part of UG, should be active for the advanced level learners, while it does not for the beginner and the intermediate level learners. The result of this chapter is opposite from the results from previous studies. In the next chapter, I will conduct the same survey on the other Asian (Korean, Mongolian, and Chinese) EFL learners, and examine whether they will show the *that*-trace effect.

CHAPTER 6: COMPARATIVE STUDY OF THE ACQUISITION OF THE LONG DISTANCE WH-MOVEMENT OPERATION WITH THE OTHER ASIAN EFL LEARNERS

6.1. Introduction

In the previous chapter, I examined whether Japanese EFL learners would show the *that*-trace effect, and found that only the advanced EFL learners showed this effect. Thus, I found that the ECP should be active for the advanced level learners, while it is not for the beginner and the intermediate level learners. In this chapter, I will investigate whether the other Asian EFL learners will show the *that*-trace in acquisition of the *wh*-interrogative construction with long distance *wh*-movement. To address this question, I conducted the same grammaticality judgment test in Chapter 5 to (i) Chinese EFL learners, (ii) Korean EFL learners, and (iii) Mongolian EFL learners.

The organization of this chapter is as follows. Section 6.2 shows the background to this study, and Section 6.3 presents the procedure of this study. Section 6.4 reports the result of analysis, and finally, Section 6.5 summarizes the findings of this study.

6.2. Background

The word order of Korean and Mongolian is SOV, and both languages belong to the same language family as Japanese, namely, the Altaic language family. On the other hand, the word order of Chinese is SVO, just like English. However all of these languages are *wh*-in-situ languages. (6-1), (6-2), (6-3), and (6-4) show examples of the *wh*-interrogative construction in Japanese, Korean, Mongolian, and Chinese, respectively.

(6-1) *Japanese*

a. Anata-wa John-ga dare-o mi-ta (to/*φ) omoi-masu ka?
you-TOP John-NOM who-ACC see-past COMP think-polite Q
'Who do you think John saw?'

b. Anata-wa dare-ga Bill-o mi-ta (to/*φ) omoi-masu ka?
you-TOP who-NOM Bill-ACC see-past COMP think-polite Q
'Who do you think saw Bill?'

(6-2) *Korean*

a. Ne-nun John-i nuku-lul po-ass-ta (ko/*φ) sayngkakha-ni?
you-TOP John-NOM who-ACC see-past-DEC COMP think-Q
'Who do you think John saw?'

b. Ne-nun nu-ka Bill-ul po-ass-ta (ko/ *φ) sayngkakha-ni?
you-TOP who-NOM Bill-ACC see-past-DEC COMP think-Q
'Who do you think saw Bill?'

(6-3) *Mongolian*

a. Či-ø John-ø ken-i qara-ɣsan (gejü/*φ) boduqu boi?
you-TOP John-NOM who-ACC see-past COMP think Q
'Who do you think John saw?'

b. Či-ø ken-ø Bill-gi qara-ɣsan (gejü/*φ) boduqu boi?
you-TOP who-NOM Bill-ACC see-past COMP think Q
'Who do you think saw Bill?'

(6-4) *Chinese*

a. Ni renwei John kanjian-le shui?
you think John see-past who
'Who do you think John saw?'

b. Ni renwei shui kanjian-le Bill?
you think who see-past Bill
'Who do you think saw Bill?'

Korean and Mongolian are very similar to Japanese. If the sentences have a null complementizer, they are ungrammatical sentences. However, Chinese is opposite from these languages. In the sentences in (6-4), a pronounced complementizer does not appear. Therefore, these languages do not exhibit a subject/object asymmetry in the complementizer-trace phenomenon.

6.3. Procedure

In this section, I present the procedure of this study. Subsection 6.3.1 provides a research question and the prediction. Subsection 6.3.2 and Subsection 6.3.3 show the overview of the material and the details of the participants, respectively.

6.3.1. Purpose

In this study, I examine whether the other Asian (Korean/Mongolian/Chinese) EFL learners will show the *that*-trace in acquisition of the *wh*-interrogative construction with long distance *wh*-movement in English. (6-5) is a research question of this study.

(6-5) *Research Question*

Do the other Asian EFL learners show the *that*-trace effect?

If the answer to the research question in (6-5) is *Yes*, the ECP, which is part of UG, is active for their L2 acquisition, just like the advanced Japanese EFL learners. On the other hand, if the answer is *No*, it is masked. It will be predicated on the basis of the findings in Chapter 5 that the advanced Korean/Mongolian/Chinese EFL learners will show a statistically significant difference in the judgment between (5-1c) and (5-1d). My prediction is shown in (6-6).

(6-6) *Prediction*

The advanced Korean/Mongolian/Chinese EFL learners show the *that*-trace effect. Thus, the ECP will be active for them in the acquisition of the *wh*-interrogative construction.

To examine the research question in (6-5), I administered the same grammaticality judgment task as the one administered to the Japanese EFL learners, to (i) 67 Korean EFL leaners, (ii) 42 Mongolian EFL learners, and (iii) 92 Chinese EFL learners.

6.3.2. Material

In this study, I used the same grammaticality judgment test as the one used in Chapter 5. For the details of the material of this study, see Subsection 5.3.2. In this subsection, I show part of the test sentences, and the measurement scale of the judgment test in (6-7) and (6-8), respectively.

(6-7) *Examples of Test Sentences*

a. Who do you think that Ron found? (object extraction with *that*)

b. Who do you think Ron found? (object extraction without *that*)

c. Who do you think that found Pam? (subject extraction with *that*)

d. Who do you think found Pam? (subject extraction without *that*)

(6-8) *VAS Evaluation Method of this Study*

How would you judge the naturalness of the sentence as English? Place a vertical mark [|] on the line below to indicate how natural you feel the sentence is.

Totally unnatural 0 ——————————————— 100 Completely natural

6.3.3. Participants

I administered the grammaticality judgment task to (i) 67 Korean EFL leaners, (ii) 42 Mongolian EFL learners, and (iii) 93 Chinese EFL learners. (6-9) shows the subjects' background.

(6-9) *Subjects' Background*

	Korean	Mongolian	Chinese
Observations	67	42	92
Ratio of Gender (Female: Male)	37:30	33:9	71:21
Age Range	19-38	18-24	17-22
Average Age	22.13	20.76	19.16
Average Score on the MET 6B	41.25	18.95	38.70
Standard Deviation on the MET 6B	10.38	11.28	8.97

The participants took the MET 6B, which is a five-minute English proficiency test shown in Section 2.2, at the same time. Based on the deviation value of the MET 6B, the participants were classified into 3 EFL level groups. The details of the classification will be

shown in the next section.

6.4. Results

Section 6.4 reports the result of analysis. The collected data was analyzed by a repeated measure of ANOVA and a multiple comparison (Bonferroni). In all analyses, the significant level was set at α<.05. The results of Korean EFL learners, Mongolian EFL learners, and Chinese EFL learners are shown in Subsection 6.4.1, Subsection 6.4.2, and Subsection 6.4.3, respectively.

6.4.1. Korean EFL Learners

In this subsection, I report the result of Korean EFL learners. 67 Korean EFL learners were classified into three EFL groups based on the deviation value of the MET 6B. The classification of the participants is shown in (6-10).

(6-10) *Three Types of EFL Level Groups*

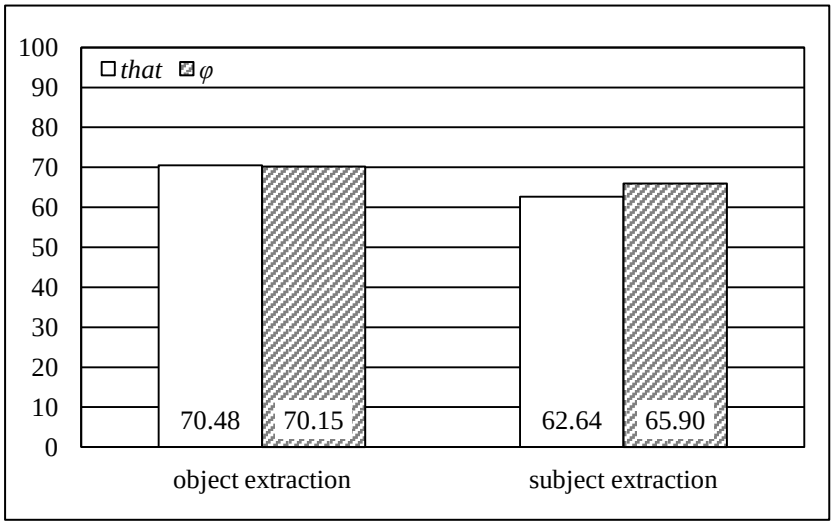
		Beginner	Intermediate	Advanced
MET 6B	Score Range	14-36	37-46	47-62
	Average Score	30.04	41.47	52.29
	Deviation Value	DV<45	45≤DV<55	55≤DV
Observations		24	19	24

The descriptive statistics is shown in (6-11), and it is more clearly represented by (6-12), (6-13), and (6-14).

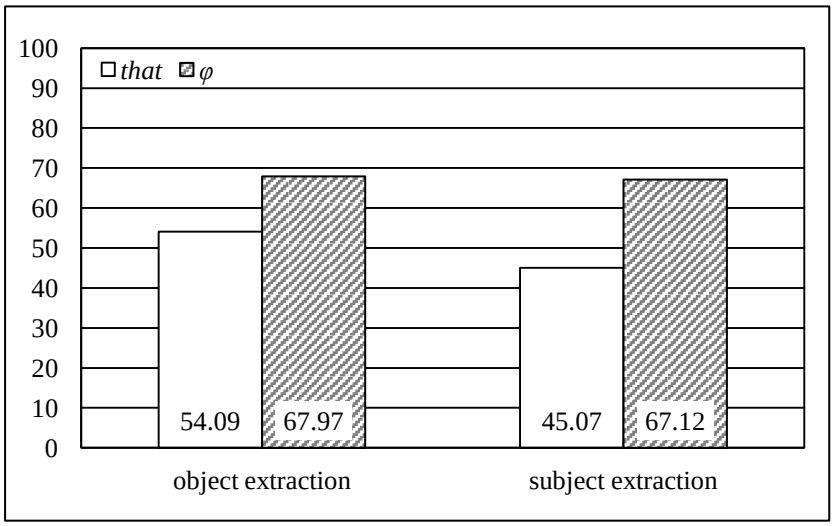
(6-11) *Descriptive Statistics*

		Object Extraction		Subject Extraction	
		that	*φ*	*that*	*φ*
Beginner	Average Score	70.48	70.15	62.64	65.90
	Standard Deviation	16.41	21.87	23.10	19.32
Intermediate	Average Score	54.09	67.97	45.07	67.12
	Standard Deviation	24.04	19.58	26.25	20.90
Advanced	Average Score	52.54	56.47	48.06	62.73
	Standard Deviation	21.56	25.12	27.12	23.18

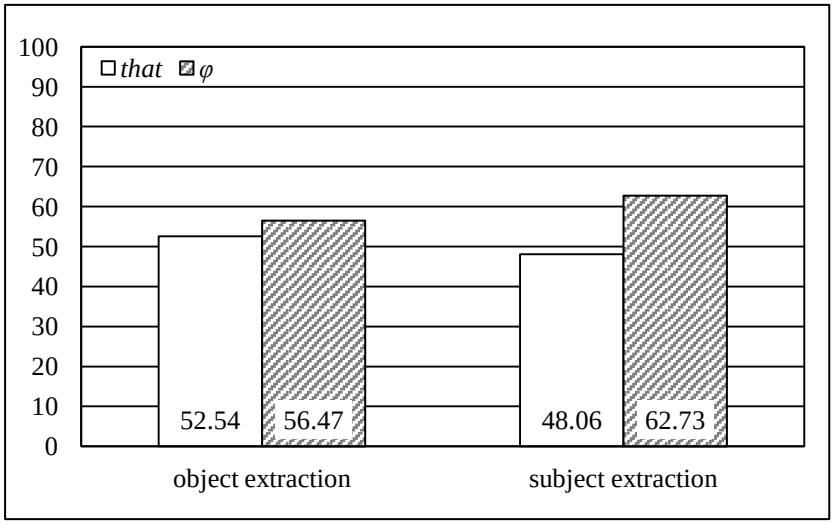
(6-12) *Beginner EFL Learners (N=24)*



(6-13) *Intermediate EFL Learners (N=19)*



(6-14) *Advanced EFL Learners (N=24)*



By a repeated measure of 3x2x2 (EFL level type, extraction (subject/object) type, and complementizer (*that/φ*) type) ANOVA, I found a statistically significant (i) main effect for factor complementizer type ($F_{(1, 64)}$=13.04, p<.001), and (ii) main effect for factor EFL level type ($F_{(2, 64)}$=4.22, p<.019). However, there was no statistically significant (i) main effect for factor extraction type ($F_{(1, 64)}$=1.63, p<.206), and (ii) an interaction among the three factors ($F_{(2, 64)}$=.392, p<.677).

By multiple comparisons, I found statistically significant differences shown in (6-15).

(6-15) a. As for subject *wh*-extraction, the intermediate EFL learners showed a statistically significant difference between complementizer *that* and *φ* ($F_{(1, 64)}$=11.26, p<.001).

b. As for object *wh*-extraction, the intermediate EFL learners showed a statistically significant difference between complementizer *that* and *φ* ($F_{(1, 64)}$=7.16, p<.009).

c. As for subject *wh*-extraction, the advanced EFL learners showed a statistically significant difference between complementizer *that* and φ ($F_{(1, 64)}$=6.30, p<.015).

The intermediate EFL learners showed the *that*-trace effect on both subject *wh*-extraction and object *wh*-extraction. However, they did not show a statistically significant difference between subject *wh*-extraction with complementizer *that* and object *wh*-extraction with complementizer *that*. Thus, they cannot judge the sentences between grammatical and ungrammatical in (5-1). Therefore, these results indicate that only advanced Korean EFL learners showed the *that*-trace effect, just like Japanese.

6.4.2. Mongolian EFL Learners

In this subsection, I report the result of Mongolian EFL learners. 42 Mongolian EFL learners were classified into three EFL groups based on the deviation value of the MET 6B. The classification of the participants is shown in (6-16).

(6-16) *Three Types of EFL Level Groups*

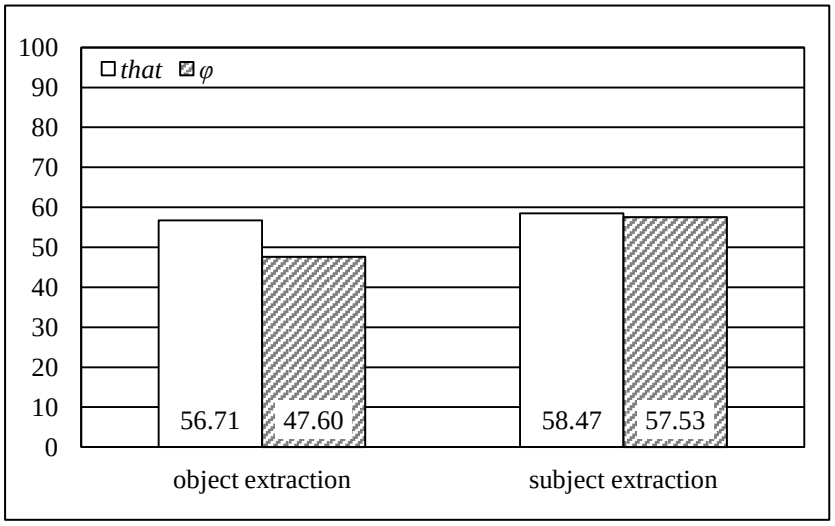
		Beginner	Intermediate	Advanced
MET 6B	Score Range	0-12	14-23	27-42
	Average Score	8.35	18.85	34.08
	Deviation Value	DV<45	45≤DV<55	55≤DV
Observations		17	13	12

The descriptive statistics is shown in (6-17), and it is more clearly represented by (6-18), (6-19), and (6-20).

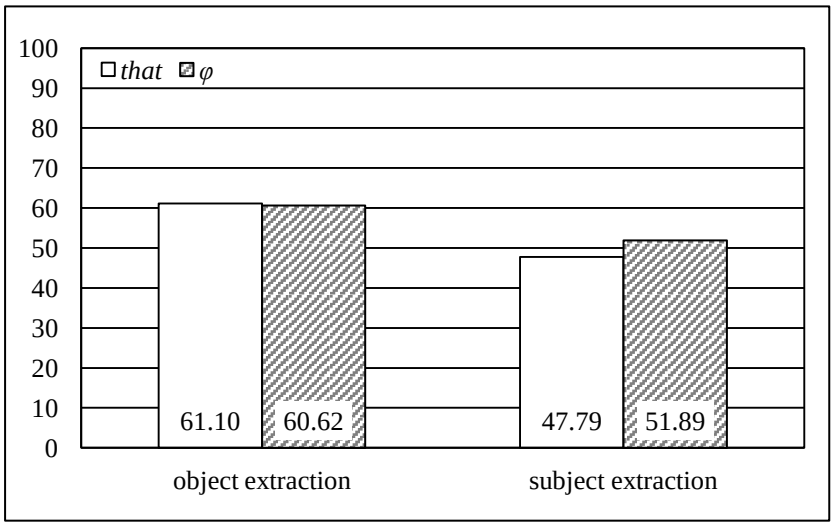
(6-17) *Descriptive Statistics*

		Object Extraction		Subject Extraction	
		that	*φ*	*that*	*φ*
Beginner	Average Score	56.71	47.60	58.47	57.53
	Standard Deviation	15.38	20.27	20.70	24.58
Intermediate	Average Score	61.10	60.62	47.79	51.89
	Standard Deviation	14.12	19.34	19.60	21.89
Advanced	Average Score	57.74	57.86	40.17	64.15
	Standard Deviation	28.74	27.56	23.64	24.99

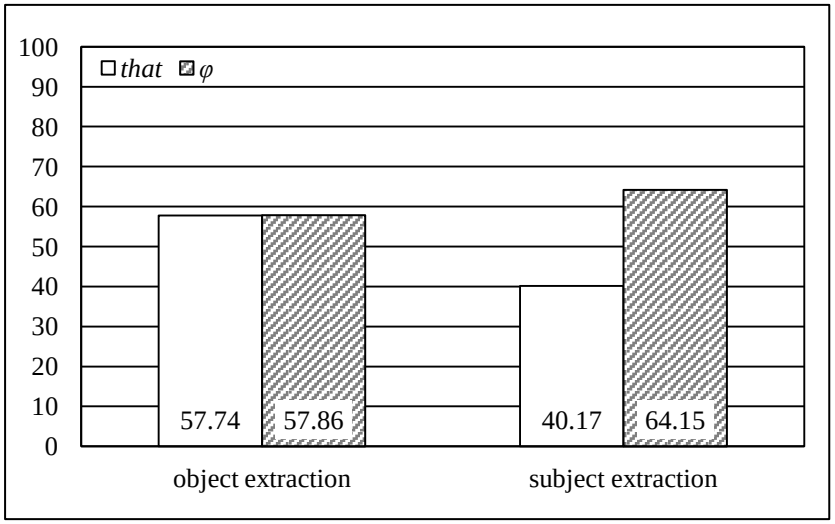
(6-18) *Beginner EFL Learners (N=17)*



(6-19) *Intermediate EFL Learners (N=13)*



(6-20) *Advanced EFL Learners (N=12)*



By a repeated measure of 3x2x2 (EFL level type, extraction (subject/object) type, and complementizer (*that/φ*) type) ANOVA, there was no statistically significant (i) main effect for factor extraction type ($F_{(1, 39)}$=1.96, p<.169), (ii) main effect for factor complementizer type ($F_{(1, 39)}$=1.19, p<.281), (iii) main effect for factor EFL level type ($F_{(2, 39)}$=.002, p<.998), and (iv) an interaction among the three factors ($F_{(2, 39)}$=1.62, p<.212).

By multiple comparisons, I found that as for subject *wh*-extraction, the advanced EFL learners showed a statistically significant difference between complementizer *that* and *φ* ($F_{(1, 39)}$=10.50, p<.002). Therefore, the advanced Mongolian EFL learners showed the *that*-trace effect, just like Japanese and Korean.

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6.4.3. Chinese EFL Learners

In this subsection, I report the result of Chinese EFL learners. 92 Chinese EFL learners were classified into three EFL groups based on the deviation value of the MET 6B. The classification of the participants is shown in (6-21).

(6-21) *Three Types of EFL Level Groups*

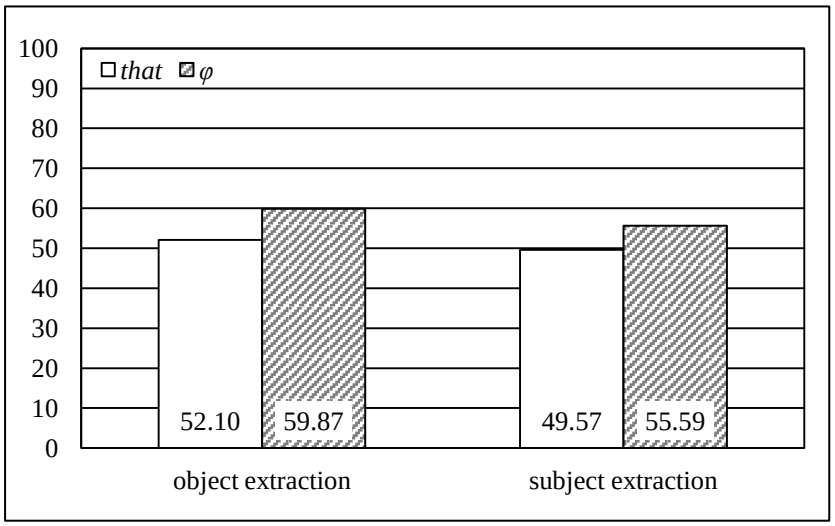
		Beginner	Intermediate	Advanced
MET 6B	Score Range	14-34	35-43	44-58
	Average Score	27.92	38.78	48.75
	Deviation Value	DV<45	45≤DV<55	55≤DV
Observations		25	40	27

The descriptive statistics is shown in (6-22), and it is more clearly represented by (6-23), (6-24), and (6-25).

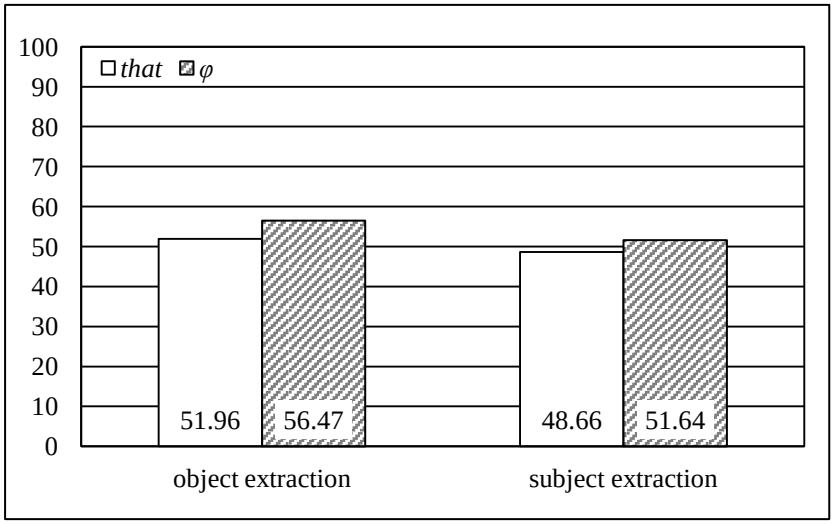
(6-22) *Descriptive Statistics*

		Object Extraction		Subject Extraction	
		that	*φ*	*that*	*φ*
Beginner	Average Score	52.10	59.87	49.57	55.59
	Standard Deviation	17.75	22.70	18.21	21.41
Intermediate	Average Score	51.96	56.47	48.66	51.64
	Standard Deviation	20.52	23.60	22.06	19.14
Advanced	Average Score	56.40	58.49	48.03	60.23
	Standard Deviation	20.39	22.08	20.43	20.41

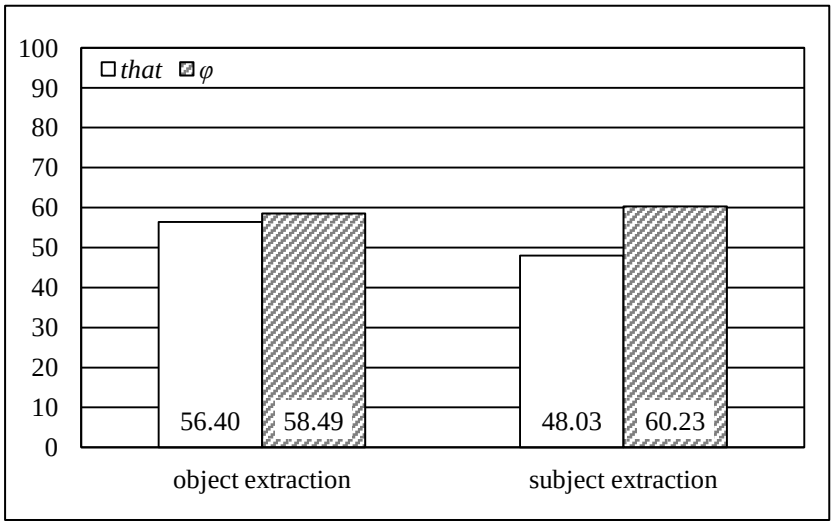
(6-23) *Beginner EFL Learners (N=25)*



(6-24) *Intermediate EFL Learners (N=40)*



(6-25) *Advanced EFL Learners (N=27)*



By a repeated measure of 3x2x2 (EFL level type, extraction (subject/object) type, and complementizer (*that/φ*) type) ANOVA, I found a statistically significant main effect for factor complementizer type ($F_{(1, 89)}$=9.64, p<.003). However, there was no statistically significant (i) main effect for factor extraction type ($F_{(1, 89)}$=3.79, p<.055), (ii) main effect for factor EFL level type ($F_{(2, 89)}$=.462, p<.632), and (iii) an interaction among the three factors ($F_{(2, 89)}$=1.78, p<.175).

By multiple comparisons, I found that as for subject *wh*-extraction, the advanced EFL

learners showed a statistically significant difference between complementizer *that* and *φ* ($F_{(1,\ 89)}$=7.12, p<.009). Therefore, the advanced Mongolian EFL learners showed the *that*-trace effect, just like Japanese, Korean, and Mongolian.

6.5. Conclusion

In this study, I examined whether the ECP would be active for the other Asian EFL learners in judgment of long distance *wh*-interrogatives in English. The research question in (6-5) and the prediction in (6-6) are repeated in (6-26) and (6-27), respectively.

(6-26) *Research Question*

Do the other Asian EFL learners show the *that*-trace effect?

(6-27) *Prediction*

The advanced Korean/Mongolian/Chinese EFL learners show the *that*-trace effect. Thus, the ECP will be active for them in the acquisition of the *wh*-interrogative construction.

The answer to the research question is *Yes*, and the prediction is *True*. I found that the advanced Korean/Mongolian/Chinese EFL learners showed the *that*-trace effect. Therefore, the ECP, which is assumed to be part of UG, should be active for the advanced level learners, while it is not for the beginner and the intermediate level learners. The result of this chapter thus supports the results of Chapter 5. I will consider what the results of Chapters 5-6 may suggest for L2 acquisition in Section 9.1.

CHAPTER 7: THREE TYPES OF SURPRISING *THAT*-TRACE EFFECTS BY NATIVE SPEAKERS OF ENGLISH

7.1. Introduction

In this chapter, I focus on the surprising *that*-object trace effect by native speakers of English, which was found by the analysis in Subsection 5.4.1. In the first half of this chapter, I will point out a variation in grammaticality judgments of two cases of the (non-)*that*-trace effect in English. Then, in the latter half of this chapter, I will examine whether the *that*-trace effect in English will be suspended by intervening adverbs, as proposed by Culicover (1993) and Ackema (2011), and found that native speakers of English also showed the surprising *that*-adverb-trace effect.

The organization of this paper is as follows. Section 7.2 provides the data of the (non-)*that*-trace effect in English. Section 7.3 presents the survey of a grammaticality judgment task with respect to the (non-)*that*-adverb-trace effect, and Section 7.4 discuss what the results might suggest. Finally, Section 7.5 concludes this chapter.

7.2. Data

In this section, I summarize two cases of the (non-)*that*-trace effect in English. Subsection 7.2.1 shows the first surprising *that*-trace effect in English based on a statistical analysis in Subsection 5.4.1. Subsection 7.2.2 reviews Aoun, Hornstein, Lightfoot, and Weinberg's (1987) (AHLW (1987), hereafter) analysis, and shows that there are two varieties of English, one with the *that*-adjunct trace effect, and another without it.

7.2.1. The That-Object Trace Effect by Native Speakers of English

In Chapter 5, I conducted the grammaticality judgment task with respect to the

wh-interrogative construction shown in (7-1), to native speakers of English.

(7-1) a. Who do you think that John saw [*t*]?

b. Who do you think John saw [*t*]?

c. * Who do you think that [*t*] saw Bill?

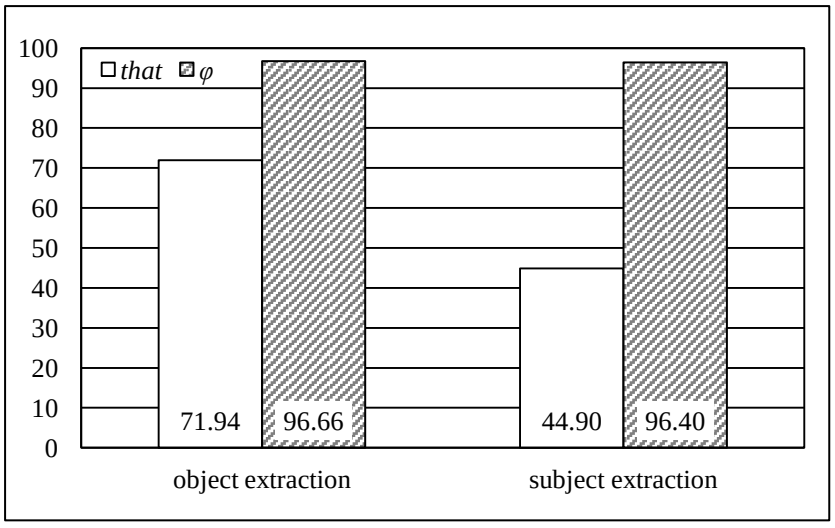
d. Who do you think [*t*] saw Bill?

The descriptive statistics of the grammaticality judgment test is shown in (7-2), and it is more clearly represented by (7-3).

(7-2) *Descriptive Statistics*

	Object Extraction		Subject Extraction	
	that	*φ*	*that*	*φ*
Average Score	71.94	96.66	44.90	96.40
Standard Deviation	22.06	6.56	27.76	8.53

(7-3) *Native Speakers of English (N=39)*



Through the analysis, I found two types of *that*-trace effect, as shown below.

(7-4) a. The native speakers of English showed a statistically significant difference in the average scores on the grammaticality judgment task between subject *wh*-extraction with complementizer *that* and subject *wh*-extraction without complementizer *that* ($F_{(1, 38)}$=118.03, p<.001).

b. The native speakers of English showed a statistically significant difference in the average scores on the grammaticality judgment task between object *wh*-extraction with complementizer *that* and object *wh*-extraction without complementizer *that* ($F_{(1, 38)}$=48.55, p<.001).

The finding in (7-4a) is an expected *that*-subject trace effect. However, the finding in (7-4b) indicates a "surprising" *that*-trace effect: extraction of an object *wh*-phrase from a clause headed by *that* is worse than extraction of from a clause headed by a null complementizer, whether or not the *wh*-phrase originates from the subject or the object position. This generalized *that*-trace effect may reflect some grammatical factor which we have overlooked. Although I cannot identify what it is at the present level of my understanding, there is a phenomenon in a variety of English which may be related to this factor, which I will see in the next subsection.

7.2.2. The (Non)-That-Adjunct Trace Effect by Native Speakers of English

AHLW (1987) point out the *that*-adjunct trace effect based on the examples in (7-5).

(7-5) *The That-Adjunct Trace Effect*

a. Why did Fay say [the boat sank *t*]?

b. * Why did Fay say [that the boat sank *t*]?

For them, the adjunct *wh*-phrase *why* can originate from the embedded clause, asking the reason of the boat's sinking, when the clause is not headed by the overt COMP *that*, as shown in (7-5a), but it cannot, when it is headed by it, as shown in (7-5b).

Ronald Craig (personal communication), who was raised in Ohio, is one of these speakers. He says that prosody matters in these examples, and states that for example (7-6), the answer in (7-7) is possible, with *why* accented strongly and *do you think* said quickly, as shown in (7-8).

(7-6) Why do you think [John was fired *t*]?

(7-7) Because he stole his boss' money.

(7-8) WHY doyouthink John was fired?

On the other hand, for example (7-9) with the overt COMP *that*, the answer in (7-7) is impossible, even with *why* accented strongly and *do you think* said quickly, as shown in (7-10)[11].

(7-9) * Why do you think [that John was fired *t*]?

(7-10) WHY doyouthink that John was fired?

[11] For him, in contrast to verb *think*, verb *believe* does not allow the interpretation in which *why* asks the reason of John's having been fired, whether *that* is absent, as shown in (I), or whether prosody is controlled, as shown in (II).

(I) * Why do you believe [(that) John was fired *t*]?
(II) * WHY doyoubelieve [John was fired *t*]?

Therefore, there is a class of native speakers except those who AHLW (1987) consulted who show the contrast between type (7-5a) and type (7-5b).

On the other hand, Huang (1982) and Lasnik and Saito (1984) assume that the overt COMP *that* does not affect the interpretation of *why*, and for them, (7-11) allows the adjunct *wh*-phrase *why* to originate from the embedded clause, asking the reason of the boat's sinking in (7-5b).

(7-11) Why do you think [that John left *t*]?

Therefore, we have to admit that there are two types of native speakers of English in terms of the extractability of *why* from the embedded clause.

The fact that (7-5b) and (7-9) in the variety of English which AHLW (1987) deals with are ungrammatical indicates that this variety of English exhibits the *that*-adjunct trace effect, which is another case of the surprising *that*-trace effect. Of course, no research has been done yet whether the same informants in this variety of English exhibit the *that*-trace effect for adjunct *wh*-extraction and object *wh*-extraction, along with subject *wh*-extraction. However, this fact at least suggests that the overt complementizer *that* induces some sort of blocking effect for extraction of any element from its complement domain in a variety of English.

Now let us consider what the above discussion actually suggests for linguistic inquiry. It is necessary to explicitly state the generalizations of the target phenomena, and then to explicitly state that they hold for the language or for some variety of the language. AHLW (1987) uses data from the variety of English they are familiar with, and develop a particular theory of locality, especially, Generalized Binding. On the other hand, Lasnik and Saito

(1984, 1992) use data from another variety of English, and pursue elaboration of the mechanism of γ-marking and the ECP. Both Generalized Binding and the ECP are considered to be part of UG, but they have been partly developed based on the same data with different grammaticality judgments. Unless it is explicitly stated that there are two types of native speakers of English in terms of the extractability of *why*, it would cause a severe confusion for theory construction.

7.3. This Study

In this section, I focus on another type of the (non-)*that*-trace effect, pointed out by Culicover (1993) and Ackema (2011). They point out that the *that*-trace effect in English is suspended by intervening adverbs, which I call the adverb effect, as shown in (7-12) and (7-13).

(7-12) a. This is the tree that I said that *(just yesterday) [*t*] had resisted my shovel.
b. I asked what Leslie said that *(in her opinion) [*t*] had made Robin give a book to Lee.

(7-13) Who do you think that, according to the latest rumors, [*t*] is quitting politics?

However, I have encountered some native speakers of English for whom an intervening adverb does not suspend a *that*-trace violation. Given these facts, in order to examine to what degree the adverb effect is general among native speakers of English, I conducted a grammaticality judgment survey.

The methodology and the result of analysis are shown in Subsections 7.3.1 and 7.3.2, respectively.

7.3.1. Methodology

In this study, I created a grammaticality judgment test with respect to the adverb effect. There are 16 types of target sentences which constitute minimal pairs. (7-14)-(7-21) show part of the test sentences. All the target sentences are provided in Appendix 7.

Wh-interrogatives

(7-14) a. Who do you think [*t*] bought the car?

b. Who do you think that [*t*] bought the car?

(7-15) a. Who do you think just a few months ago [*t*] bought the car?

b. Who do you think that just a few months ago [*t*] bought the car?

(7-16) a. Who do you think in Daniel's opinion [*t*] bought the car?

b. Who do you think that in Daniel's opinion [*t*] bought the car?

(7-17) a. Who do you think, according to Sophia, [*t*] bought the car?

b. Who do you think that, according to Sophia, [*t*] bought the car?

Relative Clauses

(7-18) a. The man who I think [*t*] bought the car is Steven.

b. The man who I think that [*t*] bought the car is Steven.

(7-19) a. The boy who I think just a few months ago [*t*] bought the car is Benjamin.

b. The boy who I think that just a few months ago [*t*] bought the car is Benjamin.

(7-20) a. The girl who I think in Daniel's opinion [*t*] bought the car is Grace.

b. The girl who I think that in Daniel's opinion [*t*] bought the car is Grace.

(7-21) a. The person who I think, according to Sophia, [*t*] bought the car is Charles.

b. The person who I think that, according to Sophia, [*t*] bought the car is Charles.

I created eight types of test sheets for the counterbalanced design. There are 40 examples in each type of structure, and each test sheet contains five examples based on the Latin square method. Each type of questionnaire consisted of 104 questions in total (80 test sentences and 24 benchmark sentences).

I used the 100mm line scale shown in (7-22) after showing one example of a totally unnatural sentence and another example of a completely natural sentence. For more detail of the VAS evaluation method, see Section 5.3.2.

(7-22) *VAS Evaluation Method of this Study*

> *How would you judge the naturalness of the sentence as English? Place a vertical mark [|] on the line below to indicate how natural you feel the sentence is.*
>
> Totally unnatural 0 ——————————————— 100 Completely natural

The participants are 62 native speakers of English (ratio of female: male 29:33, age range 18 to 38 years old, and average age 21.48 years old). The collected data was analyzed be a repeated measure of ANOVA and a multiple comparison (Bonferroni). In all analyses, the significant level was set at α<.05.

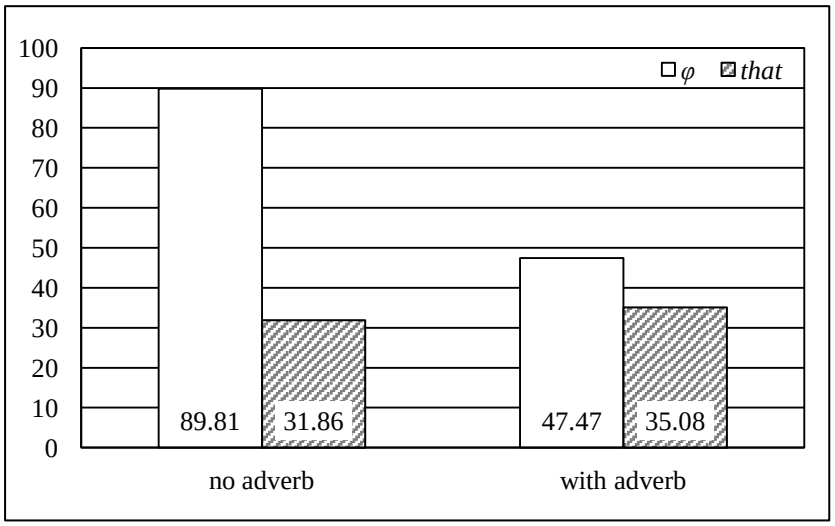
7.3.2. Result of Analysis

In this subsection, I report the result of analysis of this study. The descriptive statistics is shown in (7-23), and it is more clearly represented by (7-24) and (7-25).

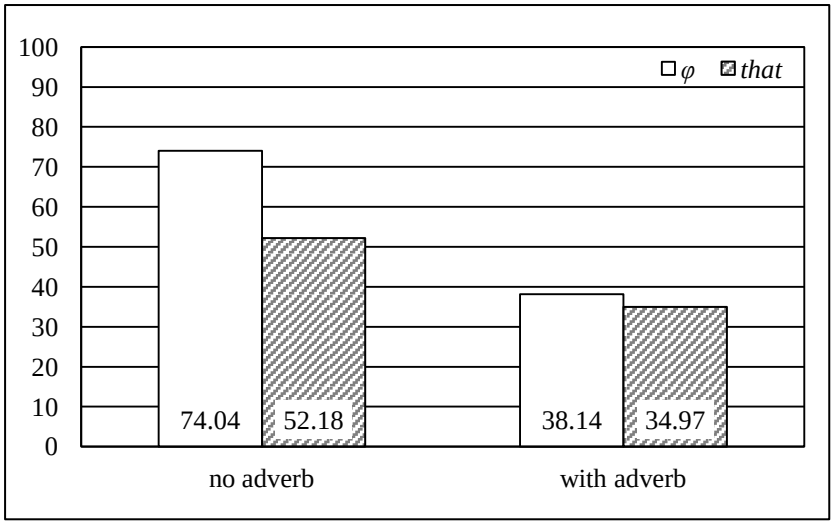
(7-23) *Descriptive Statistics*

		No adverb		With adverb	
		φ	*that*	*φ*	*that*
Wh-interrogatives	Average Score	89.81	31.86	47.47	35.08
	Standard Deviation	10.68	23.45	21.37	19.10
Relative Clauses	Average Score	74.04	52.18	38.14	34.97
	Standard Deviation	23.70	22.22	20.55	18.30

(7-24) *Wh-interrogatives (N=62)*



(7-25) *Relative Clauses (N=62)*



By a repeated measure of 2x2x2 (construction (*wh*-interrogatives/ relative clauses)

type, adverb (no adverb/ with adverb) type, and complementizer (*that/φ*) type) ANOVA, I found a statistically significant (i) main effect for factor adverb type ($F_{(1, 61)}$=131.30, p<.001), (ii) main effect for factor complementizer type ($F_{(1, 61)}$=216.66, p<.001), and (iii) an interaction among the three factors ($F_{(1, 61)}$=54.50, p<.001).. However, there was no statistically significant main effect for factor construction type ($F_{(1, 61)}$=1.06, p<.308).

By multiple comparisons, I found statistically significant differences shown in (7-26).

(7-26) a. As for the *wh*-interrogative construction with an adverb, there was a statistically significant difference in the average scores between complementizer *that* and complemenzier *φ* ($F_{(1, 61)}$=58.11, p<.001).

b. As for the relative clause construction with an adverb, there was a statistically significant difference in the average scores between complementizer *that* and complemenzier *φ* ($F_{(1, 61)}$=7.52, p<.008).

c. As for the *wh*-interrogative construction with complementizer *that*, there was no statistically significant difference in the average scores between no adverb and an adverb ($F_{(1, 61)}$=1.31, p<.257).

d. As for the relative clause construction without complementizer *that*, there was a statistically significant difference in the average scores between no adverb and an adverb ($F_{(1, 61)}$=43.35, p<.001).

These results indicate that the native speakers of English showed the *that*-trace effect on the construction with an adverb, and then they did not exhibit the adverb effect. Therefore, I found the third surprising *that*-trace effect in this survey.

7.4. Discussion

In this chapter, I found that the (non-)*that* trace effect and the adverb effect do not generally hold among native speakers of English, and are only limited to a variety of English. In this section, let us consider what the findings of this chapter may suggest. In Subsection 7.4.1, I discuss the result of the survey in terms of a Phonological Form (PF) condition. In Subsection 7.4.2, I focus on data with *naze* 'why' in Japanese.

7.4.1. The That-Adverb Trace Effect

If the result in Subsection 7.3.2 is correct, it follows that the examples with the *that*-trace pattern and the *that*-adverb-trace pattern should receive an identical analysis in the variety of English with no adverb effect. In the traditional account, the *that*-trace effect has been attributed to the ECP. However, since Chomsky's (1995) Minimalist Program, it is no longer clear that the ECP exists as an independent UG principle. At the same time, researchers working in the framework have yet reached a consensus concerning a precise alternative (syntactic) account of the *that*-trace phenomenon.

In this regard, it is worth considering Ackema's (2011) PF account for the suspension of the *that*-trace effect in the variety of English with the adverb effect. Ackema (2011), following Ackema and Neeleman's (2004) essential claim, provides an account of restrictions on subject extraction out of embedded clauses, such as the *that*-trace effect in English, in terms of a PF condition, rather than a syntactic condition such as the ECP.

Ackema and Neeleman (2004) propose that feature checking can take place not only in local domains in syntax, but also within prosodic domains at PF. This can be expressed as in (7-27), where { } indicates prosodic phrase (φ) boundaries.

(7-27) *PF feature checking*

{[A (F1) (F2) (F3) …] [B (F1) (F2) (F3) …]} →

{[A ($F1_i$) ($F2_j$) ($F3_k$) …] [B ($F1_i$) ($F2_j$) ($F3_k$) …]}

Prosodic phrasing is in principle determined by the alignment principle (Selkirk 1986) in (7-28), which says that right edges of syntactic phrases should be aligned with right edges of prosodic phrases.

(7-28) Align (<right edge, XP> , <right edge, φ>)[12] (where φ is a prosodic phrase)

Ackema and Neeleman (2004) then propose the condition in (7-29), which holds not only in syntax proper, but also at the PF interface.

(7-29) Let α_i and α_{i+1} be links of the same chain such that α_i c-commands α_{i+1}.
If agreement checking involves α_i and β, then α_{i+1} cannot be in a configuration that would allow agreement checking between it and β.

Under the assumption that CP is a phase, it follows from the Phase Impenetrability Condition (PIC) proposed by Chomsky (2001), that extraction of an XP out of an embedded CP must involve movement to the left edge of this CP in syntax, as shown in (7-30a). However, at PF, the condition in (7-29) will be violated if the XP originated in a position that allows PF feature checking against C, as shown in (7-30b).

[12] According to Ackema (2011), (7-28) has the effect that an XP ends up in the same prosodic phrase as a head when it is right-adjacent to this head, or when just another head intervenes, but not when another XP intervenes. An XP does not end up in the same prosodic phrase with a head to which it is left-adjacent, as the XP's right bracket includes φ-closure by (7-28).

(7-30) a. syntax: [Wh$_i$] … [$_{CP}$ [t_i] that [$_{IP}$ [t_i] …

b. PF: {Wh$_i$} C… {t_i} {**that t_i**} { …

The intermediate trace in (7-30a) is in an agreement relationship with C in syntax, while at PF the lowest trace in (7-30b) is also in a checking configuration with C, because it is in the same prosodic phrase as C at PF. (7-30b) thus violates (7-29). On the other hand, a violation of (7-29) does not take place without an overt complementizer. Thus, Ackema and Neeleman (2004) are able to account for the *that*-trace effect shown in (7-30).

Let us now turn to Ackema's (2011) account of the fact that the *that*-trace effect disappears if there is an intervening phrase between C and the subject trace (i.e., the adverb effect). Let us consider the relevant structures of (7-13), for example, represented in (7-31).

(7-31) a. syntax: [Wh$_i$] … [$_{CP}$ [t_i] that [according to the latest rumors] [$_{IP}$ [t_i] …

b. PF: {Wh$_i$} … {t_i} {that according to the latest rumors} {**t_i** …

The adverb effect is predicted by the PF account. By (7-28), in (7-31b), the intervening phrase prevents the lowest subject trace from ending up in the same prosodic phrase as C, so that no violation of (7-29) takes place. Thus, the variety of English with the adverb effect provides some support for the idea that the *that*-trace effect is best analyzed as a PF phenomenon.

On the other hand, Ackema's (2011) PF condition, as it stands, does not provide an adequate account for the lack of suspension of *that*-trace effects in the variety of English without the adverb effect, as it would incorrectly predict that structures such as (7-31) are well-formed for all speakers. Any adequate analysis of *that*-trace phenomena must be able to account for these two different varieties of English, presumably in terms of some sort of

parameter.

7.4.2. The That-Adjunct Trace Effect in Japanese

If the native speaker of English shows variation of judgment of the interpretation of *why*, it is expected that in other languages, the same should hold true. To see if this is so, I will see data with *naze* 'why' in Japanese. Lasnik and Saito (1984) provide the examples in (7-32). They judge them perfectly grammatical.

(7-32) a. John-wa naze kubi-ni natta no?
John-TOP why was fired Q
'Why was John fired?'

b. Bill-wa [John-ga naze kubi-ni natta tte] itta no?
Bill-TOP John-NOM why was fired COMP said Q
'Why did Bill say that John was fired *t*?

There is no doubt that (7-32a) is grammatical, otherwise no question with *naze* 'why' will be possible in Japanese. (7-32b) also looks perfectly grammatical. In the following, I will see whether this is true in Japanese in general.

I start by examining *wh*-interrogative clauses with an argument *wh*-phrase such as *dare* 'who.' (7-33a) is a simple sentence and perfectly grammatical in Japanese, and it can be properly answered by (7-33b).

(7-33) a. John-wa dare-ni atta no?
John-TOP who-DAT met Q
'Who did John meet?'

b. Mary(-ni(-desu)).

Mary-DAT-be

‘((It is) to) Mary.’

Also, (7-34a), a more complex sentence than (7-33a), is perfect, and can be properly answered by (7-34b).

(7-34) a. Bill-wa [John-ga dare-ni atta to] itta no?

Bill-TOP John-NOM who-DAT met COMP said Q

‘Who did Bill say that John met?’

b. Mary(-ni(-desu)).

Mary-DAT-be

‘((It is) to) Mary.’

What I intended to show with the above examples is that although I can test whether a given *wh*-interrogative sentence is grammatical simply by comparing it with its minimal pair counterpart, it will make the judgment more solid if one further examines whether it can be properly answered, because it is a question rather than a statement. With this in mind, let us now consider interrogative sentences with *naze* ‘why.’ Consider first (7-35b).

(7-35) a. John-wa naze kubi-ni natta no?

John-TOP why was.fired Q

‘Why was John fired?’

b. Jooshi-no okane-o nusunda kara (desu).
boss-GEN money-ACC stole because be
‘(It is) because he stole his boss’ money.’

(7-35a) is a simple sentence and perfectly grammatical in Japanese, and it can be properly answered by (7-35b). Therefore, we say with confidence that (7-35a) is truly grammatical in Japanese.

Let us then consider a more complex sentence than (7-35a). The example in (7-36a) contains *naze* ‘why’ in the embedded clause. A potential answer to it is given in (7-36b).

(7-36) a. Bill-wa John-ga naze kubi-ni natta to itta no?
Bill-TOP John-NOM why was.fired COMP said Q
‘Why did Bill say [that John was fired *t*]?
b. Jooshi-no okane-o nusunda kara (desu).
boss-GEN money-ACC stole because be
‘(It is) because he stole his boss’ money.’

At first sight, (7-36a) sounds perfectly grammatical, and at the same time, (7-36b) sounds like a perfect answer to it. However, a careful examination shows that (7-36b) is somehow understood to be the reason for Bill’s saying so, not John’s having been fired, at least in the variety of Japanese the author of this paper has been a native speaker of.

To me, interrogative sentences with *naze* ‘why’ in situ in Japanese, as shown in (7-35a) and (7-36a), are more or less close to the corresponding cleft sentences, as shown in (7-37a) and (7-38a), whose potential answers are shown in (7-37b) and (7-38b), respectively.

(7-37) a. John-ga *t* kubi-ni natta no-wa naze desu ka?
John-NOM was.fired NO-TOP why be Q
'Why is it that John was fired?'

b. Jooshi-no okane-o nusunda kara (desu).
boss-GEN money-ACC stole because be
'(It is) because he stole his boss' money.'

(7-38) a. Bill-ga [John-ga *t* kubi-ni natta to] itta no-wa naze desu ka?
Bill-NOM John-NOM was.fired COMP said NO-TOP why be Q
'Why is it that Bill said [that John was fired *t*]?'

b. * Jooshi-no okane-o nusunda kara (desu).
boss-GEN money-ACC stole because be
'(It is) because he stole his boss' money.'

(7-37a) can be properly answered by (7-37b), but (7-38a) cannot by (7-38b). This indicates that as long as the cleft construction with *naze* 'why' involves movement, long distance movement of some operator corresponding to *naze* 'why' is illicit in Japanese.

Let us then consider whether the same tendency is observed with other bridge verbs. (7-39a) contains *shinjita* 'believed' and (7-40a) *omottta* 'thought,' and the possible answers to (7-39a) and (7-40a) are given in (7-39b) and (7-40b), respectively.

(7-39) a. Kimi-wa John-ga naze kubi-ni natta to shinjita no?
you-TOP John-NOM why was.fired COMP believed Q
'Why did you believe [that John was fired *t*]?

b. Jooshi-no okane-o nusunda kara (desu).
boss-GEN money-ACC stole because be
‘(It is) because he stole his boss’ money.’

(7-40) a. Kimi-wa John-ga naze kubi-ni natta to omotta no?
you-TOP John-NOM why was.fired COMP thought Q
‘Why did you think [that John was fired *t*]?
b. Jooshi-no okane-o nusunda kara (desu).
boss-GEN money-ACC stole because be
‘(It is) because he stole his boss’ money.’

Again, at first sight, (7-39a) sounds grammatical, and at the same time, (7-39b) sounds like a perfect answer to it. However, in my variety of Japanese, (7-39b) is understood to be the reason for my believing so, not John’s having been fired. In the same vein, (7-40a) sounds like a perfectly grammatical sentence, and (7-40b) is a possible answer to it. However, in my variety of Japanese, (7-40b) is understood to be the reason for my thinking so, not John’s having been fired.

Again, to me, (7-39a) and (7-40a) are more or less close to the corresponding cleft sentences, as shown in (7-41a) and (7-42a), whose potential answers are shown in (7-41b) and (7-42b), respectively.

(7-41) a. Kimi-ga [John-ga *t* kubi-ni natta to] shinjita no-wa naze desu ka?
you-NOM John-NOM was.fired COMP believed NO-TOP why be Q
‘Why is it that you believed [that John was fired *t*]?’

b. * Jooshi-no okane-o nusunda kara (desu).
boss-GEN money-ACC stole because be
‘(It is) because he stole his boss’ money.’

(7-42) a. Kimi-ga [John-ga *t* kubi-ni natta to] omotta no-wa naze desu ka?
you-NOM John-NOM was.fired COMP thought NO-TOP why be Q
‘Why is it that you thought [that John was fired *t*]?’

b. * Jooshi-no okane-o nusunda kara (desu).
boss-Gen money-Acc stole because be
‘(It is) because he stole his boss’ money.’

To summarize, this subsection showed that native speakers of Japanese show variation of judgments of the interpretation of *naze* ‘why,’ just like native speakers of English, and thus, it shows a case of the surprising *that*-trace effect in some variety of Japanese. Therefore, as long as the data in this subsection are reliable, it is necessary to make it explicit that there are two types of native speakers of Japanese, that is, those who accept long distance association of *naze* ‘why’ and the [+Q] COMP, and those who do not.

7.5. Conclusion

This chapter showed three cases of the surprising *that*-trace effect in English, shown in (7-43).

(7-43) *The Surprising That-Trace Effect in English*

a. The *that*-object trace effect

b. The *that*-adjunct trace effect

c. The *that*-adverb-trace effect

I found that the (non-)*that*-trace effect does not generally hold among native speakers of English, but rather is only limited to a variety of English. Given these findings, the issue whether the *that*-trace effect is syntactic or non-syntactic in nature remains open.

CHAPTER 8: A STUDY OF THE MULTIPLE WH-MOVEMENT OPERATION WITH THE SUPERIORITY EFFECT BY JAPANESE EFL LEARNERS

8.1. Introduction

In the previous chapters, I focused on the long distance *wh*-interrogative construction, and found that the advanced Japanese EFL learners exhibited the *that*-trace effect. As long as this effect is attributed to one of the principles of UG, namely the ECP, it suggests that the ECP is active for the advanced level Japanese EFL learners. Given this, the question arises as to whether other UG principles will be active for these Japanese EFL learners. To address the question, in this chapter, I will focus on another type of the *wh*-interrogative construction, namely, the *wh*-interrogative construction with multiple *wh*-phrases, and examined whether Chomsky's (1995) Attract-F may be active for these learners.

The organization of this chapter is as follows. Section 8.2 shows the background to this study, and Section 8.3 presents the procedure of this study. Section 8.4 reports the result of analysis, and finally, Section 8.5 summarizes the findings of this study.

8.2. Background

In this study, I focus on multiple *wh*-interrogatives with the superiority effect. (8-1) shows a typical paradigm of the (non-)superiority effect in English[13].

[13] Japanese counterparts to the examples in (8-1) are shown in (I). It is well-known that scrambling of a direct object *wh*-phrase over a subject *wh*-phrase in Japanese constructions such as (I-b) does not result in the superiority violation. The sentence in (I-b) is grammatical in Japanese.

(I) a. dare-ga nani-o kat-ta no?
who-NOM what-ACC buy-past Q
'who bought what?'

b. nani-o dare-ga kat-ta no?
what-ACC who-NOM buy-past Q

c. dono hito-ga dono hon-o kat-ta no?
which man-NOM which book-ACC buy-past Q
'which man bought which book?'

d. dono hon-o dono hito-ga kat-ta no?
which book-ACC which man-NOM buy-past Q

However, Hagstrom (1998) pointed out that the sentence in (I-a) and (I-b) do not receive the same interpretation. Whereas the sentence in (I-a) has both a single-pair and a pair-list answer reading, the sentence in (I-b) only has a single-pair answer reading.

(8-1) a. Who bought what?

b. * What did who buy?

c. Which man bought which book?

d. Which book did which man buy?

The grammaticality in the examples in (8-1) can be explained with Attract-F proposed by Chomsky (1995).

(8-2) Attract-F

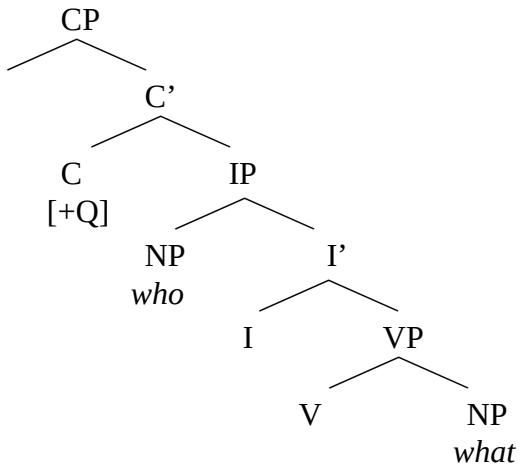
A target *K* attracts a feature *F* if *F* is the closest feature that can enter into a checking relation with a sublabel of *K*.

(8-2) is considered to be part of UG principles. Attract-F incorporates in its definition the Minimal Link Condition (MLC)[14]. The MLC is always respected because a functional head which has a feature that needs to be checked, always attracts the closest element. In this system, the trigger for movement is always on the target. (8-1a) is a grammatical multiple *wh*-question, where the subject *wh*-phrase *who* c-commands the object *wh*-phrase *what* at the base-structure, as schematized in (8-3).

[14] The Minimal Link Condition was proposed by Chomsky (1995), and it is defined as in (II). He then provides the definition of closeness, as shown in (III).

(II) *K* attracts α only if there is no β, β closer to *K* than α, such that *K* attracts β.
(III) β is closer to the target *K* than α if β c-commands α.

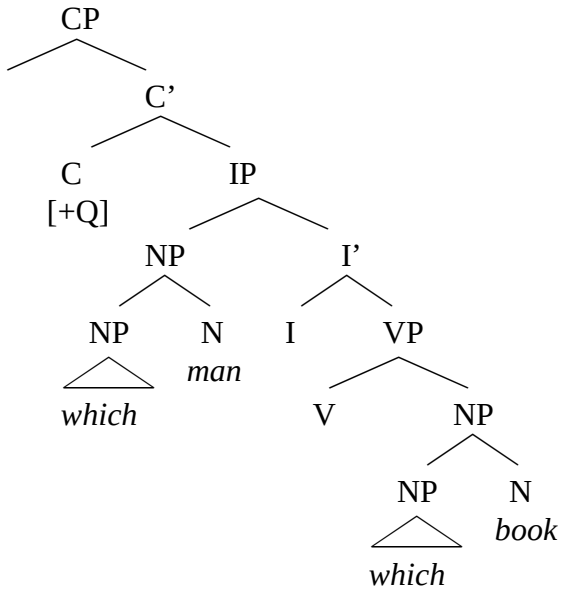
(8-3)



The [+Q] COMP attracts the higher *wh*-phrase *who* to CP-SPEC rather than the lower *wh*-phrase *what*, and the derivation does not violate Attract-F. However, in (8-1b), the [+Q] COMP attracts the lower *wh*-phrase *what* to CP-SPEC rather than the higher *wh*-phrase *who*. Thus, the derivation violates Attract-F, and the example is ruled out.

Let us now consider the underlying structure of (8-1c) shown in (8-4).

(8-4)



In (8-4), the subject *wh*-phrase *which man* c-commands the object *wh*-phrase *which book* at

the base-structure. Note, however, that the *wh*-phrase *which* of *which man* in the subject position does not c-command the *wh*-phrase *which* of *which book* in the object position. Therefore, the [+Q] COMP may attract either one of the *wh*-phrases, *which* of *which man* or *which* of *which book*, and when the *wh*-phrase is attracted, the entire NP is moved together in English by pied-piping. Therefore, both (8-1c) and (8-1d) are grammatical[15].

8.3. Procedure

In this section, I present the procedure of this study. Subsection 8.3.1 provides a research question and the prediction. Subsection 8.3.2 and Subsection 8.3.3 show the overview of the material and the details of the participants, respectively.

8.3.1. Purpose

In this study, I examine whether Attract-F will be active for Japanese EFL learners in judgment of multiple *wh*-interrogatives in English. (8-5) is a research question of this study.

(8-5) *Research Question*

Do Japanese EFL learners show the superiority effect?

If the answer to the research question in (8-5) is *Yes*, Attract-F, which is part of UG, is active for their L2 acquisition. On the other hand, if the answer is *No*, it is masked. Now, if Attract-F is part of the principles of UG, it will be predicated on the basis of the results of Chapter 5, that the advanced level Japanese EFL learners will distinguish between (8-1a) and (8-1b), but will not distinguish between (8-1c) and (8-1d), and then the participant will

[15] This was first pointed out by Pesetsky (1987), who characterized the *wh*-phrases whose form is of *which N* as Discourse-linked (D-linked) *wh*-phrases, and the other *wh*-phrases as non-Discourse-linked (non-D-linked) *wh*-phrases.

show the following result.

(8-6) *Prediction*

Only the advanced Japanese EFL learners exhibit the superiority effect. In other words, Attract-F will be in operation for the advanced Japanese learners, while it will not for the beginner and the intermediate Japanese EFL learners.

To examine the research question in (8-5), I administered a grammaticality judgment task with respect to multiple *wh*-interrogatives to 54 Japanese EFL learners.

8.3.2. Material

In this study, I created a grammaticality judgment test containing multiple *wh*-interrogatives. There are four types of target sentences which constitute minimal pairs. (8-7) and (8-8) show some examples of the test sentences. All the target sentences are provided in Appendix 8.

(8-7) *Examples of Test Sentences (Animate Object)*

a. Who saved who? (non-D-linked *wh*-phrases, Subject)

b. Who did who save? (non-D-linked *wh*-phrases, Object)

c. Which doctor saved which patient? (D-linked *wh*-phrases, Subject)

d. Which patient did which doctor save? (D-linked *wh*-phrases, Object)

(8-8) *Examples of Test Sentences (Inanimate Object)*

a. Who bought what? (non-D-linked *wh*-phrases, Subject)

b. What did who buy? (non-D-linked *wh*-phrases, Object)

c. Which man bought which car? (D-linked *wh*-phrases, Subject)

d. Which car did which man buy? (D-linked *wh*-phrases, Object)

I used two types of verbs in the grammaticality judgment test: 12 verbs which take an animate subject and an animate object, and 12 verbs which take an animate subject and an inanimate object. Therefore, there are 24 examples in each type of sentence. For the counterbalanced design, I created four types of test sheets. In each questionnaire, I used 120 sentences (24 target sentences, 84 filler sentences, and 12 benchmark sentences) based on the Latin square method.

I used the 100mm line scale shown in (8-9) after showing one example of a totally unnatural sentence and another example of a completely natural sentence. For more detail of the VAS evaluation method, see Section 5.3.2.

(8-9) *VAS Evaluation Method of this Study*

How would you judge the naturalness of the sentence as English? Place a vertical mark [|] on the line below to indicate how natural you feel the sentence is.

Totally unnatural 0 ——————————— 100 Completely natural

8.3.3. Participants

I administered the grammaticality judgment task to 54 Japanese EFL learners who were learning English as a second language in Japan. (8-10) shows the subjects' background.

(8-10) *Subjects' Background*

Observations	54
Ratio of Gender (Female: Male)	23: 31
Age Range	18-37
Average Age	19.30
Average Score on the MET 6B	23.93
Standard Deviation on the MET 6B	8.21

The participants took the MET 6B, which is a five-minute English proficiency test shown in Section 2.2, at the same time. Based on the deviation value of the MET 6B, the participants were classified into 3 EFL level groups. I show the classification of the participants in (8-11).

(8-11) *Three Types of EFL Level Groups*

		Beginner	Intermediate	Advanced
MET 6B	Score Range	5-19	20-28	29-43
	Average Score	14.27	23.48	33.63
	Deviation Value	DV<45	45≤DV<55	55≤DV
Observations		15	23	16

I conducted the same grammaticality judgment test to 18 native speakers of English as a control group of this study (ratio of female: male 7:11, age range 19 to 29 years old, and average age 22.22 years old).

8.4. Results

This section reports the result of analysis. The collected data was analyzed by a repeated measure of ANOVA and a multiple comparison (Bonferroni). In all analyses, the significant level was set at α<.05. The results of native speakers of English and Japanese EFL Learners are shown in Subsection 8.4.1 and Subsection 8.4.2, respectively.

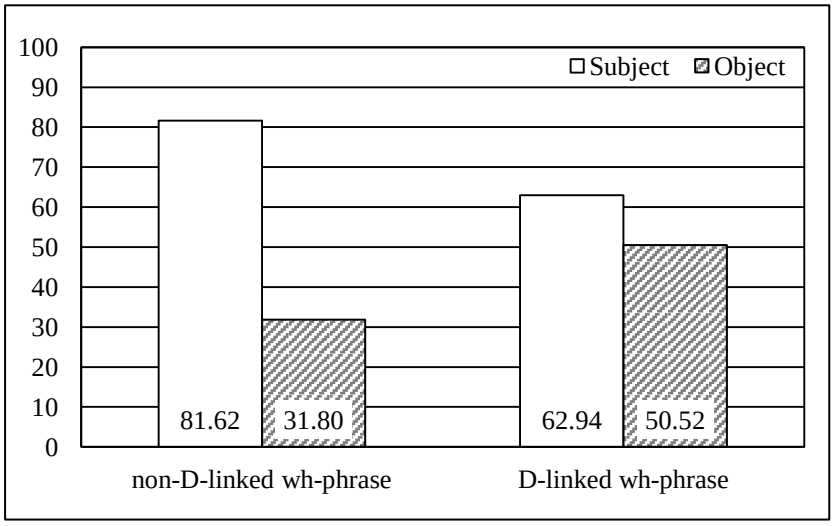
8.4.1. Native Speakers of English

In this subsection, I report the result from the native speakers of English. The descriptive statistics is shown in (8-12), and it is more clearly represented by (8-13).

(8-12) *Descriptive Statistics*

	non-D-linked *wh*-phrase		D-linked *wh*-phrase	
	Subject	Object	Subject	Object
Average Score	81.62	31.80	62.94	50.52
Standard Deviation	20.21	28.49	28.38	30.40

(8-13) *Native Speakers of English (N=18)*



By a repeated measure of 2x2 (*wh* (D-linked/non-D-linked) type and extraction (subject/object) type) ANOVA, I found a statistically significant (i) main effect for factor extraction type ($F_{(1, 17)}$=45.73, p<.001), and (ii) interaction between two factors ($F_{(1, 17)}$=41.00, p<.001). However, there was no statistically significant main effect for factor *wh* type ($F_{(1, 17)}$<.001, p<.997).

By multiple comparisons, as for non-D-linked multiple *wh*-interrogatives, the native

speakers of English showed a statistically significant difference in the average scores between subject extraction and object extraction ($F_{(1, 17)}$=49.00, p<.001)[16]. The average score on object extraction from non-D-linked multiple *wh*-interrogatives have a statistically significant difference (i) with the average score on subject extraction from D-linked multiple *wh*-interrogatives, and (ii) with the average score on object extraction from D-linked multiple *wh*-interrogatives (p<.001). These results indicate that the native speakers of English showed the superiority effect shown in (8-1).

8.4.2. Japanese EFL Learners

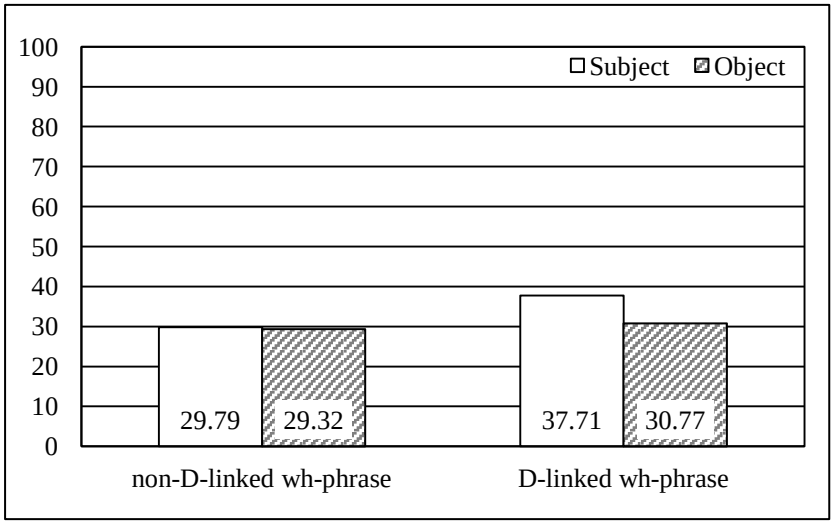
In this subsection, I report the result from Japanese EFL learners. The descriptive statistics is shown in (8-14), and it is more clearly represented by (8-15), (8-16), and (8-17).

(8-14) *Descriptive Statistics*

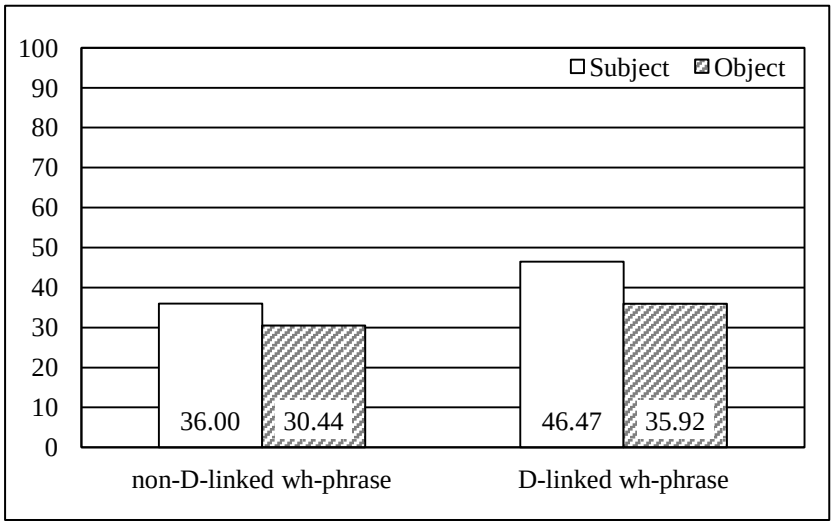
		non-D-linked *wh*-phrase		D-linked *wh*-phrase	
		Subject	Object	Subject	Object
Beginner	Average Score	29.79	29.32	37.71	30.77
	Standard Deviation	25.20	18.46	20.87	15.38
Intermediate	Average Score	36.00	30.44	46.47	35.95
	Standard Deviation	17.31	19.41	21.26	18.90
Advanced	Average Score	35.08	25.71	36.32	31.17
	Standard Deviation	25.93	20.01	24.04	22.33

[16] As for D-linked multiple *wh*-interrogatives, they showed a statistically significant difference in the average scores between subject extraction and object extraction ($F_{(1, 17)}$=17.60, p<.001). I conducted the grammaticality judgment task with respect to indirect *wh*-interrogatives, at the same time. Through the analysis, I found a statistically significant difference between subject extraction and object extraction (i) with respect to non-D-linked indirect multiple *wh*-interrogatives (average$_{(subject)}$=50.13, average$_{(object)}$=10.04, p<.001), and (i) with respect to D-linked indirect *wh*-interrogatives (average$_{(subject)}$=58.00, average$_{(object)}$=35.46, p<.001). In both multiple *wh*-interrogatives and indirect *wh*-interrogative, D-linked *wh*-phrases showed the superiority effect. This is the surprising superiority effect, just like the surprising *that*-trace effect shown in Chapter 7.

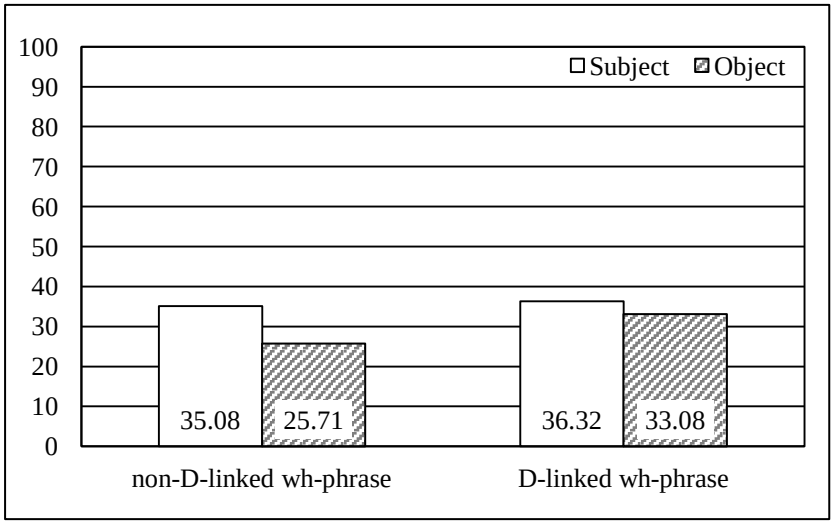
(8-15) *Beginner EFL Learners (N=15)*



(8-16) *Intermediate EFL Learners (N=23)*



(8-17) *Advanced EFL Learners (N=16)*



By a repeated measure of 3x2x2 (EFL level type, *wh* (D-linked/non-D-linked) type, and extraction (subject/object) type) ANOVA, I found a statistically significant (i) main effect for factor *wh* type ($F_{(1, 51)}$=8.88, p<.004), and (ii) main effect for factor extraction type ($F_{(1, 51)}$=12.05, p<.001). However, there was no statistically significant (i) main effect for factor EFL level type ($F_{(2, 51)}$=.554, p<.578), and (ii) an interaction among the three factors ($F_{(2, 51)}$=12.30, p<.301).

By multiple comparisons, I found statistically significant differences shown in (8-18).

(8-18) a. As for D-linked multiple *wh*-interrogatives, the intermediate EFL learners showed a statistically significant difference between subject extraction and object extraction ($F_{(1, 51)}$=9.63, p<.003).

b. As for non-D-linked multiple *wh*-interrogatives, the advanced EFL learners showed a statistically significant difference between subject extraction and object extraction ($F_{(1, 51)}$=4.63, p<.036).

These results indicate that only advanced EFL learners showed the superiority effect[17].

8.5. Conclusion

In this study, I examined whether Attract-F would be active for Japanese EFL learners in judgment of multiple *wh*-interrogatives in English. The research question in (8-5) and the prediction in (8-6) are repeated in (8-19) and (8-20), respectively.

(8-19) *Research Question*

Do Japanese EFL learners show the superiority effect?

(8-20) *Prediction*

Only the advanced Japanese EFL learners exhibit the superiority effect. In other words, Attract-F will be in operation for the advanced Japanese learners, while it will not for the beginner and the intermediate Japanese EFL learners.

The answer to the research question is partially *Yes*, and the prediction is *True*. I found that only the advanced EFL learners showed the superiority effect. Therefore, Attract-F, which is considered to be part of UG, should be active for the advanced level learners, while it is not for the beginner and the intermediate level learners. The result of this chapter supports the results of Chapter 5. In the next chapter, I will discuss what the results from Chapter 5, Chapter 6, and Chapter 8 may suggest for L2 acquisition.

[17] In order to investigate whether the types of verbs would affect the grammaticality judgment, I used two types of verbs: (i) verbs which take an animate subject and an animate object (8-7), and (ii) verbs which take an animate subject and an inanimate object (8-8). I found that the animacy effect was not consistently observed across the four sentence structures or the three EFL levers. Therefore, the types of verbs did not crucially affect the grammaticality judgment task on the superiority effect.

CHAPTER 9: DISCUSSION

9.1. Introduction

In this chapter, I will discuss the results of the experiments with respect to the acquisition of the *wh*-movement operation in English by Japanese EFL learners. I discuss (i) what the results from short distance *wh*-movement may suggest for English education in Section 9.2, and (ii) what the results from long distance *wh*-movement and multiple *wh*-interrogatives may suggest for L2 acquisition in Section 9.3.

9.2. The Interrogatives with Short Distance WH-Movement

In this section, I discuss the results of Chapters 3-4. First, I found that the junior high school EFL learners who typically learn interrogatives for the first time in school, showed two types of argument/adjunct asymmetries and two types of subject/object asymmetries in acquisition of the *wh*-interrogative construction. Let us consider what these results may suggest for English education. I found that the beginner level learners showed a different tendency from the advanced level learners. This fact seems to suggest steps of acquisition of interrogative constructions by Japanese junior high school EFL learners. In order to fully investigate the acquisition steps with respect to interrogative constructions, I divided the data into six groups (Level-1 to Level-6, where Level-1 < … < Level-6) based on the scores on the interrogative formation test, as shown in (9-1).

(9-1) *Average Scores on the Interrogative Formation Test*

	Score Range	N	yes/no	subject *wh*	object *wh*	adjunct *wh*
Level-1	1-5	55	.2515[*1]	.1515[*2]	.0273	.0227
Level-2	6-10	29	.4828[*1]	.5230[*2]	.0920	.1207[*3]
Level-3	11-15	14	.6190	.3571[*5]	.3452[*4]	.4107[*3]
Level-4	16-20	21	.8333	.0873[*5]	.5952[*4]	.7619
Level-5	21-25	20	.9333	.0917[*6]	.8583	.9375
Level-6	26-30	8	.9167	.9375[*6]	.9167	.9375

([*N] means statistically significant difference between them.)

I found that the Japanese junior high school EFL learners seem to experience 6 steps in the acquisition of interrogative constructions, shown in (9-2).

(9-2) a. the acquisition of *yes/no*-interrogatives (*do*-support operation)[*1]

b. the acquisition of *wh*-interrogatives with subject extraction[*2]

c. the acquisition of *wh*-interrogatives with adjunct extraction[*3]

d. the acquisition of *wh*-interrogatives with object extraction[*4]

e. the regression of *wh*-interrogatives with subject extraction[*5]

f. the re-acquisition of *wh*-interrogatives with subject extraction[*6]

Second, let us consider the results from college and university EFL learners. They showed (i) an argument/adjunct asymmetry and (ii) two types of subject/object asymmetries in the acquisition of the *wh*-interrogative construction with short distance *wh*-movement. Given these results, the question arises as to what caused the asymmetries in acquisition of the *wh*-interrogative construction. Let us consider these asymmetries in terms of their syntactic properties.

First, let us consider the argument/adjunct asymmetry. For the Japanese EFL learners,

adjunct *wh*-extraction was easier than argument *wh*-extraction. Why is this so? I claim that adjunct *wh*-extraction involves less computational complexity than argument *wh*-extraction, following Rizzi's (1990) main idea. Based on the examples with the negative island effect in (9-3), Rizzi (1990) proposes that an adjunct *wh*-phrase can be directly base-generated in CP-SPEC. Note that in (9-3b), *why* is intended to modify the predicate *come*.

(9-3) a. Why didn't you come?

b. * Why don't you think that John came?

Example (9-3b) illustrates the so-called negative island effect: the sentence is said to be ungrammatical since the adjunct *wh*-phrase that modifies the predicate in the embedded clause moves across the negation in the matrix clause on the way to the matrix CP-SPEC. However, the grammaticality of (9-3a) is then not expected, if *why* must also move across negation to reach CP-SPEC. Therefore, Rizzi (1990) proposes that the adjunct *wh*-phrase *why* can be base-generated in the CP-SPEC of the clause it modifies. If this is the case, and if extraction of argument (subject and object) *wh*-phrases involves movement to CP-SPEC rather than base-generation in CP-SPEC, adjunct *wh*-extraction should not involve a movement operation, in contrast to argument *wh*-extraction, and the former is considered to involve less computational complexity. Therefore, I conclude that the argument/adjunct asymmetry is attributed to the difference in the base-generated position of the *wh*-phrase between adjunct *wh*-extraction and argument *wh*-extraction.

Second, let us turn to the subject/object asymmetry. I claim that this asymmetry is derived from the T-C movement asymmetry between object *wh*-extraction and subject *wh*-extraction suggested by Koopman (1983). For the intermediate level learners, it was more difficult to generate *wh*-interrogatives with subject extraction than object extraction.

The learners made frequent errors in inserting *did* between the *wh*-phrase and the verb. This phenomenon thus seems to indicate that after internalizing the *wh*-interrogative construction with object *wh*-extraction, they implicitly assume a non-string vacuous movement operation for the *wh*-interrogative construction as a whole, which leads to overgeneration of subject *wh*-extraction with *do*/*did* being inserted. Since the beginner level learners are better at subject *wh*-extraction than object *wh*-extraction, the transition from the beginner level stage to the intermediate level stage clearly shows a process of internalization of the *wh*-movement strategy.

Before going to the next section, I will point out an interesting question arising from another construction with short distance *wh*-movement, namely, the relative clause construction. Japanese college and university EFL learners showed two types of subject/object asymmetries in acquisition of *wh*-interrogatives. It was more difficult to generate *wh*-interrogatives with object extraction than subject extraction for the beginner level learners. On the other hand, the intermediate level learners have the opposite tendency from the beginner level learners. For them, it was more difficult to generate *wh*-interrogatives with subject extraction than object extraction. Furthermore, the advanced level learners did not show the asymmetry. Thus, in *wh*-interrogatives, the Japanese EFL learners showed different tendencies among three types of EFL groups. However, there was no difference in the level of acquisition of relative clauses among the three EFL groups. The Japanese EFL learners showed a subject/object asymmetry: for them, object *wh*-extraction was more difficult than subject *wh*-extraction in relative clause formation. These results seem to indicate that if the construction does not involve the *do*-support operation, as in relative clause formation, subject extraction is easier than object extraction, because of the distance of the movement.

9.3. The Interrogatives with Long Distance WH-Movement and Multiple WH-Phrases

In this section, I will discuss what the results of Chapters 5, 6, and 8 might suggest. First, let us consider the result of Chapter 5. I found that only the advanced Japanese EFL learners exhibit the *that*-trace effect. Given this result, I examined whether Japanese EFL learners had genuinely acquired long distance *wh*-movement in English, using the result of the preliminary study. In the preliminary study, I compared three types of sentences in (9-4).

(9-4) a. Who do you think that found Pam?

b. Who do you think found Pam?

c. Do you think who found Pam?

The sentence in (9-4c) is a mistake which Japanese EFL learners frequently make, which shows that long distance overt *wh*-movement has not been acquired. I found the following. First, the beginner level learners showed no statistically significant difference between (9-4a) and (9-4b) ($Average_{(9\text{-}4a)}$=61.63, $Average_{(9\text{-}4b)}$=66.48, p<.58), or between (9-4b) and (9-4c) ($Average_{(9\text{-}4b)}$=66.48, $Average_{(9\text{-}4c)}$=59.61, p<.96), which indicates that they have not genuinely acquired long distance *wh*-movement. Second, the intermediate level learners showed a statistically significant difference between (9-4b) and (9-4c) ($Average_{(9\text{-}4b)}$=71.18, $Average_{(9\text{-}4c)}$=54.30, p<.03), but no statistically significant difference between (9-4a) and (9-4b) ($Average_{(9\text{-}4a)}$=72.72, $Average_{(9\text{-}4b)}$=71.18, p<1.00). This indicates that they seem to have acquired long distance *wh*-movement, but the ECP is being masked. Third, and finally, the advanced learners showed a statistically significant difference between (9-4b) and (9-4c) ($Average_{(9\text{-}4b)}$=72.31, $Average_{(9\text{-}4c)}$=45.12, p<.01), and between (9-4a) and (9-4b) ($Average_{(9\text{-}4a)}$=63.87, $Average_{(9\text{-}4b)}$=72.31, p<.05). This indicates that they have acquired

long distance *wh*-movement, and at the same time, the ECP tends to be in operation. The results of the preliminary study thus seem to suggest that Japanese EFL learners experience two steps before being able to properly judge the *that*-trace effect.

Second, let us consider the relationship between acquisition of the *wh*-movement operation and the involvement of the principles of UG. I summarize the results of Chapters 5, 6, and 8 in (9-5).

(9-5) *Summary of the Results of Chapters 5, 6, and 8*

	Effect	Beginner	Intermediate	Advanced
Japanese	*that*-trace	-	-	✓
	superiority	-	-	✓
Korean	*that*-trace	-	-	✓
Mongolian	*that*-trace	-	-	✓
Chinese	*that*-trace	-	-	✓

(9-5) shows that only the advanced Japanese EFL learners showed both the *that*-trace effect and the superiority effect in acquisition of the *wh*-movement operation in English. Thus, the ECP and Attract-F, which are assumed to be part of UG principles, should be active for the advanced level learners, while they are not for the beginner and the intermediate level learners. Furthermore, Korean EFL learners, Mongolian EFL learners, and Chinese EFL learners showed the same tendency as Japanese EFL learners. Therefore, these results indicate that for Asian EFL learners, L2 grammar is constrained not only by L1 knowledge, but also by UG. Thus, these results support the Transfer Hypothesis rather than the No UG Access Hypothesis or the Full Access Hypothesis.

CHAPTER 10: CONCLUSION

In L2 acquisition, there are three hypotheses on access to UG. The hypotheses in (1-6), (1-7) and (1-8) are repeated in (10-1), (10-2), and (10-3), respectively.

(10-1) *The No UG Access Hypothesis*

UG is unavailable in L2 acquisition. L2 grammar is constrained by L1 knowledge which the learners had already acquired.

(10-2) *The Full Access Hypothesis*

UG is available in L2 acquisition. L2 grammar is constrained by UG, and it is uninfluenced by L1 knowledge.

(10-3) *The Transfer Hypothesis*

UG access is possible in L2 acquisition. L2 grammar is constrained by both L1 knowledge and UG.

In this dissertation, I examined the relationship between L2 acquisition and the involvement of the principles of UG in the acquisition of the *wh*-movement operation in English by Japanese EFL learners. The general research questions of this dissertation in (1-14) are repeated in (10-4).

(10-4) *General Research Questions*

a. Do syntactic asymmetries affect the acquisition of the *wh*-movement operation by Japanese EFL learners?

b. Are the UG principles active for the *wh*-movement operation by Japanese EFL learners?

To address these research questions, I conducted (i) the interrogative formation test, (ii) the translation test, and (iii) the grammaticality judgment test to Japanese EFL learners. Through the analysis, I found the following.

(10-5) a. As for Japanese junior high school EFL learners, there are two types of argument/adjunct asymmetries in acquisition of the short distance *wh*-movement operation (Chapter 3).

b. As for Japanese junior high school EFL learners, there are two types of subject/object asymmetries in acquisition of the short distance *wh*-movement operation (Chapter 3).

c. As for Japanese college and university EFL learners, there are two types of argument/adjunct asymmetries in acquisition of the short distance *wh*-movement operation (Chapter 4).

d. As for Japanese college and university EFL learners, there are two types of subject/object asymmetries in acquisition of the short distance *wh*-movement operation (Chapter 4).

e. Only the advanced Japanese EFL learners showed the *that*-trace effect in judgment of *wh*-interrogatives with long distance *wh*-movement (Chapter 5).

f. Only the advanced Japanese EFL learners showed the superiority effect in judgment of multiple *wh*-interrogatives (Chapter 8).

First, the answer to the research question in (10-4a) is *Yes*. Japanese EFL learners

acquire four types of *wh*-interrogatives (subject, object, pseudo adjunct, and adjunct) differently, and they showed two types pf argument/adjunct asymmetry and two types of subject/object asymmetry in acquisition of these *wh*-interrogatives.

For the advanced junior high school EFL learners, and college and university EFL learners, it was more difficult to generate *wh*-interrogatives with argument extraction than adjunct extraction. The beginner junior high school EFL learners showed an opposite tendency from them. It was more difficult for them to generate *wh*-interrogatives with adjunct extraction than argument extraction.

For the beginner junior high school EFL learners, and the beginner college and university EFL learners, it was more difficult to generate *wh*-interrogatives with object extraction than subject extraction. The advanced junior high school EFL learners, and the intermediate college and university EFL learners showed an opposite tendency from them. It was more difficult for them to generate *wh*-interrogatives with subject extraction than object extraction.

Second, the answer to the research question in (10-4b) is partially *Yes*. Only advanced Japanese EFL learners showed both the *that*-trace effect and the superiority effect in acquisition of the *wh*-movement operation in English. Thus, the ECP and Attract-F, which are considered to be part of the UG principles, should be active for the advanced level learners, while they are not for the beginner and the intermediate level learners.

Based on these results, I conclude that L2 grammar by Japanese EFL learners regarding the *wh*-movement operation in English, is constrained not only by L1 knowledge, but also by UG. Therefore, the results of my dissertation support the Transfer Hypothesis rather than the No UG Access Hypothesis or the Full Access Hypothesis.

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APPENDIXES

The appendixes show three types of English proficiency tests used in this dissertation: (i) the Minimal English Test, (ii) the Minimal English Test 6B, and (iii) New Horizon version of the junior Minimal English Test, and list all of the target sentences used for (i) the interrogative formation test, (ii) the translation test, and (iii) the grammaticality judgment test.

Appendix 1: The Minimal English Test

Student ID:_____ Name:_____ Date: _____

Please fill an English word with 4 letters or less into each blank space, while listening to the CD.

1. The majority of people have at least one pet at ( )[1] time in their ( )[2].
2. Sometimes the relationship between a pet ( )[3] or cat and its owner is ( )[4] close
3. that ( )[5] begin to resemble ( )[6] other in their appearance and behavior.
4. On the other ( )[7], owners of unusual pets ( )[8] as tigers or snakes
5. sometimes ( )[9] to protect themselves ( )[10] their own pets.
6. Thirty years ( )[11] the idea of an inanimate ( )[12] first arose.
7. This was the pet ( )[13], which became a craze ( )[14] the United States and
8. spread ( )[15] other countries as ( )[16].
9. People ( )[17] large sums of money for ordinary rocks and assigned ( )[18] names.
10. They tied a leash around the rock and pulled ( )[19] down the street just ( )[20] a dog.
11. The rock owners ( )[21] talked ( )[22] their pet rocks.
12. Now ( )[23] we have entered the computer age, ( )[24] have virtual pets.
13. The Japanese *Tamagotchi*--- ( )[25] imaginary chicken ( )[26]---
14. ( )[27] the precursor of ( )[28] virtual pets.
15. Now there ( )[29] an ever-increasing number of such virtual ( )[30]
16. which mostly young people are adopting ( )[31] their ( )[32].
17. And ( )[33] your virtual pet ( )[34],
18. you ( )[35] reserve a permanent resting place ( )[36] the Internet in a virtual pet cemetery.

19. Sports are big business. Whereas Babe Ruth, the ( )[37] famous athlete of ( )[38] day,
20. was well-known ( )[39] earning as ( )[40] as the President of the United States, the average
21. salary ( )[41] today's professional baseball players is ( )[42] times that of the President.
22. ( )[43] a handful of sports superstars earn 100 times ( )[44] through their contracts
23. ( )[45] manufacturers of clothing, ( )[46], and sports equipment.
24. But every generation produces ( )[47] or two legendary athletes ( )[48] rewrite
25. the record books, and whose ability and achievements ( )[49] remembered ( )[50] generations.
26. ( )[51] the current generation Tiger Woods and Michael Jordan are two ( )[52] legendary
27. figures, ( )[53] of whom ( )[54] achieved almost mythical status.
28. The ( )[55] that a large number of professional athletes ( )[56] huge incomes
29. has ( )[57] to increased competition throughout ( )[58] sports world.
30. Parents ( )[59] their children to sports training camps ( )[60] an early age.
31. Such ( )[61] typically practice three to ( )[62] hours a day,
32. ( )[63] weekend ( )[64] during their school vacations
33. in order ( )[65] better their chances of eventually obtaining ( )[66] well-paid position
34. on a professional ( )[67] when they grow ( )[68].
35. As for the ( )[69] young aspirants who do ( )[70] succeed,
36. one wonders if they ( )[71] regret having ( )[72] their childhood.

Appendix 2: The Minimal English Test 6B

Student ID:_____ Name:_____ Date: _____

Please fill an English word into each blank space, while listening to the CD.

1. The majority of people have ( )[1] least one pet at some ( )[2] in their life.
2. Sometimes the ( )[3] between a pet dog or ( )[4] and its owner
3. is so ( )[5] that they begin to resemble ( )[6] other in their appearance
4. and ( )[7]. On the other hand, owners ( )[8] unusual pets
5. such as tigers ( )[9] snakes sometimes have to protect ( )[10] from their own pets
6. Thirty ( )[11] ago the idea of an ( )[12] pet first arose.
7. This was ( )[13] pet rock, which became a ( )[14] in the United States
8. and ( )[15] to other countries as well. ( )[16] paid large sums of money
9. ( )[17] ordinary rocks and assigned them ( )[18].
10. They tied a leash around ( )[19] rock and pulled it down ( )[20] street just like a dog.
11. ( )[21] rock owners even talked to ( )[22] pet rocks.
12. Now that we ( )[23] entered the computer age, we ( )[24] virtual pets.
13. The Japanese *Tamagotchi*---the ( )[25] chicken egg---
14. was the precursor ( )[26] many virtual pets.
15. Now there ( )[27] an ever-increasing number of such ( )[28] pets
16. which mostly young people ( )[29] adopting as their own.
17. And ( )[30] your virtual pet dies, you ( )[31] reserve a permanent resting place
18. ( )[32] the Internet in a virtual ( )[33] cemetery.

19. Sports are big business. ( )[34] Babe Ruth, the most famous athlete of ( )[35] day,
20. was well-known for earning ( )[36] much as the President of ( )[37] United States,
21. the average salary ( )[38] today's professional baseball players
22. is ( )[39] times that of the President. ( )[40] a handful of sports superstars
23. ( )[41] one hundred times more through ( )[42] contracts with manufacturers
24. of clothing, ( )[43], and sports equipment. But every ( )[44] produces
25. one or two legendary ( )[45] who rewrite the record books,
26. ( )[46] whose ability and achievements are ( )[47] for generations.
27. In the current ( )[48] Tiger Woods and Michael Jordan are two such legendary ( )[49],
28. both of whom have achieved ( )[50] mythical status.
29. The fact that ( )[51] large number of professional athletes ( )[52] huge incomes
30. has led to ( )[53] competition throughout the sports world.
31. ( )[54] send their children to sports ( )[55] camps at an early age.
32. ( )[56] kids typically practice three to ( )[57] hours a day,
33. all weekend ( )[58] during their school vacations in ( )[59] to better their chances
34. of ( )[60] obtaining a well-paid position on ( )[61] professional team
35. when they grow ( )[62]. As for the many young ( )[63] who do not succeed,
36. one ( )[64] if they will regret having ( )[65] their childhood.

Appendix 3: New Horizon Version of the junior Minimal English Test

Student ID:_____ Name:_____ Date: _____

Please fill an English word into each blank space, while listening to the CD.

1. This is my family. This ( )[1] my sister Lisa.
2. She lives in ( )[2]. She likes Japan very much. ( )[3] husband Koji teaches Japanese.

3. Happy New ( )[4]! How are you doing? Are ( )[5] enjoying your first *oshogatsu*?
4. We're having ( )[6] great time in Canada. Yesterday ( )[7] walked across
5. the Rainbow Bridge to America. ( )[8] really enjoyed the view. See ( )[9] soon!

6. At night I went ( )[10] the shrine with Ms. Sato, the English ( )[11].
7. We saw a lot of ( )[12] there. I got home at ( )[13].
8. Then I called my family ( )[14] Canada. I went to bed ( )[15] two.

9. I read about the ( )[16] parking area plan. It is ( )[17] news.
10. I am against the ( )[18] because we need our parks.
11. ( )[19] know we have a problem ( ) [20] bikes.
12. But we can keep ( )[21] parks if we change our ( )[22].
13. Remember that the accident taught ( )[23] an important thing.
14. We can ( )[24] two things. One: Walk when ( )[25] don't have to ride
15. our ( )[26]. Two: Be careful when we ( )[27] our bikes.

16. Look at this! ( )[28] so big. It's about eight ( )[29] tall and weighs seventy tons.
17. ( )[30] call it a *moai*. Easter Island is very ( )[31].
18. But it has about one ( )[32] *moais*. These *moais* are standing on the ( )[33].
19. They're looking at the sky. ( )[34] are they thinking about?

20. Communication ( )[35] important. You have to speak ( )[36].
21. But you don't have to ( )[37] perfect English.
22. You're a member ( )[38] the family. You have to ( )[39] with the housework.

23. Hello, everyone. ( )[40] is your reporter, Maria Jones. Today I'm ( )[41] in a big park
24. in *Hirosaki*. ( )[42] going to go to a *shamisen* ( )[43].
25. I've lived in Japan for ( )[44] years, and I've loved
26. Japanese ( )[45] since I heard it for ( )[46] first time.

27. When you want ( )[47] order in Japanese restaurants, you ( )[48] say,
28. "*Sumimasen*," in a loud voice. ( )[49] in America, we just make ( )[50] contact
29. or raise our hand. ( )[51] I still have a hard ( )[52]
30. in Japanese restaurants. I always ( )[53], "*Sumi* … uh, uh, *sumimasen*," too quietly.
31. It's not easy ( )[54] me to get food. So ( )[55] get very hungry.

32. Thanks to ( )[56] help, our village has another ( )[57]. It is near my house.
33. ( )[58] I have already started going ( )[59] school again.
34. I have a ( )[60] of things to learn. My ( )[61] also go to
35. the same ( )[62]. There is a class for ( )[63].
36. They are learning to read ( )[64] write. We are very glad ( )[65] have a chance
37. to study ( )[66] at home. It is fun. ( )[67] you all very much.

Appendix 4: The Interrogative Formation Test

(A) ***Yes/No*-Interrogatives with the *Do*-Support Operation**
(Please make an interrogative sentence whose answer is 'Yes, he/she did.')

A-1 John read the book.
Did John read the book?

A-2 Mary ate the apple.
Did Mary eat the apple?

A-3 David wrote the letter.
Did David write the letter?

A-4 Kim bought the car.
Did Kim buy the car?

A-5 Betty washed the cup.
Did Betty wash the cup?

A-6 Susan played the guitar.
Did Susan play the guitar?

A-7 Carol saw Bill.
Did Carol see Bill?

A-8 Ron found Pam.
Did Ron find Pam?

A-9 Richard helped Kate.
Did Richard help Kate?

A-10 Becky caught Jack.
Did Becky catch Jack?

A-11 Linda hit Tom.
Did Linda hit Tom?

A-12 Jim saved Amy.
Did Jim save Amy?

(B) ***Wh*-Interrogatives with Subject Extraction**
(Please make an interrogative sentence which asks the underlined part.)

B-1 <u>John</u> read the book.
Who read the book?

B-2 <u>Mary</u> ate the apple.
Who ate the apple?

B-3 <u>David</u> wrote the letter.
Who wrote the letter?

B-4 <u>Kim</u> bought the car.
Who bought the car?

B-5 <u>Betty</u> washed the cup.
Who washed the cup?

B-6 Susan played the guitar.
Who played the guitar?

B-7 Carol saw Bill.
Who saw Bill?

B-8 Ron found Pam.
Who found Pam?

B-9 Richard helped Kate.
Who helped Kate?

B-10 Becky caught Jack.
Who caught Jack?

B-11 Linda hit Tom.
Who hit Tom?

B-12 Jim saved Amy.
Who saved Amy?

(C) *Wh*-Interrogatives with Object Extraction
(Please make an interrogative sentence which asks the underlined part.)

C-1 John read the book.
What did John read?

C-2 Mary ate the apple.
What did Mary eat?

C-3 David wrote the letter.
What did David write?

C-4 Kim bought the car.
What did Kim buy?

C-5 Betty washed the cup.
What did Betty wash?

C-6 Susan played the guitar.
What did Susan play?

C-7 Carol saw Bill.
Who did Carol see?

C-8 Ron found Pam.
Who did Ron find?

C-9 Richard helped Kate.
Who did Richard help?

C-10 Becky caught Jack.
Who did Becky catch?

C-11 Linda hit Tom.
Who did Linda hit?

C-12 Jim saved Amy.
Who did Jim save?

(D) ***Wh*-Interrogatives with Pseudo Adjunct Extraction**
(Please make an interrogative sentence which asks the underlined part.)

D-1 John read the book <u>yesterday</u>.
When did John read the book?

D-2 Mary ate the apple <u>yesterday</u>.
When did Mary eat the apple?

D-3 David wrote the letter last <u>Sunday</u>.
When did David write the letter?

D-4 Kim bought the car last <u>Sunday</u>.
When did Kim buy the car?

D-5 Betty washed the cup <u>last night</u>.
When did Betty wash the cup?

D-6 Susan played the guitar <u>last night</u>.
When did Susan play the guitar?

D-7 Carol saw Bill <u>two days ago</u>.
When did Carol see Bill?

D-8 Ron found Pam <u>two days ago</u>.
When did Ron find Pam?

D-9 Richard helped Kate <u>last week</u>.
When did Richard help Kate?

D-10 Becky caught Jack <u>last week</u>.
When did Becky catch Jack?

D-11 Linda hit Tom <u>this morning</u>.
When did Linda hit Tom?

D-12 Jim saved Amy <u>this morning</u>.
When did Jim save Amy?

(E) ***Wh*-Interrogatives with Adjunct Extraction**
(Please make an interrogative sentence which asks the underlined part.)

E-1 John read the book <u>because he learned French</u>.
Why did John read the book?

E-2 Mary ate the apple <u>because she was hungry</u>.
Why did Mary eat the apple?

E-3 David wrote the letter <u>because he visited Tokyo</u>.
Why did David write the letter?

E-4 Kim bought the car <u>because he liked it</u>.
Why did Kim buy the car?

E-5 Betty washed the cup <u>because she had coffee</u>.
Why did Betty wash the cup?

E-6 Susan played the guitar <u>because she liked the music</u>.
Why did Susan play the guitar?

E-7 Carol saw Bill because he smiled at her.
Why did Carol see Bill?

E-8 Ron found Pam because she rode the bus.
Why did Ron find Pam?

E-9 Richard helped Kate because she was busy.
Why did Richard help Kate?

E-10 Becky caught Jack because he broke the chair.
Why did Becky catch Jack?

E-11 Linda hit Tom because he was noisy.
Why did Linda hit Tom?

E-12 Jim saved Amy because she had a problem.
Why did Jim save Amy?

Appendix 5: The Translation Test

(A) ***Wh*-Interrogatives with Subject Extraction**
(Please translate each Japanese sentence into English.)

A-1 Dare-ga Bill-o shikari-mashi-ta ka?
who-NOM Bill-ACC scold-polite-past Q
Who scolded Bill?

A-2 Dare-ga Jack-o odorokase-mashi-ta ka?
who-NOM Jack-ACC surprise-polite-past Q
Who surprised Jack?

A-3 Dare-ga Susan-o oikake-mashi-ta ka?
who-NOM Susan-ACC chase-polite-past Q
Who chased Susan?

A-4 Dare-ga Rick-o tsukamae-mashi-ta ka?
who-NOM Rick-ACC catch-polite-past Q
Who caught Rick?

A-5 Dare-ga Alice-o yorokobase-mashi-ta ka?
who-NOM Alice-ACC please-polite-past Q
Who pleased Alice?

A-6 Dare-ga Tim-o mi-mashi-ta ka?
who-NOM Tim-ACC see-polite-past Q
Who saw Tim?

A-7 Dare-ga Pam-o mitsuke-mashi-ta ka?
who-NOM Pam-ACC find-polite-past Q
Who found Pam?

A-8 Dare-ga Betty-o home-mashi-ta ka?
who-NOM Betty-ACC praise-polite-past Q
Who praised Betty?

(B) ***Wh*-Interrogatives with Object Extraction**
(Please translate each Japanese sentence into English.)

B-1 John-wa dare-o shikari-mashi-ta ka?
John-TOP who-ACC scold-polite-past Q
Who did John scold?

B-2 David-wa dare-o odorokase-mashi-ta ka?
David-TOP who-ACC surprise-polite-past Q
Who did David surprise?

B-3 Mary-wa dare-o oikake-mashi-ta ka?
Mary-TOP who-ACC chase-polite-past Q
Who did Mary chase?

B-4 Carol-wa dare-o tsukamae-mashi-ta ka?
Carol-TOP who-ACC catch-polite-past Q
Who did Carol catch?

B-5 Becky-wa dare-o yorokobase-mashi-ta ka?
Becky-TOP who-ACC please-polite-past Q
Who did Becky please?

B-6 Amy-wa dare-o mi-mashi-ta ka?
Amy-TOP who-ACC see-polite-past Q
Who did Amy see?

B-7 Ron-wa dare-o mitsuke-mashi-ta ka?
Ron-TOP who-ACC find-polite-past Q
Who did Ron find?

B-8 Kim-wa dare-o home-mashi-ta ka?
Kim-TOP who-ACC praise-polite-past Q
Who did Kim praise?

(C) *Wh*-Interrogatives with Pseudo Adjunct Extraction
(Please translate each Japanese sentence into English.)

C-1 John-wa itsu Bill-o shikari-mashi-ta ka?
John-TOP when Bill-ACC scold-polite-past Q
When did John scold Bill?

C-2 David-wa itsu Jack-o odorokase-mashi-ta ka?
David-TOP when Jack-ACC surprise-polite-past Q
When did David surprise Jack?

C-3 Mary-wa itsu Susan-o oikake-mashi-ta ka?
Mary-TOP when Susan-ACC chase-polite-past Q
When did Mary chase Susan?

C-4 Carol-wa itsu Rick-o tsukamae-mashi-ta ka?
Carol-TOP when Rick-ACC catch-polite-past Q
When did Carol catch Rick?

C-5 Becky-wa itsu Alice-o yorokobase-mashi-ta ka?
Becky-TOP when Alice-ACC please-polite-past Q
When did Becky please Alice?

C-6 Amy-wa itsu Tim-o mi-mashi-ta ka?
Amy-TOP when Tim-ACC see-polite-past Q
When did Amy see Tim?

C-7 Ron-wa itsu Pam-o mitsuke-mashi-ta ka?
Ron-TOP when Pam-ACC find-polite-past Q
When did Ron find Pam?

C-8 Kim-wa itsu Betty-o home-mashi-ta ka?
Kim-TOP when Betty-ACC praise-polite-past Q
When did Kim praise Betty?

(D) ***Wh*-Interrogatives with Adjunct Extraction**
(Please translate each Japanese sentence into English.)

D-1 John-wa naze Bill-o shikari-mashi-ta ka?
John-TOP why Bill-ACC scold-polite-past Q
Why did John scold Bill?

D-2 David-wa naze Jack-o odorokase-mashi-ta ka?
David-TOP why Jack-ACC surprise-polite-past Q
Why did David surprise Jack?

D-3 Mary-wa naze Susan-o oikake-mashi-ta ka?
Mary-TOP why Susan-ACC chase-polite-past Q
Why did Mary chase Susan?

D-4 Carol-wa naze Rick-o tsukamae-mashi-ta ka?
Carol-TOP why Rick-ACC catch-polite-past Q
Why did Carol catch Rick?

D-5 Becky-wa naze Alice-o yorokobase-mashi-ta ka?
Becky-TOP why Alice-ACC please-polite-past Q
Why did Becky please Alice?

D-6 Amy-wa naze Tim-o mi-mashi-ta ka?
Amy-TOP why Tim-ACC see-polite-past Q
Why did Amy see Tim?

D-7 Ron-wa naze Pam-o mitsuke-mashi-ta ka?
Ron-TOP why Pam-ACC find-polite-past Q
Why did Ron find Pam?

D-8 Kim-wa naze Betty-o home-mashi-ta ka?
Kim-TOP why Betty-ACC praise-polite-past Q
Why did Kim praise Betty?

(E) **Relative Clauses with Subject Extraction from the Subject Domain**
(Please translate each Japanese sentence into English.)

E-1 Bill-o shikat-ta hito-wa Tom-o nayamase-ta.
Bill-ACC scold-past man-TOP Tom-ACC bother-past
The man who scolded Bill bothered Tom.

E-2 Jack-o odorokase-ta hito-wa Linda-o karakat-ta.
Jack-ACC surprise-past man-TOP Linda-ACC tease-past
The man who surprised Jack teased Linda.

E-3 Susan-o oikake-ta hito-wa Paul-o shinpaisase-ta.
Susan-ACC chase-past man-TOP Paul-ACC worry-past
The man who chased Susan worried Paul.

E-4 Rick-o tsukamae-ta hito-wa Mike-o hihanshi-ta.
Rick-ACC catch-past man-TOP Mike-ACC criticize-past
The man who caught Rick criticized Mike.

E-5 Alice-o yorokobase-ta hito-wa Jim-o kandoosase-ta.
Alice-ACC please-past man-TOP Jim-ACC move-past
The man who pleased Alice moved Jim.

E-6 Tim-o mi-ta hito-wa Kate-o seme-ta.
Tim-ACC see-past man-TOP Kate-ACC blame-past
The man who saw Tim blamed Kate.

E-7 Pam-o mitsuke-ta hito-wa Richard-o tasuke-ta.
Pam-ACC find-past man-TOP Richard-ACC help-past
The man who found Pam helped Richard.

E-8 Betty-o home-ta hito-wa Bob-o shinyooshi-ta.
Bill-ACC praise-past man-TOP Bob-ACC trust-past
The man who praised Betty trusted Bob.

(F) Relative Clauses with Object Extraction from the Subject Domain
(Please translate each Japanese sentence into English.)

F-1 John-ga shikat-ta hito-wa Tom-o nayamase-ta.
John-NOM scold-past man-TOP Tom-ACC bother-past
The man who John scolded bothered Tom.

F-2 David-ga odorokase-ta hito-wa Linda-o karakat-ta.
David-NOM surprise-past man-TOP Linda-ACC tease-past
The man who David surprised teased Linda.

F-3 Mary-ga oikake-ta hito-wa Paul-o shinpaisase-ta.
Mary-NOM chase-past man-TOP Paul-ACC worry-past
The man who Mary chased worried Paul.

F-4 Carol-ga tsukamae-ta hito-wa Mike-o hihanshi-ta.
Carol-NOM catch-past man-TOP Mike-ACC criticize-past
The man who Carol caught criticized Mike.

F-5 Becky-ga yorokobase-ta hito-wa Jim-o kandoosase-ta.
Becky-NOM please-past man-TOP Jim-ACC move-past
The man who Becky pleased moved Jim.

F-6 Amy-ga mi-ta hito-wa Kate-o seme-ta.
Amy-NOM see-past man-TOP Kate-ACC blame-past
The man who Amy saw blamed Kate.

F-7 Ron-ga mitsuke-ta hito-wa Richard-o tasuke-ta.
Ron-NOM find-past man-TOP Richard-ACC help-past
The man who Ron found helped Richard.

F-8 Kim-ga home-ta hito-wa Bob-o shinyooshi-ta.
Kim-NOM praise-past man-TOP Bob-ACC trust-past
The man who Kim praised trusted Bob.

(G) Relative Clauses with Subject Extraction from the Object Domain
(Please translate each Japanese sentence into English.)

G-1 Tom-wa Bill-o shikat-ta hito-o nayamase-ta.
Tom-TOP Bill-ACC scold-past man-ACC bother-past
Tom bothered the man who scolded Bill.

G-2 Linda-wa Jack-o odorokase-ta hito-o karakat-ta.
Linda-TOP Jack-ACC surprise-past man-ACC tease-past
Linda teased the man who surprised Jack.

G-3 Paul-wa Susan-o oikake-ta hito-o shinpaisase-ta.
Paul-TOP Susan-ACC chase-past man-ACC worry-past
Paul worried the man who chased Susan.

G-4 Mike-wa Rick-o tsukamae-ta hito-o hihanshi-ta.
Mike-TOP Rick-ACC catch-past man-ACC criticize-past
Mike criticized the man who caught Rick.

G-5 Jim-wa Alice-o yorokobase-ta hito-o kandoosase-ta.
Jim-TOP Alice-ACC please-past man-ACC move-past
Jim moved the man who pleased Alice.

G-6 Kate-wa Tim-o mi-ta hito-o seme-ta.
Kate-TOP Tim-ACC see-past man-ACC blame-past
Kate blamed the man who saw Tim.

G-7 Richard-wa Pam-o mitsuke-ta hito-o tasuke-ta.
Richard-TOP Pam-ACC find-past man-ACC help-past
Richard helped the man who found Pam.

G-8 Bob-wa Betty-o home-ta hito-o shinyooshi-ta.
Bob-TOP Bill-ACC praise-past man-ACC trust-past
Bob trusted the man who praised Betty.

(H) Relative Clauses with Object Extraction from the Object Domain
(Please translate each Japanese sentence into English.)

H-1 Tom-wa John-ga shikat-ta hito-o nayamase-ta.
Tom-TOP John-NOM scold-past man-ACC bother-past
Tom bothered the man who John scolded.

H-2 Linda-wa David-ga odorokase-ta hito-o karakat-ta.
Linda-TOP David-NOM surprise-past man-ACC tease-past
Linda teased the man who David surprised.

H-3 Paul-wa Mary-ga oikake-ta hito-o shinpaisase-ta.
Paul-TOP Mary-NOM chase-past man-ACC worry-past
Paul worried the man who Mary chased.

H-4 Mike-wa Carol-ga tsukamae-ta hito-o hihanshi-ta.
Mike-TOP Carol-NOM catch-past man-ACC criticize-past
Mike criticized the man who Carol caught.

H-5 Jim-wa Becky-ga yorokobase-ta hito-o kandoosase-ta.
Jim-TOP Becky-NOM please-past man-ACC move-past
Jim moved the man who Becky pleased.

H-6 Kate-wa Amy-ga mi-ta hito-o seme-ta.
Kate-TOP Amy-NOM see-past man-ACC blame-past
Kate blamed the man who Amy saw.

H-7 Richard-wa Ron-ga mitsuke-ta hito-o tasuke-ta.
Richard-TOP Ron-NOM find-past man-ACC help-past
Richard helped the man who Ron found.

H-8 Bob-wa Kim-ga home-ta hito-o shinyooshi-ta.
Bob-TOP Kim-NOM praise-past man-ACC trust-past
Bob trusted the man who Kim praised.

Appendix 6: The Grammaticality Judgment Test for the *That*-Trace Effect

(A) *Wh*-Interrogatives with Subject Extraction

A-1 Who do you think ($_{COMP}$ φ/that) scolded Bill?

A-2 Who do you think ($_{COMP}$ φ/that) surprised Jack?

A-3 Who do you think ($_{COMP}$ φ/that) chased Susan?

A-4 Who do you think ($_{COMP}$ φ/that) caught Rick?

A-5 Who do you think ($_{COMP}$ φ/that) pleased Alice?

A-6 Who do you think ($_{COMP}$ φ/that) saw Tim?

A-7 Who do you think ($_{COMP}$ φ/that) found Pam?

A-8 Who do you think ($_{COMP}$ φ/that) praised Betty?

(B) *Wh*-Interrogatives with Object Extraction

B-1 Who do you think ($_{COMP}$ φ/that) John scolded?

B-2 Who do you think ($_{COMP}$ φ/that) David surprised?

B-3 Who do you think ($_{COMP}$ φ/that) Mary chased?

B-4 Who do you think ($_{COMP}$ φ/that) Carol caught?

B-5 Who do you think ($_{COMP}$ φ/that) Becky pleased?

B-6 Who do you think ($_{COMP}$ φ/that) Amy saw?

B-7 Who do you think ($_{COMP}$ φ/that) Ron found?

B-8 Who do you think ($_{COMP}$ φ/that) Kim praised?

Appendix 7: The Grammaticality Judgment Test for the *That*-Adverb Trace Effect

(A) Wh-Interrogatives

A-1 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) bought the car?

A-2 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) blamed Kim?

A-3 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) criticized Mike?

A-4 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) saved Kate?

A-5 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) saw John?

A-6 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) found Bill?

A-7 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) teased Linda?

A-8 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) scolded Tom?

A-9 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) washed the shirt?

A10 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) used the cup?

A-11 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) made the cake?

A-12 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) received the mail?

A-13 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) ate the apple?

A-14 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) wrote the letter?

A-15 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) took the picture?

A-16 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) finished the assignment?

A-17 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) carried the baggage?

A-18 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) cheered Nancy?

A-19 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) read the book?

A-20 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) disappointed Betty?

A-21 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) moved Pam?

A-22 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) praised Alice?

A-23 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) visited the museum?

A-24 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) fascinated Maria?

A-25 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) helped Susan?

A-26 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) bothered David?

A-27 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) caught Mary?

A-28 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) pleased Becky?

A-29 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) admired Bob?

A-30 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) surprised Ann?

A-31 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) solved the problem?

A-32 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) played the guitar?

A-33 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/Tommy's opinion/according to Katherine) closed the window?

A-34 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/Tommy's opinion/according to Katherine) chased Ron?

A-35 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/Tommy's opinion/according to Katherine) broke the vase?

A-36 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/Tommy's opinion/according to Katherine) stole the bag?

A-37 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/Tommy's opinion/according to Katherine) witnessed Richard?

A-38 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/Tommy's opinion/according to Katherine) drank the beer?

A-39 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/Tommy's opinion/according to Katherine) opened the box?

A-40 Who do you think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/Tommy's opinion/according to Katherine) kicked the ball?

(B) Relative Clauses

B-1 The man who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) bought the car is Steven.

B-2 The man who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) blamed Kim is Colin.

B-3 The man who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) criticized Mike is Steven.

B-4 The man who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) saved Kate is Colin.

B-5 The man who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) saw John is Steven.

B-6 The man who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) found Bill is Colin.

B-7 The man who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) teased Linda is Steven.

B-8 The man who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few months ago/Daniel's opinion/according to Sophia) scolded Tom is Colin.

B-9 The woman who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) washed the shirt is Libby.

B-10 The woman who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) used the cup is Jennie.

B-11 The woman who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) made the cake is Libby.

B-12 The woman who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) received the mail is Jennie.

B-13 The woman who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) ate the apple is Libby.

B-14 The woman who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) wrote the letter is Jennie.

B-15 The woman who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/Julie's opinion/according to Patrick) took the picture is Libby.

B-16 The woman who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few hours ago/ Julie's opinion/according to Patrick) finished the assignment is Jennie.

B-17 The person who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/ Fred's opinion/according to Christine) carried the baggage is Robert.

B-18 The person who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) cheered Nancy is Veronica.

B-19 The person who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) read the book is Robert.

B-20 The person who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/ Fred's opinion/according to Christine) disappointed Betty is Veronica.

B-21 The person who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) moved Pam is Robert.

B-22 The person who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/ Fred's opinion/according to Christine) praised Alice is Veronica.

B-23 The person who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/ Fred's opinion/according to Christine) visited the museum is Robert.

B-24 The person who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few weeks ago/Fred's opinion/according to Christine) fascinated Maria is Veronica.

B-25 The girl who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) helped Susan is Helen.

B-26 The girl who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) bothered David is Olivia.

B-27 The girl who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) caught Mary is Helen.

B-28 The girl who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) pleased Becky is Olivia.

B-29 The girl who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) admired Bob is Helen.

B-30 The girl who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) surprised Ann is Olivia.

B-31 The girl who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) solved the problem is Helen.

B-32 The girl who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few days ago/Emily's opinion/according to William) played the guitar is Olivia.

B-33 The boy who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/ Tommy's opinion/according to Katherine) closed the window is James.

B-34 The boy who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/ Tommy's opinion/according to Katherine) chased Ron is Kevin.

B-35 The boy who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/ Tommy's opinion/according to Katherine) broke the vase is James.

B-36 The boy who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/ Tommy's opinion/according to Katherine) stole the bag is Kevin.

B-37 The boy who I think ($_{COMP}$ φ/that) ($_{Adverb}$ φ/just a few minutes ago/ Tommy's opinion/according to Katherine) witnessed Richard is James.

B-38 The boy who I think ($_{\text{COMP}}$ φ/that) ($_{\text{Adverb}}$ φ/just a few minutes ago/ Tommy's opinion/according to Katherine) drank the beer is Kevin.

B-39 The boy who I think ($_{\text{COMP}}$ φ/that) ($_{\text{Adverb}}$ φ/just a few minutes ago/ Tommy's opinion/according to Katherine) opened the box is James.

B-40 The boy who I think ($_{\text{COMP}}$ φ/that) ($_{\text{Adverb}}$ φ/just a few minutes ago/ Tommy's opinion/according to Katherine) kicked the ball is Kevin.

Appendix 8: The Grammaticality Judgment Test for the Superiority Effect

(A) Non-D-Linked *Wh*-Interrogatives with Subject Extraction

A-1 Who bought what?

A-2 Who washed what?

A-3 Who wrote what?

A-4 Who ate what?

A-5 Who played what?

A-6 Who drank what?

A-7 Who operated what?

A-8 Who made what?

A-9 Who fixed what?

A-10 Who published what?

A-11 Who finished what?

A-12 Who used what?

A-13 Who found who?

A-14 Who saw who?

A-15 Who helped who?

A-16 Who caught who?

A-17 Who pleased who?

A-18 Who criticized who?

A-19 Who saved who?

A-20 Who surprised who?

A-21 Who scolded who?

A-22 Who moved who?

A-23 Who hired who?

A-24 Who admired who?

(B) Non-D-Linked *Wh*-Interrogatives with Object Extraction

B-1 What did who buy?

B-2 What did who wash?

B-3 What did who write?

B-4 What did who eat?

B-5 What did who play?

B-6 What did who drink?

B-7 What did who operate?

B-8 What did who make?

B-9 What did who fix?

B-10 What did who publish?

B-11 What did who finished?

B-12 What did who use?

B-13 Who did who find?

B-14 Who did who see?

B-15 Who did who help?

B-16 Who did who catch?

B-17 Who did who please?

B-18 Who did who criticize?

B-19 Who did who save?

B-20 Who did who surprise?

B-21 Who did who scold?

B-22 Who did who move?

B-23 Who did who hire?

B-24 Who did who admire?

(C) D-Linked *Wh*-Interrogatives with Subject Extraction

C-1 Which man bought which car?

C-2 Which woman washed which shirt?

C-3 Which pianist wrote which letter?

C-4 Which girl ate which fruit?

C-5 Which person played which guitar?

C-6 Which boy drank which tea?

C-7 Which magician operated which machine?

C-8 Which cook made which cake?

C-9 Which mechanic fixed which computer?

C-10 Which teacher published which paper?

C-11 Which student finished which assignment?

C-12 Which kid used which cup?

C-13 Which professor found which scientist?

C-14 Which nurse saw which baby?

C-15 Which linguist helped which child?

C-16 Which policeman caught which offender?

C-17 Which gentleman pleased which lady?

C-18 Which writer criticized which artist?

C-19 Which doctor saved which patient?

C-20 Which actor surprised which director?

C-21 Which boss scolded which staff?

C-22 Which musician moved which singer?

C-23 Which manager hired which worker?

C-24 Which researcher admired which assistant?

(D) D-Linked *Wh*-Interrogatives with Object Extraction

D-1 Which car did which man buy?

D-2 Which shirt did which woman wash?

D-3 Which letter did which pianist write?

D-4 Which fruit did which girl eat?

D-5 Which guitar did which person play?

D-6 Which tea did which boy drink?

D-7 Which machine did which magician operate?

D-8 Which cake did which cook make?

D-9 Which computer did which mechanic fix?

D-10 Which paper did which teacher publish?

D-11 Which assignment did which student finish?

D-12 Which cup did which kid use?

D-13 Which scientist did which professor find?

D-14 Which baby did which nurse see?

D-15 Which child did which linguist help?

D-16 Which offender did which policeman catch?

D-17 Which lady did which gentleman please?

D-18 Which artist did which writer criticize?

D-19 Which patient did which doctor save?

D-20 Which director did which actor surprise?

D-21 Which staff did which boss scold?

D-22 Which singer did which musician move?

D-23 Which worker did which manager hire?

D-24 Which assistant did which researcher admire?