

IS IT DIFFICULT TO ACQUIRE SUBJACENCY AND THE ECP?

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ABSTRACT

This paper aims to examine English- and Japanese-speaking adult learners' acquisition of Subjacency¹ and the Empty Category Principle² (ECP) (Chomsky 1981, 1986) in Chinese. The participants were forty intermediate foreign students of the Mandarin Training Center of National Taiwan Normal University: half were native English speakers and half Japanese. In addition, there were twenty native controls. Two tasks (i.e., a preference task and an ordering task) were designed on the basis of the following properties concerning Subjacency and the ECP: wh-island constraints, complex NP constraints, sentential subject constraints, *that*-trace effects and subject/object asymmetries, and superiority effects. The results show that, except for the superiority effect, neither group of L2 learners carried their L1 knowledge to acquire Subjacency and the ECP, suggesting that L1 influence is not significant. Furthermore, it was found that the Japanese speakers did not perform significantly better than the English speakers. This shows that Universal Grammar is still available, since our participants have reset their L1 parameters to proper L2 values. In addition, among these features our participants did less well on non-superiority, and the native controls rejected island violations more strongly than either group of L2 participants. Finally, Subjacency and the ECP were found equally easy for our participants to acquire.

¹ Subjacency says that movement cannot cross more than one bounding node, and the choice of bounding nodes is language-specific (cf. Chomsky 1981, 1986).

² The ECP states that an empty category must be properly governed (i.e., either theta-governed or antecedent governed) (cf. Chomsky 1986).

1. INTRODUCTION

This paper aims to examine the acquisition of Subjacency and the Empty Category Principles (ECP) by English- and Japanese-speaking learners of Chinese. As we know, *wh*-phrases undergo movement to sentence-initial position in English at SS as in (1), but they must stay in-situ³ in Chinese as in (2) and in Japanese as in (3):

- (1) **Which car** should I buy ___?
(2) Ni mai le **sheme**?
you buy Asp what
'What did you buy?'
(3) Mary-ga **dare-o** tataiteru no? (Yoshinaga 1996)
Nom who-Acc is-hitting Q
'Who is Mary hitting?'

To explain the above language variations, we may assume that there exists a *wh*-fronting parameter, which is set plus in English, and minus in Chinese and Japanese. That is to say, English is marked [+*wh*-fronting], while Chinese and Japanese are marked [-*wh*-fronting].

Here we are interested in the parameters related to *wh*-movement, namely Subjacency and the ECP (Chomsky 1981, 1986). In recent years, there have been many studies of L2 learners' knowledge of movement constraints. Several studies argue that Dutch, German, and Spanish learners of English can perform as well as native English speakers (Felix 1988, Schachter 1988) because these languages also exhibit syntactic *wh*-movement. Since those learners observe Subjacency and the ECP in their L1's, they can acquire these two principles in English with comparative ease. However, not many studies focus on L2 learners who do not have this movement in their native language (Bley-Vroman *et al.* 1988, Martohardjono 1993), and in those studies over half of the L2 subjects have correct UG-based judgments, indicating that adults have some access to UG. However, so far, no experiment on L2 Chinese has been conducted regarding the two principles; hence we would like to explore this topic more fully and answer the following questions:

³ Chen (1991) argues that Infl and Comp in Chinese act as place holders. They have no ability to discharge enough features to Spec of CP, so *wh*-movement cannot be triggered.

1. Will English- and Japanese-speaking learners apply their L1 knowledge of Subjacency and the ECP in seeking to acquire Chinese?
2. Will L2 learners respond correctly to structures they have not learnt from their L1?
3. Will L2 learners respond differently to specific properties of Subjacency and the ECP?

This paper is organized as follows: in Section 2 we will first compare the linguistic properties of *wh*-questions in English, Japanese, and Chinese with respect to Subjacency and the ECP, and then review previous experimental studies of *wh*-questions. In Section 3, we will report the subjects, methodology, test materials, and results of the present study. In Section 4, we will further interpret our findings. In Section 5, finally, we will conclude the main points of our study and suggest some research topics for further study.

2. LINGUISTIC PROPERTIES AND PREVIOUS STUDIES OF SUBJACENCY AND THE ECP

In this section, we will discuss the constructions related to Subjacency and the ECP in English, Chinese and Japanese, and review previous L2 studies of these constructions.

2.1 Subjacency and the ECP in English, Chinese and Japanese

English and Chinese are SVO languages while Japanese is SOV. However, the *wh*-construction in Chinese and Japanese is similar in that it is marked [-*wh*-fronting], while it is [+*wh*-fronting] in English. Though English *wh*-elements may move at SS, these elements are subject to Subjacency and the ECP (cf. Chomsky 1981). Extraction of *wh*-elements from certain types of phrases or clauses will result in ungrammaticality. In what follows, we will discuss these types of phrases and clauses.

1. Wh-islands

Consider the following examples concerning *wh*-movement out of a *wh*-island:

- (4) *Who_i did Amy tell you [when_j she had invited t_i t_j]?
(5) *Heshi₁ ta xiang zhidao [shei t_i hui lai]?
when he wonder who will come
'*When does he wonder when will come?'
(6) *Nani-o_i John-wa [Mary-ga t_i katta ka-dooka] siritagatte iru
what-Acc -Top -Nom bought whether want-to know
no?⁴
Q
'*What does John want to know whether Mary bought?'

In English, when the wh-word is moved out of an embedded question, the sentence will be ungrammatical as in (4). Since Chinese and Japanese are marked [-wh-fronting], wh-words must stay in-situ (cf. Chomsky 1986). Thus, (5) and (6) are ungrammatical, because the wh-words are not only fronted but are also moved out of the embedded questions.

2. Complex noun phrases

Let us now consider the Complex NP, which is also an island that will block wh-movement:

- (7) *What_i did Tony hear [_{NP} a rumor that you had finished t_i]?
(8) *Shei [ni tingdao [_{NP} [_S t yao lai] de xiaoxi]]]?
who you heard will come DE news
'*Who did you hear the news that will come? '
(9) *Dare-o_i John-ga [Mary-ga t_i sakete iru to yuu uwasa-o] kiita?
who-Acc -Nom -Nom avoiding that say rumor-Acc heard
'*Whom did John hear a rumor that Mary is avoiding?'

The wh-element is moved out of a complex NP, resulting in the ungrammaticality of (7) in English. And in (8) and (9) wh-movement violates the wh-fronting parameter. In addition, the wh-words are moved from the complex NP, which also violates the complex NP constraint.

⁴ This example is taken from Watanabe (1991).

3. Sentential subjects

Now, let us see if the wh-element can be moved out of a sentential subject:

- (10)*[What sort of job]_i is [to do t_i] difficult?
 (11)*Shei_i [Lisi da le t_i] shi ni hen bu gaoxing]]? (Huang 1982)
 who hit Asp make you very unhappy
 ‘*Who is the x such that the fact that Lisi hit x made you very unhappy?’
 (12)?*Donoyouni_i watasitachi-wa t_i kyaku-o motenasitara mottomo
 how we-Top guest-Acc treat most
 yoi desuka?
 good Q
 ‘*How is we treat guests best?’

Wh-movement out of the sentential subject results in the ungrammaticality of (10) in English. Like the other two islands, (11) and (12) are ill-formed because the wh-phrases are moved, in violation of the fronting parameter and the sentential subject (SS) constraint in Chinese and Japanese.

4. That-trace effects

When Comp is occupied by an overt complementizer, *that*, it will block movement of a wh-subject to sentence-initial position in English. This is documented in the literature as the **that-trace effect** (cf. Chomsky 1981). Now, let us see how the wh-element in an embedded clause interacts with the complementizer:

- (13) *Who_i do you think [_{CP} that [_{IP} t_i hates Mary]]?
 (14) SS: Ni renwei [shuo [shei hui qu]]?
 you think that who will go
 ‘*Who do you think that will come?’
 LF: Shei_i [ni renwei [shuo [t_i hui lai]]]?
 (15) SS: Mary-wa John-ga dare-ni sono hon-o watasita to
 -Top -Nom who-to that book-Acc handed that
 omotte iru no desuka?
 think Q
 ‘*Whom does Mary think that John handed that book to?’

LF: Dare-ni_i [Mary-wa John-ga t_i sono hon-o watasita to]
omotte iru no desuka?

In (13), the *wh*-element is extracted out of the embedded clause where *Comp* is filled, so the sentence is ungrammatical. Chinese does not have an embedded clause introduced by a meaningless complementizer such as ‘that’ in English (cf. Huang 1982, Chen 1991)⁵. However, Cheng (1994) believes *shuo* is a complementizer corresponding to *that* in English. Being influenced by Taiwanese, the SS of (14) is acceptable and the LF movement is legitimate because the complementizer *shuo* does not block subject movement. In Japanese, *to* is a complementizer⁶ (cf. Chen 1991), corresponding to *that* in English, and it must be present. However, unlike English, it does not have any effect on the extraction of an embedded subject (Chen 1991), as illustrated in (15). That is to say, Chinese and Japanese do not exhibit *that*-trace effects.

5. Subject-object asymmetry

The complementizer *that* will block subject extraction but not object extraction. This is so-called **subject/object asymmetry** (cf. Chomsky 1981). Let us consider the following sentences, where the *wh*-elements are moved out of an adverbial clause:

- (16) a. *Who_i did John get angry [after t_i called to complain]?⁷
b. ??What_i did John get angry [after Sam called to complain t_i]?
- (17) a. SS: [Shei xiele na feng xing zhihou, Zhangsan jiu da
who wrote that CL letter after then call
dianhua lai]?
telephone come
‘After who wrote that letter, Zhangsan called?’

⁵ Chen (1991) assumes that *yinwei*, *suoyi*, and *suiran* are meaningful complementizers, so the clauses introduced by those words are more like adverbial clauses.

⁶ According to our Japanese subjects, *to* in Japanese has several functions. It can also be a conjunction like *and*, as in (i) (an example from our informant Ayako Nakane):

(i) Anata to watasi-wa nakayosi desu.

you and I -Top good friends

‘You and I are good friends.’

⁷ This example is taken from Culicover (1997).

- LF: $shei_i [t_i xie\ le\ na\ fong\ xing\ zhihou, Zhangsan\ jiu\ da\ dianhua\ lai?]$
 who write Asp that CL letter after then
 call telephone come
- b. SS: $[Ni\ zuo\ le\ sheme\ shi\ yihou, Zhangsan\ da\ dianhua\ gei\ ni?]$
 you do Asp what matter after call telephone
 to you
 ‘After you did what, Zhangsan called you?’
- LF: $[sheme\ shi]_i [ni\ zuo\ le\ t_i\ yihou], Zhangsan\ da\ dianhua\ gei\ ni?]$
 what matter you did Asp after call telephone
 to you
- (18) a. SS: $Dare-ga\ sono\ tegami-no\ kaita\ ato\ John-ga\ denwa-wa\ kakete\ kimasitaka?$
 who-Nom that letter-Acc wrote after John-Nom
 telephone-Top kakete kimasitaka?
 denwa-wa call come
 ‘After who wrote that letter, John called?’
- LF: $Dare-ga_i [t_i\ sono\ tegami-no\ kaita\ ato] John-ga\ denwa-wa\ kakete\ kimasitaka?$
 who-Nom that letter-Acc wrote after John-Nom
 denwa-wa kakete kimasitaka?
 telephone-Top call come
- b. SS: $Kare-ga\ nani-no\ itta\ ato\ Mary-wa\ nakimasita\ ka?$
 he-Nom what-Acc say after Mary-Top cry Q
 ‘After he said what, Mary cried?’
- LF: $Nani-no_i [kare-ga\ t_i\ itta\ ato] Mary-wa\ nakimasita\ ka?$
 what-Acc he-Nom say after -Top cry Q

In English we find that extracting a wh-subject out of the adverbial clause as in (16a) yields a better reading than extracting a wh-object as in (16b). Huang (1982) assumes that Infl in Chinese has more lexical contents than Infl in English; hence he suggests that Infl can lexically govern the subject. Hence, Chinese does not exhibit the subject/object asymmetry, because both subjects and objects can properly be governed in (17). Japanese, like Chinese, does not exhibit the subject/object asymmetry, either. Thus, either the wh-subject or the wh-object may be moved out of an adverbial clause at LF, as can be seen in (18).

6. Superiority effects

When two *wh*-words co-occur in a sentence, the first *wh*-word will generally be interpreted prior to the second *wh*-word. This is the so-called **superiority condition**⁸, a constraint on the order of *wh*-movement in sentences where more than one *wh*-word is found, as exemplified below:

- (19) a. Who bought what?
b. *What did who buy?
- (20) Ni xiang zhidao [[shei mai le sheme]]?
you wonder who buy Asp what
a. 'Who is the person x such that you wonder what x bought?'
b. 'What is the thing x such that you wonder who bought x?'
- (21) John-wa dare-ga nani-o kaita ka utagate-irunodesu⁹ ka?
Top who-Nom what-Acc wrote Q wondered Q
'Who did John wonder wrote what?'
* 'What did John wonder who wrote?'

In (19), *who* must be interpreted prior to *what*; otherwise, the sentence will be ungrammatical. However, Chinese and Japanese do not have the superiority effect. Though *wh*-elements in Chinese and Japanese do not move in syntax, we find that (20) and (21) are ambiguous. Either the *wh*-subject or the *wh*-object can be the focus of the sentence.

So far, we have compared the properties of the *wh*-constructions in English, Chinese, and Japanese. We have found that the three languages are similar in that they are all subject to Subjacency, so extraction of the *wh*-element out of a *wh*-island, a complex NP, or a sentential subject yields ungrammaticality either at SS or at LF. However, they differ in that English exhibits syntactic *wh*-movement, *that*-trace effects, subject/object asymmetries, and superiority effects, while Chinese and Japanese do not.

⁸ XP is superior to YP if XP and YP are in the same IP and XP c-commands YP (cf. Haegeman 1991).

⁹ This example is taken from Chen (1991).

2.2 Previous Empirical Studies of Acquisition of Wh-questions

Several studies of second language acquisition have dealt with the acquisition of Subjacency and the ECP (Schachter 1989, Martohardjono 1993).

According to White (1988), L2 learners are guided by UG; hence they will not produce sentences with UG violations. Sixty-six French-speaking, ESL Canadians participated in her experiment. They were divided into three groups: Adult (1), Adult (2), and Secondary IV. Adult (1) consisted of 18 people (mean age=31) with a low-intermediate or intermediate level of proficiency in English. Adult (2) had 25 people (mean age=27) with a high-intermediate or advanced level of proficiency in English. Secondary IV had 23 adolescents (mean age=15). In addition, there were 14 English-speaking native controls. Three different judgment tasks—a multiple choice judgment task (MCGJ), a paced judgment task (Paced GJ), and a comprehension task were used. It was found that in the MCGJ task, Adult (1) mastered the complex NP structure and observed the CNPC, but Adult (2) still had difficulties. The results of the Paced GJ task show that in judging grammatical and ungrammatical CNPC sentences, the adults (both groups) and the natives were very much alike. As for *wh*-island constructions, the adult groups were significantly different from the natives. Results of extractions from object complements in both judgment tasks were problematic. As for subject extraction in both tasks, both adult groups found it was impossible. In recognizing the ungrammaticality of *that*-trace violations in both judgment tasks, all the subjects experienced difficulties. In the comprehension task, both groups of adults performed well on the control sentences and the test sentences, indicating that they had acquired Subjacency. In general, adolescents did badly on all tasks, indicating that they still could not handle complex sentences or observe the principles of UG. That is, they had not yet reached a stage where Subjacency and the ECP are operating. On *wh*-islands, Adult (1) was still influenced by their L1 while Adult (2) had reset the relevant parameter. In general, all the adults were still somehow constrained by UG.

Assuming that Korean speakers can receive knowledge of syntactic *wh*-movement in English in their input, but not knowledge of Subjacency and the ECP, Bley-Vroman, Felix, and Ioup (1988) looked at Korean learners of English to see if they have access to the constraints on *wh*-movement. Ninety-two Korean native speakers living in an English-speaking environment participated in their experiment. A

grammaticality judgment test was used in the experiment. Among the 32 sentences, 15 were grammatical and 17 were ungrammatical. The test sentences were presented in two random orders with half of the subjects receiving each sequence. The sentences were of the same length and structural complexity. Instructions were presented in both Korean and English. The results showed that the average score of the native speakers was 92%, and that the average score of the nonnative speakers was 75%. The difference was significant. Factors such as age, length of residence, age at arrival in the USA, and number of years of formal English study were found to be irrelevant. The native speakers generally performed quite well on each individual sentence, though only about 50% of the native speakers rejected sentences with the *that*-trace effect. They did significantly better at rejecting ungrammatical sentences than at accepting grammatical ones. The fact that Korean exhibits similar ECP effects did not facilitate L2 acquisition in response to the judgment task. It was also found that about 56% of the non-native speakers made the correct UG-based judgments. They, like the native controls did badly only on sentences with the *that*-trace effect. Furthermore, the non-native speakers tended to reject more sentences than they were expected to according to the hypothesis of the study; hence, the correct responses to the grammatical examples were low, while those to ungrammatical sentences were high. In conclusion, the subjects in this study were not merely guessing; hence Bley-Vroman *et al.* concluded that perhaps UG did operate in adult language acquisition, but in some attenuated form.

Uziel (1993) believes that L2 grammars are systems of knowledge guided by UG and that UG is available in adult SLA. Following Flynn (1987), she assumed that the process of L2 acquisition was a process of parameter resetting in which the L2 learner reassigns the parameter-values of the L1 to the values in the L2. Therefore, the L2 learner might have to spend a longer time in acquiring one setting than another to a degree to which L1 and L2 match. Ten speakers of Hebrew, aged 19-29 (mean age=24;7), who had at least eight years of formal study of English, and 11 Italians, aged 17-34 (mean age=26;1), who were college students, took part in Uziel's experiment. In addition, ten Americans, aged 17-38 (mean age=25.5), with no background in linguistics, served as native controls. Three tasks were conducted: the standardized placement test, a pre-test, and a grammaticality judgment test designed by Martohardjono (1991). The results showed that (i) the control group performed better than the other two groups; (ii) all of the

participants performed better on the grammatical sentences than on the ungrammatical ones; (iii) the participants judged the adjuncts and relative clauses more accurately than they did the complex NP's and wh-islands; (iv) Hebrew and Italian speakers performed better on the sentential subjects than the native controls; (v) the participants did better on ungrammatical strong constructions (such as adjuncts, relative clauses, and sentential subjects) than they did on ungrammatical weak constructions (such as complex NP's, wh-islands, and sentences with *that*-trace effects); and (vi) they did much better on subject extraction than on object extraction. Uziel's participants did better on judging strong constructions, suggesting that L2 learners resort to UG in acquiring the L2. This also proves Flynn's (1987) claim that L2 learners will depend on their existing linguistic knowledge in learning the L2 when the parameter-settings in L1 and L2 are identical. That the L2 learners performed poorly on the weak constructions might be due to a delay in L2 acquisition of the relevant parameter-setting.

To sum up, White (1988) observed the acquisition of adolescent and adult French-speaking learners of English and claimed that L2 learners were guided by UG and that the errors they made are possible forms in UG. Bley-Vroman *et al.* (1988) found that UG was indeed accessible in adult second language acquisition, but in "attenuated" form. Uziel (1993) claimed that UG was available in second language acquisition as it was also in first language acquisition. All three studies indicate that adult learners utilized UG in the process of the acquisition of an L2.

3. RESEARCH METHODS AND RESULTS

In this section, we will describe the present experiment, which examines the L2 acquisition of Chinese wh-constructions by English- and Japanese-speaking learners of Chinese.

3.1 Participants

Two groups of National Taiwan Normal University students participated in this study: 20 English speakers and 20 Japanese speakers learning Chinese at the Mandarin Training Center (MTC). In addition, there was a control group, which consisted of 20 native speakers of Chinese. Before the experiment, the participants were asked to indicate their background information. The participants of the three groups were


all adult learners. Though the English speakers ranged in age from 20 to 50 and the Japanese subjects from their early twenties to late forties, most of the participants were in their twenties. The mean ages of both L2 groups were quite similar. Most of the English speakers were intermediate students and only three were at advanced level. Fourteen Japanese speakers were intermediate and six were advanced students.

3.2 Methodology and Materials

Many methodologies have been used in the study of language acquisition, such as a grammaticality judgment (GJ) task, an imitation task, and a translation task. However, in the study of Subjacency and the ECP, the GJ task has been the most common one (Bley-Vroman *et al.* 1988, Felix 1988, White 1988, Schachter 1989, Johnson and Newport 1991, Uziel 1993, and Martohardjono 1993, White and Genesee 1996), for it is a useful and effective means to determine L2 learners' competence (White 1986). In addition, some first language acquisition researchers have also used a picture-identification task or an elicited production task to test children's use of simple and multiple wh-questions (Yoshinaga 1996, Sarma 1992).

In the present study, we designed two types of tasks: a comprehension task and a production task. The comprehension task was a preference task, in which each sentence was read twice to the participants and they were to make a judgment as to their preference. The production task was an ordering task, in which a picture was provided to outline a context and the participants were to rearrange the order of the phrases according to the picture. In addition, to avoid the problem of unwillingness or inability of the participants to write down Chinese characters, Arabic numerals were used to identify the phrases, as shown below:

Table 1: A Sample of a Test Item Given in the Ordering Task



Shei Wang xiansheng qu rang ni hen shangxin
 who Wang Mr. marry make you very sad
 1 2 3
 (Anticipated answer) → 2 1 3?
 (Possible answer of the L2 participants) → 1 2 3?

Each of the test sentences except for the fillers was used to examine the acquisition of Subjacency and the ECP parameters in Chinese by English and Japanese speakers. The test was administered in two parts: first the ordering task and then the preference task. In the ordering task, twelve items were designed to test the two parameters, each with three tested features. Moreover, each item has a picture describing the context. In addition, there were three items concerning simple wh-movement as fillers. In the preference task, fifteen pairs of sentences were given: one sentence exhibited wh-in-situ and the other overt wh-movement. The thirty sentences were randomized. Moreover, among the thirty sentences, thirteen were grammatical and seventeen were ungrammatical. The test sentence types are shown in Tables 2 and 3:

Table 2: Test Sentences Used to Test Subjacency in Both Tasks¹⁰

Type	Violation	Example
Wh-island	Yes	*Shemme ta xiang zhidao shifou Meimei chi le? what she wonder whether sister eat Asp ‘*What does she wonder whether sister ate?’
	No	Ni xiang zhidao shifou Xiao-Lin renshi shei? you wonder whether know whom ‘*Who do you wonder whether Xiao-Lin knows?’
Complex NP	Yes	Shei Xiao-Ming tingdao Xiao-Hua xihuan de xiaoxi? who heard like DE news ‘*Who did Xiao-Ming hear the news that Xiao-Hua likes?’
	No	Ni yudao yige hen hui da shemme qiu de nuhai? you meet one very good play what ball DE girl ‘*What ball did you met a girl good at playing?’
Sentential Subject	Yes	*Shei Xiao-Ming zai xiang rang ni hen shengqi? who is miss make you very angry ‘*Who _i did that Xiao-Ming missed t _i make you very angry?’
	No	Wang xiansheng qu shei rang ni hen shangxin? Wang Mr. marry who make you very sad ‘*Who _i did that Mr. Wang married t _i make you very sad?’

¹⁰ As one of the reviewers pointed out, the sentences with violations as shown in Tables 2 and 3 all involve wh-fronting, whereas there is no violation when wh-words are in-situ. At the present stage, we assume that our participants may object to the ungrammatical sentences because those sentences violate Subjacency or ECP. However, it is also possible that our participants may object to the ungrammatical sentences simply because they are [+wh-fronting]. Further research will be necessary to design test sentences that are able to differentiate sentences with violations of [+wh-fronting] from those with violations of Subjacency or ECP.

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Table 3: Test Sentences Used to Test the ECP in Both Tasks

Type	Violation	Example
That-trace Sequence	Yes	Shei ta cai shuo zai changge? who he guess that is singing ‘*Who does he guess that is singing?’
	No	Ta cai shuo shei bingle? he guess that who sick ‘*Who does he guess that is sick?’
S/O Asymmetry	Yes	**Shei Wang mama zhidao dale Xiao-Ming yihou Xiao-Ming who Wang Mrs. know hit after kule? cried ‘Mrs. Wang knows that Xiao-Ming cried after who hit him?’
	No	*Shei Lao Wang zhidao A-Zhu dadianhua gei yihou qu who old Wang know call for after go shuijiao? sleep ‘*Whom _i does Mr. Wang know A-Zhu went to bed after she called t _i ?’
Superiority	Yes	A: Ta xiang zhidao shei chile shemme? he wonder who ate what ‘Who did he wonder ate what?’ B: Didi chi tang; meimei, bing. ¹¹ brother ate candy sister ice ‘Brother ate candy; sister, ice.’
	No	A: Ta xiang zhidao shei maile shemme? he wonder who bought what ‘Who did he wonder bought what?’ B: Jiu, Lao Li maile; cha, Lao Wang. wine old Li bought tea old Wang ‘*Wine, Mr. Li bought; tea, Mr. Wang.’

The test types in the two tasks were the same; thus, the ordering task was done first and then the preference task. Most vocabulary words used in the tasks were taken from the Chinese language textbook used in the MTC course and with which the participants could be assumed to be familiar; in addition, the English translations were given for those words the subjects might not be familiar with. In the ordering task, the

¹¹ As mentioned in the previous section, topicalization applies in Chinese at SS while non-superiority effects should be observed at LF. However, to test the knowledge of LF of the participants is impossible. Thus, we adopted Yoshinaga’s (1996) methodology to test subjects’ knowledge of superiority effects.

participants were to order the phrases, according to the given picture, to form a grammatical sentence in Chinese. In the preference task, the participants were to judge the acceptability of the given sentence and then circle the number that matched their understanding or intuition.

3.3 Procedures

Three pretests were given to ensure the validity of the tasks. After several revisions of the pretests, the revised tasks were used in the present study. Formal testing was given in one of the MTC classrooms. To prevent the performance of the participants in the production task from being influenced by the sentences hinted in the preference task, the ordering task was given first and then the preference task. The participants were allowed between 10-20 minutes to finish the ordering task, and 5-7 minutes to do the preference task. Before commencing the tasks, the participants were told that they could ask questions if they had any difficulty in understanding the pictures, the meaning of the Chinese characters, or the nature of the tasks. After the data were all collected, the responses of the participants and the order they decided on were noted, and tabulated. Sentences with simple *wh*-movement were used as fillers so they were not counted in the results. Each response was entered into SPSS files, and a one-way ANOVA, a Paired-Sample test, and LSD *post hoc* procedures were utilized for data analysis.

3.4 Results

Now let us see the results of the two tasks¹².

3.4.1 Subjacency

The results of the responses of all of the participants to *wh*-islands are shown in Table 4:

¹² For more details, please read Huang (1999).

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Table 4: Responses of All the Participants to Subjacency in the Preference Task

Type Group	WHI Violation		No WHI Violation		p-value *p<0.05
	Mean	SD	Mean	SD	
ES	1.9750	.6382	4.05	.7763	<.001**
JS	2.325	1.3981	4.075	1.0036	<.001**
NS	1.75	.9389	3.675	1.0422	<.001**
Type Group	CNP Violation		No CNP Violation		p-value *p<0.05
	Mean	SD	Mean	SD	
ES	1.7	.7327	4.0	.6407	<.001**
JS	1.6	.7539	4.425	.6514	<.001**
NS	1.125	.2751	4.3	.7145	<.001**
Type Group	SS Violation		No SS Violation		p-value *p<0.05
	Mean	SD	Mean	SD	
ES	2.325	.8626	4.325	.6544	<.001**
JS	1.925	.9497	4.325	.8472	<.001**
NS	1.5	.6882	4.55	.5104	<.001**

Range: 1~5

Most participants considered sentences without wh-island violations (that is, those with wh-elements in-situ) grammatical (ES: 4.05, JS: 4.075, NS: 3.675) and those with wh-island violations strongly ungrammatical (ES: 1.975, JS: 2.325, NS: 1.75). In addition, their judgment on the two patterns was significantly different (ES: t -value=7.493, p =.000; JS: t -value=5.217, p =.000; NS: t -value=7.484, p =.000). Interestingly, the results of the ANOVA showed that there was no group effect (WHI violation: $F(2,57)$ =1.553, p =.220; no WHI violation: $F(2, 57)$ =1.117, p =.334). That is to say, the preference of the L2 participants was just the same as that of the native speakers', suggesting that the L2 participants should have noticed that sentences with wh-island violations are not acceptable in Chinese.

Similarly, all our participants considered sentences without complex NP violations grammatical (ES: 4.0, JS: 4.425, NS: 4.3) and those with complex NP violations ungrammatical (ES: 1.7, JS: 1.6, NS: 1.125). Also, there was a significant difference in their judgments of the two patterns (ES: t -value=12.879, p <.001; JS: t -value=14.643, p <.001; NS: t -value= 17.199, p <.001). The results of the ANOVA further showed that the responses of the three groups to the grammatical patterns were not significantly different ($F(2,57)$ =.195, p =.824). However, in judging ungrammatical patterns (i.e., patterns with complex NP violations), the L2 participants responded significantly differently from the NS controls (ES vs. NS: p =.005, JS vs. NS: p =.020). That is to say, the native

controls rejected sentences with violations more strongly than the L2 participants did. However, at least the L2 participants had noticed that sentences with complex NP violations are not acceptable.

All the participants performed significantly differently in judging sentences with and without sentential subject violations (ES: t -value=8.403, p <.001; JS: t -value=6.951, p <.001; NS: t -value=16.177, p <.001). They were more in favor of sentences with no violation (ES: 4.325, JS: 4.325, NS: 4.55) and against those with a violation (ES: 2.325, JS: 1.925, NS: 1.5). In measuring the preference of the participants for the grammatical patterns, the group effect was found to be insignificant ($F(2, 57)=.720$, $p=.491$). That is, the L2 groups could handle sentences without SS violations as well as the native controls. But, in judging sentences with SS violations, the preference of the English speakers was still significantly different from that of the NS controls ($p=.003$), while the preference of the Japanese speakers was not significantly different ($p=.115$).

Now let us look at the results in Table 5, which show the percentage of correct responses by the participants to each test feature concerning Subjacency in the ordering task:

Table 5: Correct Responses of the Participants to the Subjacency Parameter (in percentages)

Feature	ES (n=20)	JS (n=20)	NS (n=20)
Wh-Island 1	80%	45%	75%
Wh-Island 2	75%	90%	90%
WHI (average)	77.5%	67.5%	85%
Noun-Complement	80%	90%	75%
CNP's (Average)	75%	85%	87.5%
Sentential Subject 1	95%	85%	95%
Sentential Subject 2	100%	95%	100%
SS (Average)	97.5%	90%	97.5%

As can be seen in Table 5, most of the participants successfully produced the correct patterns in dealing with Subjacency. In responding to wh-islands, most of them showed correct responses (ES: 77.5%, JS: 67.5% and NS: 85%). Moreover, they had a high percentage of correct responses to complex NP's also (ES: 75%, JS: 85%, NS: 87.5%). Turning to sentential subjects, we found that the percentage of correct responses for the three groups was higher (ES: 97.5%, JS: 90%, NS: 97.5%). In general, all groups responded quite well on sentential subjects.

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And the Japanese speakers performed worst on wh-islands, just as they had in the preference task.

3.4.2 The ECP

In what follows, we will present the results with respect to the three construction types— superiority effects, *that*-trace effects, and subject/object (S/O) asymmetries.

The preferences of all of the participants in response to the ECP are shown in Table 6:

Table 6: Responses of All Participants to the ECP in the Preference Task

Group	<i>That</i> -Trace		<i>That</i> -Trace		<i>That</i> -Trace		<i>That</i> -Trace	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
ES	2.25	1.2927	2.05	1.2344	4.65	.6708	4.3	.8645
JS	2.05	1.3169	1.8	1.2814	4.45	.9445	4.2	1.1965
NS	1.55	.9987	2.85	1.1367	3.5	1.0513	4.85	.3363
Group	Wh-Subject Movement		Wh-Object Movement		Wh-Subject In-Situ		Wh-Object In-Situ	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
ES	2.05	.8256	1.4	.5982	4.15	.8751	4.3	.9234
JS	1.85	1.2258	1.8	1.1517	4.6	.5982	4.55	.9445
NS	1.95	1.1653	1.5	.9459	4.55	.6048	4.05	1.1910
Group	[+Superiority]				[-Superiority]			
	Mean		SD		Mean		SD	
ES	4.45		.5356		3.125		1.0244	
JS	4.225		.9662		3.425		1.1035	
NS	4.15		.7797		3.775		.9797	

Range: 1~5

The responses of the participants to *that*-trace effects in the preference task showed that both English and Japanese speakers rejected sentences with wh-fronting (ES: 2.25 & 2.05, JS: 2.05 & 1.8) and strongly accepted sentences with wh-in-situ (ES: 4.65 & 4.3, JS: 4.45 & 4.2). The presence of the complementizer did not significantly influence the preferences of the participants (<wh-fronting> ES: t-value=-.721, p=.479; JS: t-value=-.641, p=.529; <wh-in-situ> ES: t-value=-1.584, p=.130; JS: t-value=-.815, p=.425), indicating that both the English and Japanese speakers have already found that Chinese is a wh-in-situ language; i.e., that whether or not there is a complementizer, wh-elements are in their base positions. In other words, the English

speakers have successfully reset the fronting parameter from [+wh-fronting] to [-wh-fronting].

The native control group accepted sentences with wh-in-situ (mean=3.5 & 4.85) and rejected those with wh-fronting (mean=1.55 & 2.85). This shows that [+/- wh-fronting] is a crucial factor. However, when comparing sentences with a complementizer to those with no complementizer, it was found that the presence of the complementizer was also influential. The Chinese speakers considered sentences with a complementizer worse than those with no complementizer. That is, they were not so much in favor of sentences with an overt complementizer in Chinese. The results of the ANOVA showed that there was no significant group effect among the responses of the participants to sentences with *that*-trace effects ($F(2, 57)=1.772, p=.179$). However, in accepting the *that*-trace pattern (i.e., sentences with wh-in-situ and an overt complementizer) and rejecting the ~~*that*~~-trace pattern (i.e., sentences with wh-fronting and no complementizer), the preferences of both L2 groups were significantly different from that of the NS control group (ES vs. NS: $p=.042$ & $.009$, JS vs. NS: $p<.001$ & $p=.002$).

It was found that all participants in the three groups accepted sentences with wh-in-situ (<S in-situ> ES: 4.15, JS: 4.6, NS: 4.55; <O in-situ> ES: 4.3, JS: 4.55, NS: 4.05) and rejected sentences with wh-subject movement or wh-object movement (<wh-S movement> ES: 2.05, JS: 1.85, NS: 1.95; <wh-O movement> ES: 1.4, JS: 1.85, NS: 1.5). Although in English, moving a wh-object is considered as unacceptable as moving a wh-subject, the English speakers in our study rejected sentences with wh-object movement more than those with wh-subject movement (moved object: 1.4, moved subject: 2.05) in Chinese, and the discrepancy was significant ($t\text{-value}=-3.322, p=.004$). Their performance then might be independent of L1 and L2 and belong to inter-language grammar. In the case of the Japanese speakers, they considered sentences with wh-subject fronting almost equality as unacceptable as those with wh-object fronting ($t\text{-value}=-.370, p=.716$). That is, no subject/object asymmetry was found in their L2 performance. The Chinese native speakers were more inclined against moving wh-subjects (mean=1.9) than moving wh-objects (mean=1.5), but the results of the t-test showed that the divergence was insignificant ($t\text{-value}=-2.027, p=.057$). This seems to be evidence for the claim that Chinese does not exhibit subject/object asymmetries (cf. Huang 1982). There was no significant difference among the preferences of the three groups for wh-subject

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movement ($F(2,57)=.184, p=.833$) or wh-object movement ($F(2,57)=1.008, p=.371$). That is to say, the preference of the L2 participants in this regard was not significantly different from the native speakers'.

Generally speaking, the participants in all groups accepted both sentences with superiority and those with non-superiority effects (mean>3). However, the English and Japanese speakers preferred sentences with superiority effects (ES: 4.45, JS: 4.225) to those with no such effects (ES: 3.125, JS: 3.425), and the paired-sample t-test shows that the discrepancy was significant in both groups (ES: t-value=-4.744, $p<.001$; JS: t-value=-2.133, $p=.046$). Moreover, the case of the Japanese speakers was considered noteworthy because Japanese does not exhibit superiority effects (cf. Katada 1991). The native speakers of Chinese also accepted sentences with superiority effects (mean=4.15) a little bit more readily than sentences without these effects (mean=3.775), but the discrepancy was insignificant (t-value=-1.751, $p=.096$). That is, the preference of the native speakers of Chinese accorded with findings in the literature that Chinese exhibits no superiority effects (cf. Huang 1982). Finally, the results of the ANOVA indicated that there was no significant group effect in the preference of our participants for superiority effects (superiority vs. non-superiority: $F(2, 57)=.800, p=.454$ vs. $F(2,57)=1.968, p=.149$).

The results of the ordering task are shown in Table 7:

Table 7: Correct Responses of the Participants to the ECP Parameter (in percentages)

Type	ES (n=20)	JS (n=20)	NS (n=20)
<i>That-Trace</i>	65%	72.5%	72.5%
<i>That-Trace</i>	7.5%	5%	0%
(Total)	72.5%	77.5%	72.5%
Wh-Subject In-Situ	85%	100%	80%
Wh-Object In-Situ	70%	85%	70%
Superiority	65%	60%	70%
Non-Superiority	0%	7.5%	12.5%
(Total)	65%	67.5%	82.5%

Most of the participants in our study successfully produced the correct patterns in response to sentences with regard to the ECP. Although Chinese does not exhibit superiority effects, the English speakers tended to produce sentences with superiority effects (ES: 75%,

JS: 60%, and NS: 70%), while only 7.5% of the Japanese speakers and 12.5% of the native controls used non-superiority patterns. In dealing with *that*-trace effects, most of the participants produced correct patterns with an overt complementizer and *wh*-in-situ (ES: 65%, JS: 72.5%, and NS: 72.5%), but there were some participants who did not add a complementizer (ES: 7.5%, and JS: 5%). With regard to the two items concerning S/O asymmetries, most participants successfully produced the correct pattern, and all the participants did better in ordering *wh*-subjects than *wh*-objects¹³.

4. DISCUSSION

Now let us address the following issues in relation to our findings.

4.1 L1 Transfer

The role of L1 in L2 acquisition has often been considered by L2 researchers (White 1988, 1989, Gass and Schachter 1989, Gass and Selinker 1992, among others). It is assumed that if L2 learners acquire the target language by using their L1 knowledge, their L2 performance should reflect their L1 grammar. Hence, in this study, we would like to see if L1 plays a role in the L2 acquisition of Subjacency and ECP parameters.

As discussed earlier, English is marked [+*wh*-fronting] while Japanese and Chinese are marked [-*wh*-fronting] and the three languages share the same parameter setting for Subjacency. That is, they all obey Subjacency. Now let us see whether L1 has played an influential role in the present study. The preferences of the three groups for sentences with no island violations are shown in Figure 1:

¹³ The reason might be that subjects had to order five phrases with *wh*-objects and four with *wh*-subjects; subjects tended to make more mistakes on the former, some of whom had incomplete answers, for instance, ordering four phrases and forgetting one.

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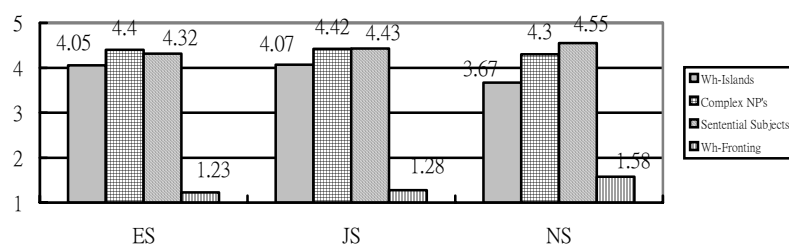


Figure 1: Preferences of the Participants for Sentences without Island Violations in the Preference Task

Neither simple questions with wh-fronting (fillers) nor islands with wh-in-situ violate Subjacency. However, for the English speakers in our study, the former were not preferred (mean=1.2333), and the latter were more acceptable. As can be seen in Figure 1, there was a high degree of preference for the three island types which have wh-elements in-situ, and the difference was significant ($p < .001$). This result indicated that the ES group knew Subjacency should be obeyed; however, they were not in favor of sentences with wh-fronting even though they did not violate Subjacency. Evidently, the English speakers have reset the fronting parameter. That is, they have acquired the relevant principles and structures in Chinese, and the L1 was not so influential. Moreover, the Japanese speakers also obeyed Subjacency. Although they rejected wh-fronting sentences, they strongly accepted sentences without island violations.

Table 8: Correct Responses of the Participants to Subjacency in the Ordering Task (in percentages)

Type Group	Wh-Islands without Violations	Complex NP's without Violations	Sentential Subjects without Violations	Simple Sentences with Wh-Fronting
ES	77.5%	75%	97.5%	0%
JS	65%	85%	90%	0%
NS	85%	87.5%	97.5%	0%

In the ordering task, as shown in Table 8, the production rate for sentences without island violations was quite high for the English group (Wh-Islands without Violations: 77.5%, Complex NP's without

violations: 75%, Sentential Subjects without Violations: 97.5%), while no one produced sentences with wh-fronting. These results accorded with those we obtained from the preference task. That is, the English speakers obeyed Subjacency; they have also reset the fronting parameter, indicating that L1 was not influential. Moreover, the production rate for sentences without island violations was also considered acceptable for the Japanese speakers (Wh-Islands without Violations: 65%, Complex NP's without Violations: 85%, Sentential Subjects without Violations: 90%).

With regard to the ECP parameter, as discussed in Section 2, English exhibits *that*-trace effects, S/O asymmetries, and superiority effects, while Japanese and Chinese do not. In what follows, we will discuss these three construction types.

The responses of the participants to *that*-trace and ~~*that*~~-trace patterns in the preference are shown in Figure 2:

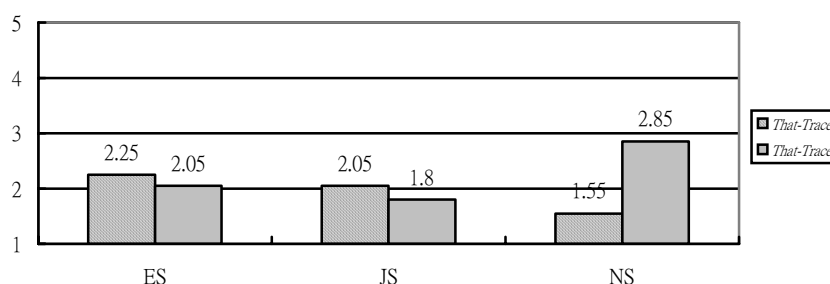


Figure 2: Responses of the Participants to Test Items on *That-Trace* Effects in the Preference Task

As Figure 2 shows, the occurrence or absence of the complementizer did not significantly influence the negative responses of the English speakers to sentences with wh-fronting (mean=2.25 & 2.05, t -value=-.721, p =.479). That is, their responses did not show *that*-trace effects. This suggests that, for the English speakers in our study, L1 was no longer influential, since the English speakers have already reset the fronting parameter and also have learned that Chinese does not exhibit *that*-trace effects. The Japanese speakers also rejected *that*-trace (mean=2.05) and ~~*that*~~-trace effects (mean=1.8) to a similar degree (t -value=-.641, p =.529).

In the ordering task, as discussed in Section 3, the English speakers tended to produce *wh*-in-situ patterns and none of them produced *wh*-fronting patterns. The results showed that they realized that *wh*-fronting is not correct in Chinese; thus, they did not use those patterns in the ordering task. In this case, L1 was no longer important for the English speakers. As for the Japanese speakers, they successfully produced the correct patterns, just as they did in the preference task, and none of them used *wh*-fronting patterns.

Flynn's (1987) model states that similarities in L1 and L2 will ease L2 acquisition, while contrasts between L1 and L2 will weaken it. In other words, when a parameter value in the native language (NL) and the TL match, there is no need to re-assign a new value; thus, the L2 learner will be able to consult the L1 parameter-value in acquiring his or her second language. However, when the NL and the TL do not match, a parameter-value reassignment is necessary; thus, L2 acquisition will be disrupted and it might take a longer time. The responses of the Japanese speakers supported Flynn's model. Their performance might result from their L1 parameter settings for fronting and *that*-trace effects, which are the same as those in Chinese, that is, [-*wh*-fronting] and [-*that*-trace effects]. However, Flynn's model cannot explain the performance of the English speakers. The parameter settings of the ECP in English and Chinese are different; that is, English exhibits superiority effects, *that*-trace effects, and S/O asymmetries while Chinese does not. According to Flynn's model, the English speakers in our study experience difficulty in acquiring the relevant structures in Chinese; however, they still could successfully respond to the test sentences.

The responses of the participants to *wh*-subject movement and *wh*-object movement in the preference task are shown in Figure 3:

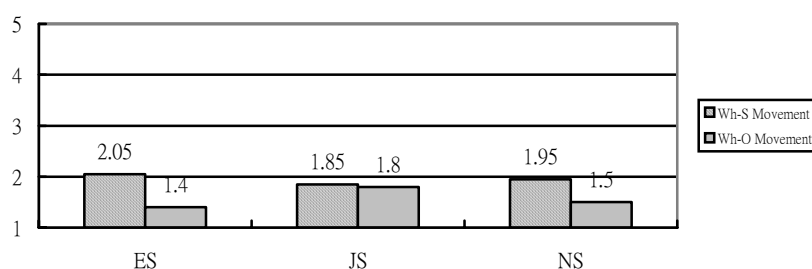


Figure 3: Responses of the Participants to Sentences with Wh-Subject Movement and Wh-Object Movement in the Preference Task

As can be seen above, in the preference task the performance of the English speakers on wh-subject and wh-object movement ($t\text{-value}=-3.322$, $p=.004$) was significantly different; however, they rejected the former (mean=1.4) more than the latter (mean=2.05). This contrasts with their L1 grammar, indicating that, for the English speakers in our study, L1 transfer was not significant. However, the Japanese speakers successfully answered the test items, and they did not think that subjects and objects involved different transformations ($t\text{-value}=-.370$, $p=.716$). This may be because their L1 and L2 match.

In the ordering task, none of the English speakers produced sentences with moved wh-elements. In other words, the English speakers had reset the fronting parameter, and they had put wh-elements in-situ. They have learned that Chinese does not have S/O asymmetries. Thus, L1 was not influential for the English speakers. The results accorded with those we found in the preference task. None of the Japanese speakers produced sentences with wh-subject or wh-object movement, either.

The participants' responses to *that*-trace effects in the preference task are shown in Figure 4:

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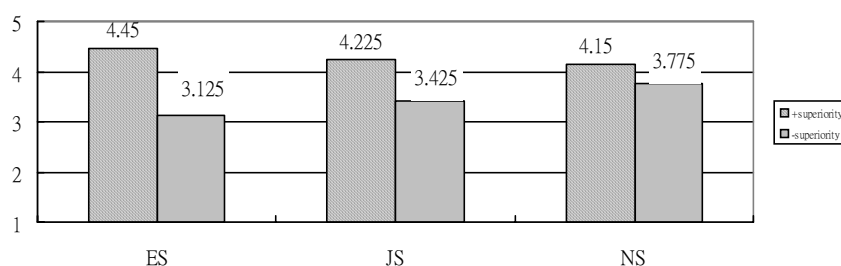


Figure 4: Responses of the Participants to Sentences with/without Superiority Effects in the Preference Task

Figure 4 shows that the preference of the English speakers for superiority patterns (mean=4.45) was significantly higher than that for non-superiority patterns (mean=3.125) in the preference task (t -value=-4.744, p <.001). This indicates that the English speakers were influenced by their L1, since English exhibits superiority effects while Chinese does not. That is to say, L1 transfer was significant for the ES group. Although Japanese does not exhibit superiority effects, the JS group significantly preferred superiority patterns (mean=4.225) to non-superiority patterns (mean=3.425) (t -value=-2.038, p =.046). It seems that L1 was not influential for the Japanese speakers.

Table 9 shows the percentage of the total number of superiority and non-superiority patterns produced by the participants:

Table 9: Responses of the Participants to Superiority Effects in the Ordering Task (in percentages)

Group	Type	Superiority	Non-Superiority
ES		75%	0%
JS		60%	7.5%
NS		70%	12.5%

As can be seen above, the English speakers only used superiority patterns (75%); none of them used non-superiority patterns (t -value=-9.747, p <.001). Although they considered non-superiority patterns acceptable in the preference task, in the ordering task none of them used this pattern, showing that L1 was still powerful for them. Interestingly, the Japanese speakers showed a similar tendency. They

tended to use more superiority patterns (60%) than non-superiority ones (7.5%), and the discrepancy was significant (t -value=.3823, p =.001)¹⁴. Thus, for the Japanese speakers, L1 was not influential in the ordering task or in the preference task.

Generally speaking, in all cases except that of superiority effects for the English speakers in our study, L1 transfer was not significant¹⁵. The preference of the ES group for superiority patterns might be due to our methodological design—the participants had to respond with pair-answers to items testing superiority. Yoshinaga (1996), in her study of L1 acquisition, found that younger children had difficulty replying to multiple *wh*-questions even though they had the ability to provide a pair of answers. In other words, multiple *wh*-questions were indeed more difficult than simple *wh*-questions. Thus, the English speakers in our study might have more difficulty in dealing with the test items for superiority effects than with other tested properties, so that they used their L1 knowledge to handle these.

Except for superiority, our findings corroborate Martohardjono (1993). In her cross-linguistic study, she found that the L1 could not have been the source of knowledge for two of her L2 groups (i.e., Chinese and Indonesian speakers). That is, L1 was not influential. On the other hand, our findings did not support Flynn's (1987) parameter setting model. Although the preference of the Japanese speakers in our study for sentences with superiority effects, *that*-trace effects, and S/O asymmetries corresponded to her model, the model cannot explain the preference of the English speakers in our study. The English speakers also preferred and produced the correct Chinese patterns except for sentences with superiority effects, although the related parameter values of their L1 and L2 do not match.

¹⁴ Mazurkewich (1984a, b) claims that an unmarked property in a given L2 will be acquired before its marked counterpart. Our results seem to indicate that [+superiority] is unmarked while [-superiority] is marked.

¹⁵ As one of the reviewers pointed out, our L2 learners were intermediate/advanced learners; hence, they might have already set the parameter to [- *wh*-fronting]. Future study will be desirable to recruit low-proficiency subjects to see if L1 also shows no effect on them and to investigate to what extent L1 influence L2 acquisition of learners at different levels of proficiency.

4.2 Accessibility of UG

Whether UG is actually involved in L2 acquisition is controversial and has received much discussion in the literature (Clahsen and Muhsken 1986, Felix 1988, Schachter 1988, 1989, White 1988, 1992, Flynn and Martohardjono 1990, Johnson and Newport 1991, Vainikka and Young-Scholten 1991, Martohardjono 1993, among others). Generally speaking, there are three different versions of the UG hypothesis: the 'no access UG hypothesis,' the 'indirect-access UG hypothesis' and the 'direct-access UG hypothesis.'

The 'no-access UG hypothesis' is the so-called 'UG-is-dead hypothesis,' which asserts that no aspect of UG is available to the L2 learner. Schachter (1988) found that the correct responses of Korean L2 learners to Subjacency were below the chance level because Korean is not subject to Subjacency. Thus, UG is not available to those adult L2 learners whose L1 does not observe Subjacency. The indirect-access UG hypothesis claims that only L1 instantiated principles and L1 instantiated parameter-values of UG are available to the L2 learner. The direct-access hypothesis claims that UG entirely constrains L2 acquisition. White and Genesee (1996) claimed that ultimate attainment in an L2 can indeed be native-like in the UG domain, and Epstein *et al.* (1996) argued that functional categories were apparently available to the L2 learner from early stages of acquisition.

Now, let us examine the results of the present study to see whether UG is available in light of the arguments above. UG principles do not allow island violations. The results in Figure 5 indicate that the ungrammatical sentences with island violations were correctly identified by subjects in all groups and that the participants in our study did not treat the three types of island constructions differently ($p > .05$). English follows those UG constraints and the preference of the English speakers also obeyed the constraints. Thus, for the English speakers in the study, UG is accessible. Moreover, the Japanese speakers also obeyed the island constraints, indicating that UG knowledge of Subjacency principles is indeed available.¹⁶

¹⁶ As many scholars (e.g., Martohardjono 1993, Li 1998) argued that Japanese is not relevant to Subjacency constraints, the preferences of the Japanese speakers in our study at least suggest that the default setting of Subjacency in SLA might be plus.

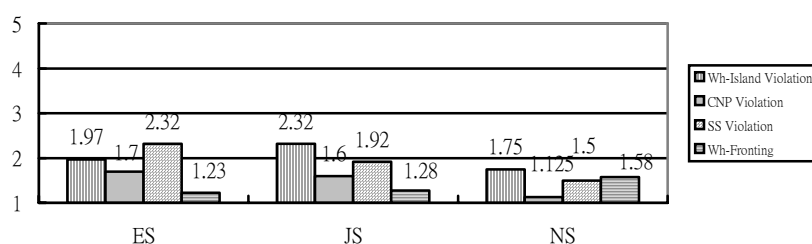


Figure 5: Responses of the Participants to Island Violations in the Preference Task

Those patterns with island violations also violate the fronting value of Chinese; thus, the participants were expected to reject sentences with Subjacency violations more strongly than sentences with the fronting violation. However, as is indicated in Figure 5, the L2 participants in our study tended to reject the latter more strongly and the native controls also did not treat them differently. Thus it seems that the L2 participants have borne in mind that Subjacency violations are impossible forms in Chinese, so that some of them might have taken wh-elements in sentence initial position as topics, i.e., base-generated topics not produced by movement. In this case, we expect the average degree preference should be a little bit higher, and if this is true, then the L2 participants still could resort to UG principles.

As can be seen in Table 10, none of the L2 participants used violation patterns in dealing with wh-islands and complex NP's; only 2.5% of the English speakers and 2.5% of the Japanese speakers used violation patterns with sentential subjects.

Table 10: Responses of the Participants to Island Violations in the Ordering Task (in percentages)

Type \ Group	WHI Violation	CNP Violation	SS Violation	Wh-Fronting
ES	0%	0%	2.5%	0%
JS	0%	0%	2.5%	0%
NS	0%	0%	0%	0%

The percentage of use of violation patterns was very low; thus the results correspond to those for the preference task and support the view

that the L2 participants have accessed UG. Otsu (1981), in his empirical L1 study, suggested that children observe Subjacency as soon as they acquire the relevant structures to which it applies. Our results further argue that even adult L2 learners observe Subjacency once they acquire the relevant structures.

As can be seen in the results in Figure 6, there was no significant difference between English or Japanese participants in their rejection of *that*-trace and ~~*that*~~-trace patterns ($p=.472$ & $.529$, respectively). This suggests that both test groups have learned that there are no *that*-trace effects in Chinese. When comparing ~~*that*~~-trace to ~~*that*~~-trace patterns (neither has a *that*-trace sequence), the English speakers rejected the former (mean=2.05) and accepted the latter (mean=4.65), suggesting that the fronting parameter had been reset.

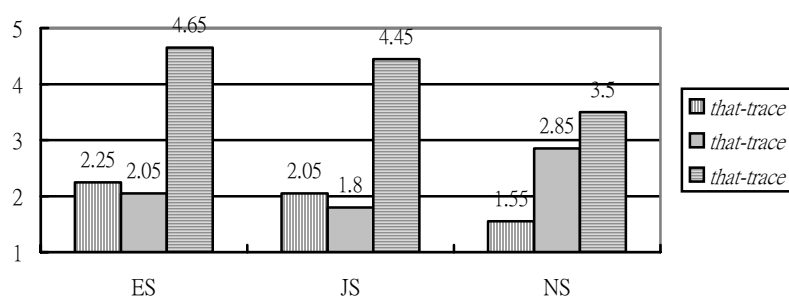


Figure 6: Response of the Participants to That-Trace Effects in the Preference Task

The Japanese speakers also successfully rejected sentences with *that*-trace or ~~*that*~~-trace sequences (mean=2.05) and accepted sentences with wh-in-situ (mean=4.45). So, in views of the results, we can say that UG is still available to the L2 participants.

That none of the participants used fronting patterns is seen in Table 11.

Table 11: Responses of the Participants to *That*-Trace Effects in the Ordering Task (in percentages)

Type \ Group	<i>That</i> -Trace	<i>That</i> -Trace	<i>That</i> -Tracee
ES	0%	0%	65%
JS	0%	0%	72.5%
NS	0%	0%	72.5%

None of the L2 participants produced sentences with *that*-trace or ~~*that*~~-trace patterns. Thus, the English speakers must have reset the fronting parameter, and the Japanese speakers had no difficulty here, either. In other words, both test groups have learned that Chinese does not exhibit *that*-trace effects. This fact supports the view that the L2 participants have accessed the principles of UG. The result is consistent with that of the preference task.

As noted in the previous section, our ES group rejected fronting patterns matter whether the fronting element was a subject or an object (subject: 2.05, object: 1.4). The results in Figure 7 signify that they accepted patterns with wh-subject and wh-object in-situ (subject: 4.15, object: 4.3) and the difference in the acceptance between the two patterns was not significant (t-value=.529, p=.603). That is, their responses showed no S/O asymmetries.

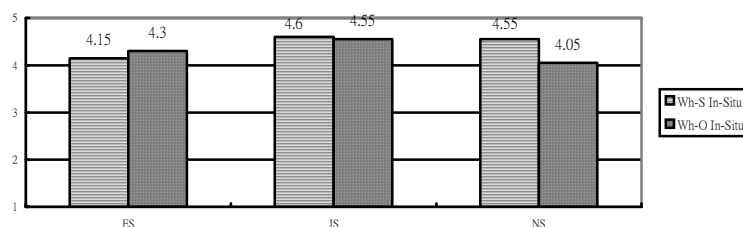


Figure 7: Responses of the Participants to S/O Asymmetries in the Preference Task

The above results suggest that the English speakers have reset the fronting parameter. The preference of the Japanese speakers also showed a similar trend; they accepted both wh-subject and wh-object in-situ patterns and the difference in their preference between the two was not significant (t-value=.370, p=.716). Thus, UG still mediated L2 acquisition for S/O asymmetries for both groups of L2 participants.

In Table 12, we can see that, in the case of S/O asymmetries, the English speakers have reset the fronting parameter since they tended to produce wh-in-situ patterns (above 70%) and, as noted in the previous section, they avoided using fronting patterns.

Table 12: Responses of the Participants to S/O Asymmetries in the Ordering Task

Group \ Type	Wh-subject in-situ	wh-object in-situ
ES	85%	70%
JS	100%	85%
NS	80%	70%

Furthermore, the responses of the three groups did not show significant S/O asymmetries (ES: $t(19)=-1.143$, $p=.267$, JS: $t(19)=-1.831$, $p=.083$; NS: $t\text{-value}=-.809$, $p=.428$). The result is consistent with the literature and it strongly argues that the L2 participants in our study resort to UG in acquiring their second language in terms of S/O asymmetries.

The above results show that adult L2 learners did have consistent intuitions regarding a grammaticality contrast involving principles of UG. Our findings confirm those of others'. Li (1998) claimed that UG rules such as Subjacency and the ECP are available to adult L2 learners for as, in her study, they have reached a high proficiency level in the target language even when their L1 and L2 have a parametric variation on these UG rules. Bley-Vroman et al.'s (1988), Felix's (1988), and Uziel's (1993) studies also show that adult L2 learners do obey principles of UG, such as Subjacency and the ECP. Moreover, White and Juffs (1998) asserted that adult learners can access island constraints, even in the case of adults not living in an environment where the L2 is spoken. In short, our findings match Martohardjono's (1998) conclusion that regardless of the L1 background (and the particular environment), L2 learners are sensitive to UG constraints.

4.3 Specific Features of Subjacency and the ECP

As we know, Subjacency is a constraint on movement from wh-islands, complex noun phrases, and sentential subjects, while the ECP applies to cases such as superiority effects, *that*-trace effects and subject/object asymmetries. In this section, we would like to observe whether there is an acquisition order for the six construction types.

The responses of the participants to patterns without any violations in the preference task are presented in Table 13:

Table 13: Responses of the Participants to Patterns without Any Violations in the Preference Task

	<i>That-Trace</i>	Wh-S In-Situ	Wh-O In-Situ	Non-Superiority	Wh-Islands	Complex NP's	Sentential Subjects
ES	4.65	4.15	4.3	3.12	4.05	4.4	4.32
JS	4.45	4.6	4.55	3.42	4.07	4.42	4.32
NS	3.5	4.55	4.05	3.77	3.67	4.3	4.55

The results of the ANOVA showed that the construction type was a significant factor for the English participants ($F(6, 133)=7.297, p<.001$), the Japanese participants ($F(6,133)=4.226, p=.001$) and the Chinese native controls ($F(6, 133)=4.420, p<.001$). At the same time, the performance of the three groups was not very different ($F(2, 417)=1.277, p=.280$).

In fact, the performance of the English and Japanese speakers was almost identical ($t\text{-value} = -1.263, p=.209$). Both groups of L2 subjects did most poorly on non-superiority patterns (ES: 3.125, JS: 3.425), and their preference for this pattern was significantly different from that for the other patterns (ES: $p<.001$, JS: $p<.001$). In addition, the *post hoc* LSD multiple comparisons show that both groups of the L2 participants showed no significant difference in their performance on the other six patterns ($p>.05$). As for the NS controls, their responses to the seven patterns did not show significant differences ($p>.05$).

Thus, the degree of difficulty of acquisition for the seven construction types is shown in Table 14:

Table 14: General Degree of Difficulty of Acquisition for the Three Groups

Group	Difficulty of Acquisition
ES	Non-Superiority > WHI \geq Wh-S In-Situ \geq Wh-O In-Situ \geq SS \geq CNP's \geq That-Trace
JS	Non-Superiority > WHI \geq SS \geq CNP's \geq that-trace \geq wh-O In-Situ \geq Wh-S In-Situ
NS	That-Trace \geq WHI \geq Non-Superiority \geq Wh-S In-Situ \geq CNP's \geq Wh-O In-Situ = SS

The poor performance of the participants on non-superiority may be the result of the difficulty of our test structures. As we know, the test

structures for superiority are more complicated and different from the others, since they use multiple wh-questions which require pair-reading answers. These test structures have been proved by Yoshinaga (1996) to be more difficult than coordinate wh-questions or simple wh-questions. The reason for the poor performance of the Chinese participants for *that-trace* could be that standard Chinese does not use a complementizer and also that most people do not use it; thus the preference for *that-trace* patterns was not strong.

The responses of the participants to the seven construction types in the ordering task are shown in Table 15:

Table 15: Responses of the Participants to Different Construction Types in the Ordering Task (in percentages)

Type \ Group	ES	JS	NS
<i>That-Trace</i>	65%	72.5%	72.5%
Wh-S In-Situ	85%	100%	80%
Wh-O In-Situ	70%	85%	70%
Non-Superiority	0%	7.5%	12.5%
Wh-Islands	77.5%	67.5%	85%
Complex NP's	75%	85%	87.5%
Sentential Subjects	97.5%	90%	97.5%

The results of the ANOVA showed that there was a significant difference among those types for the English speakers ($F(6, 133)=16.935$, $p<.001$), the Japanese speakers ($F(6,133)=20.267$, $p<.001$), and the Chinese native controls ($F(6, 133)=14.373$, $p<.001$). That is, all test groups performed differently on the above construction types. At the same time, the responses of the three groups were not significantly different ($F(2, 417)=.457$, $p=.633$).

Clearly, all groups performed most poorly on sentences showing non-superiority, and the *post hoc* LSD shows that this result was significantly different from the performance of the three groups on the other structures (ES, JS, and CS: $p>.05$). Furthermore, sentences with sentential participants were produced with a high percentage of correctness (all over 90%), suggesting that all our subjects could easily handle structures with sentential subjects. The degree of difficulty of acquisition for the three groups in the ordering task is as follows:

Table 16: Difficulty of Acquisition Found in the Ordering Task

Group	Difficulty of Acquisition
ES	Non-Superiority > <i>That-Trace</i> ≥ Wh-O In-Situ ≥ CNP's ≥ WHI ≥ Wh-S In-Situ ≥ SS
JS	Non-Superiority > WHI ≥ <i>That-Trace</i> ≥ CNP's = Wh-O In-Situ ≥ SS ≥ Wh-S In-Situ
NS	Non-Superiority > <i>That-Trace</i> ≥ Wh-O In-Situ ≥ CNP's ≥ WHI ≥ Wh-S In-Situ ≥ SS

Table 17 describes the responses of the participants to the patterns that have island violations in the preference task:

Table 17: Responses of the Participants to Patterns with Violations in the Preference Task

	<i>That-trace</i>	Wh-S In-Situ	Wh-O In-Situ	Wh-Islands	Complex NP's	Sentential Subjects
ES	2.25	2.05	1.7	1.97	1.7	2.32
JS	2.05	1.85	1.8	2.32	1.3	1.92
NS	1.55	1.95	1.5	1.75	1.12	1.5

The results of the ANOVA showed that the construction type was influential for both the English speakers ($F(5, 114)=3.308, p=.008$) and Japanese speakers ($F(5,114)=19.152, p<.001$), but not for the Chinese native controls ($F(5, 144)=1.784, p=.122$). At the same time, the performance of the three groups was significantly different ($F(2, 357)=14.420, p<.001$).

The participants in all groups most strongly rejected sentences with wh-object movement and CNP violations. Further, the responses of the participants to other test structures seemed not to show too much difference. The difficulty of acquisition of the differently conditioned violations in the preference task is as follows:

Table 18: Difficulty of Acquisition Found in the Preference Task

Group	Difficulty of Acquisition
ES	SS Violation > <i>That-Trace</i> > Wh-S Movement = WHI Violation > Wh-O Movement = CNP Violation
JS	WHI Violation > <i>That-Trace</i> > SS Violation = Wh-S/O Movement > CNP violation
NS	Wh-S Movement > WHI Violation > <i>That-Trace</i> ≥ SS Violation = Wh-O Movement > CNP Violation

Our results are slightly different from Li's (1998), who found that L2 learners treated wh-island conditions differently from CNP and SS; that is, they rejected sentences with wh-island violations less often than those with other Subjacency violations, and the difference is significant. Her English native controls did not distinguish between wh-island conditions and CNPC and SSC. Comparing our results with Li's, we found that among the various island violations, the participants in our study rejected sentences with CNPC violations more strongly.

In the ordering task, the L2 participants also tended to use grammatical patterns without the ECP or Subjacency violation, as shown in Table 19:

Table 19: Responses of the Participants to Six Violation Types in the Ordering Task (in percentages)

Type Group	<i>That-Trace</i>	Wh-S Movement	Wh-O Movement	Wh-island Violations	CNP Violations	SS Violations
ES	0%	0%	0%	0%	0%	2.5%
JS	0%	0%	0%	0%	0%	2.5%
NS	0%	0%	0%	0%	0%	0%

As can be seen, almost no participants produced patterns with any island violations or wh-fronting in the ordering task, but a few participants did so in the case of sentential subjects. In addition, the construction type was not significant for the English participants ($F(5, 114)=1.00, p=.421$) or the Japanese ($F(5, 114)=1.00, p=.421$). That is, both groups of L2 participants knew that they should avoid violation patterns. At the same time, the responses of the three groups did not show significant differences ($F(2, 357)=.500, p=.607$).

Our findings mirror others'. Martohardjono (1993 and 1998) and Li (1998) have claimed that, regardless of whether the L1 of L2 participants exhibits wh-questions with or without movement, their L2 is developed according to a certain pattern. Chen (1986) also found that her Chinese ESL learners underwent question-learning processes similar to those of ESL learners from other linguistic backgrounds. In the present study, each of the test groups performed least well on non-superiority patterns and better on sentential subjects in the preference task. In addition, both groups of L2 participants knew they needed to reject violations and few of them produced patterns with violations. Among various violations, our participants tended to reject CNP violation most strongly.

5. CONCLUDING REMARKS AND SUGGESTIONS FOR FURTHER STUDY

The present study has argued for the insignificant influence of L1, and thus the existence of UG in L2 acquisition. Moreover, it was found that there was no methodological effect, and the acquisition difficulty of Subjacency and that of the ECP were the same. However, a number of interesting questions remain unanswered and may thus motivate future research in this area.

First of all, as we noted previously, our test sentences for superiority effects are not consistent with those for other test effects in both tasks, since the former require pair-reading answers, to deal with two *wh*-phrases, while the latter only dealt with one *wh*-phrase. We argue that the effect of the task of pair-reading may result in the difficulty of our L2 groups in acquiring superiority effects in the target language. However, if we modify the test sentences for superiority effects to match others by using only movement but not pair-reading, or alter other sentences so that all of them need pair-reading answers, the result may be different. This also invites another question— to test L2 learners' acquisition of the two UG principles, which is more suitable— use of movement or of pair-reading?

Second, in the present study, we chose sentences with only one violation for testing. That is, our test sentences contain at most one violation, either a Subjacency violation or an ECP violation. For further study, it might be necessary to design test sentences with both a Subjacency violation and an ECP violation to see whether L2 subjects will be more likely to reject sentences with more violations.

Third, from our experimental results, we found that Japanese and Chinese speakers preferred superiority patterns to non-superiority patterns¹⁷ in both tasks, especially in the ordering task. The responses of the two groups did challenge the results found in the literature, since Japanese and Chinese are not supposed to exhibit superiority effects (Huang 1982, Saito 1985). Is it possible that both the Japanese and Chinese speakers were influenced by their required English education in high school? Further research is necessary.

¹⁷ Though the discrepancy in the preference of the native Chinese speakers in our study for the two patterns is not significant in the first task ($p=.096$), the CS group still accepted superiority patterns more than non-superiority ones.

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承接條件和空號原則很難習得嗎？

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本文主旨在應用「第二語言習得」理論，探討外籍學生中文疑問詞問句兩項參數：承接條件(Subjacency)及空號原則(ECP)的習得情形。針對以上兩參數之特性（如：優先作用 (superiority effects)，「補語連詞+痕跡」作用 (that-trace effects)，主/受詞不對稱作用 (subject/object asymmetries)，疑問詞島嶼限制 (wh-island constraints)，複合名詞組限制 (complex NP constraints)，子句主語限制 (sentential subject constraints)，本實驗共設計喜好測驗和看圖排序測驗。研究對象為就讀於國立台灣師大國語中心的 20 名以英語為母語和 20 名以日語為母語的外籍學生，以及 20 名以中文為母語的中國人。實驗結果顯示，除英語組在優先作用上仍然有些許母語轉換的現象外，英語組與日語組都正確地將母語設定值轉換為所學習語言的設定值，證實了普遍語法在第二語言習得中的確扮演了重要的角色。此外，三組實驗對象都在「無優先作用」的題目上表現較弱，日語組的表現並沒有明顯地比英語組來得好。最後，本實驗亦發現「空號原則」並沒有比「承接條件」難習得。