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# Study on Chinese English Learners' Acquisition of Wh-Movement Constraints

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## Abstract

This paper mainly investigates Chinese university students' acquisition of constraints on English Wh-movement, with the aim of providing some evidence of the accessibility of universal grammar (UG) in second language acquisition (SLA). One UG principle, the Subjacency Principle, puts constraints on English Wh-movement and this is the major study point of the present study. The author selects a certain number of Chinese university students as participants and carries out a grammaticality judgment test. Since there does not involve Wh-movement in Chinese language, and Chinese students have no access to the Subjacency Principle during their daily studies, then if it happens that the subjects shows certain degree of obedience to this principle, a conclusion could be drawn that UG is still accessible and operative in SLA. Abroad, numerous linguistic researchers in the field of SLA have done studies concerning the Subjacency Principle, while in China, scarce similar studies have been made. The author firstly checks Chinese participants' acceptance of grammatical long-distance Wh-movement and their rejection of ungrammatical Wh-movement with violations of the Subjacency principle, with the latter one as the major point. The discussion of the study is focused on the participant's responses to varying degrees of Subjacency violations. The experimental results show that the Chinese subjects have demonstrated a certain degree of acceptance of the long-distance Wh-movement and of rejection of Subjacency violations. Therefore, the author concludes that UG is still available and operative in SLA, while the extent to which it is accessible still requires to be further studied.

**Key words:** Universal grammar; Subjacency principle; Accessibility; Wh-movement

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## INTRODUCTION

SLA has been drawing more and more attention in the linguistic field. Among major linguistic theories, Norm Chomsky (1965) proposed the theory of UG, which has gained wide acceptance and popularity. In the framework of Government and Binding theory, Chomsky (1981) characterized UG as consisting of principles and parameters: Principles refer to the highly abstract properties of grammar that all languages share; parameters refer to the possible variations of certain principles across languages.

The proposal of UG has drawn lots of attention from researchers in the field of SLA. Many studies have been done to explore whether UG is still operative or accessible during the process of SLA in the framework of principles and parameters. They are either investigate whether a second language (L2) learners can reset a certain parameter that differs from their L1, or investigate whether L2 learners whose L1 does not manifest a certain UG principle have the knowledge of the principle in question. Studies on the Subjacency and the Empty Category Principle (ECP) are such examples. These two principles put constraints on Wh-movement in English. According to the Subjacency principle, the moved Wh-phrase can only cross one bounding node in a single movement; and the ECP principle sets that the trace left

by the moved Wh-element ought to be either lexically governed or antecedent-governed.

For those L2 leaners of English whose first languages are Wh-in-situ languages (languages without overt Wh-movement, e.g. Chinese, Japanese, Korean etc.), the Subjacency principle and the ECP seem inaccessible, which agrees with the assumption that "not all UG principles operate in all languages" (Ellis, 1999, p.440). As a result, the studies investigating these two principles adopt the following logic: If English learners, in whose first languages Wh-movement does not take place (or at least not in the range of structures that require it in English), can detect the violations of Subjacency or ECP in English, then UG must be available during their acquisition of English as a second language since they cannot obtain relative linguistic knowledge via their L1s, neither can they induce it from the language input that id also thought to be insufficient (White, 1989). Chinese language is Wh-in-situ, the present research adopts the same logic.

In the present study, the Subjacency principleis examined. The author designs a grammaticality judgment test to check Chinese university students' knowledge of the Subjacency principle. The test includes both grammatical sentences and ungrammatical sentences with Subjacency violations. Four types of ungrammatical Wh-movement structures are investigated: Wh-extraction from subject island, Wh-extraction from adjunct island (including relative clauses), Wh-extraction from Wh-island, and Wh-extraction from appositive clauses. The study aims to see whether the participants are able to correctly judge grammatical sentences and ungrammatical sentences, and whether they can detect the varying degrees of deviance in the ungrammatical sentences. This approach has been adopted by many recent and advanced studies of the relevant issue (Martohardjono, 1993, also summarized in Hawkins, 2001, pp.297-298; Perez-Leroux & Li, 1999).

With the purpose of testing Chinese students' acquisition of constraints on Wh-movement in English, this study will provide some evidence of whether or not UG is operative and accessible in SLA.

## 1. LITERATURE REVIEW

### 1.1 UG and Parameters-Principle Model

In late 1950s, Noam Chomsky proposed the theory of Universal Grammar (UG). His proposal of this concept is closely related with such a question as to how the knowledge of language is acquired (Cook & Newson, 2000, p.3). According to Chomsky (1965), children are born with a specific faculty for language learning which is independent from other learning faculties. Language acquisition is determined by a biologically endowed mechanism called Language Acquisition Device (LAD), which embodies the language universals. Then children are predisposed with ideas about the principles for forming any natural language. Thus, according to Chomsky, the language acquisition model can be schematized as follows:

Input Output
→ Universal Grammar →
(Language data) a grammar of language

In this model, children acquire a language through UG that provides children with an algorithm for developing a grammar on the basis of their linguistic experience (Radford, 2002, p.7).

In the framework of Government and Binding theory, Chomsky stated that UG is composed of sets of parameters and principles. Principles refer to the highly abstract properties of grammar that all languages have and therefore account for the similarities across all languages. Parameters refer to the possible variations of certain principles across languages and thus define the difference between languages. Not each UG principle is evidently applied to any language. The thing is that, some principles, such as the Subjacency principle, take no place in wh-in-situ languages where there is no overt wh-movement in interrogative sentences. A parameter is understood to be a set of options or values associated with a given principle. Choice of one option or value yields a given pattern, and choice of a different option or value yields a different pattern (Ouhalla, 2001, p.298). Each parameter has a binary choice of possible values. Therefore, languages are different from each other due to the variation in the setting of parameters of certain principles.

### 1.2 Accessibility of UG in SLA

UG is considered to be a system of principles and parameters which put constraints on grammars in the process of L1 acquisition. The question of whether UG is accessible and to what extent is accessible in SLA, has been investigated by many researchers. The debate on UG in L2 acquisition has concentrated on the so-called "access" issue. Hypotheses vary as to whether L2 learners have no access, partial access or full access to UG.

The "no access" position (e.g. by Cook, 1988; Epstein, Flynn, & Martohardjono, 1996) is represented by the Fundamental Difference Hypothesis (FDH; Bley-Vroman, 1996) and related claims (Clashen & Muysken, 1986; Snatcher, 1988). According to FDH, adult SLA differs from child L1 language acquisition in a number of respects. These differences are attributed to the nonavailability of domain-specific language acquisition mechanism and UG for adult L2 learning, in contrast to child language acquisition. The proponents claim that all the mechanisms available to the L1 acquirers are no longer available to L2 learners. To support this view, Schachter (1989) showed that learners are "stuck" with principles and parameter settings exemplified in the L1;

and Clashen & Muysken (1986) found that L2 learners showed no evidence of obedience to UG constraints at all.

The "partial access" position (also known as "indirect access") recognizes both the role of UG and the role of L1 transfer. Learners are assumed to have certain access to the principles and parameters of UG; however, it is via their L1s (Schwartz, 1987; White, 1986). So L2 learners' L1s function as a starting point in the process. Only L1 instantiation principles and L1 instantiation parameter-values of UG are available to L2 learners. Learners may have access to certain universal principles but not all of them; only those that are evident in their L1s can be accessed. For those principles with variations of parametric values, the parametric setting in the L1 will definitely affect that in the L2. Then UG is "no longer in its original state, but with L1 values assigned where relevant" (Yip, 1995, p.23).

The "full access" hypothesis asserts that UG in its entirety guides and constrains L2 acquisition, thus UG in the L1 and L2 are exactly in the same state. Universal Grammar is still operative and accessible when learners acquire their L2 languages. During the process of SLA, the effect and transfer of he L1 are not taken into consideration.

## 1.3 The Subjacency Principle

Subjacency Principle, pointed by Chomsky (1973), that regulates how far categories may be moved and that places bounds on syntactic movement. According to this principle, any syntactic movement cannot cross more than one bounding node in a single step. With the constraint put on wh-movement by the Subjacency Principle, extracting wh-words from certain places within sentences will bring ungrammaticality, and those places out of which a wh-word cannot be extracted are referred to as extraction islands. In the following part, four types of extraction islands will be briefly introduced.

### 1.3.1 Subject Island

Wh-movement appears impossible to be out of phrases that appear in the subject position. The sentence subject discussed here can be a phrase or a clause. Here are two examples:

(10)* [$_{CP}$ Which friend$_i$ did [$_{IP}$ [$_{DP}$ the gift from $t_i$] please Ellen]]?

(11)* [$_{CP1}$ Whoi did [$_{IP1}$ [$_{CP2}$ that [$_{IP2}$ this girl danced with $t_i$]]annoy you]]?

In sentence (10), the phrase *which friend* is moved out of a DP subject, crossing two bounding nodes, a DP and an IP. In sentence (11), the subject of the sentence is itself a clause, and the Wh-word *who* is extracted from this clause crossing two IPs in one single step. Both of the extractions in sentence (10) and (11) violate the Subjacency Principle.

### 1.3.2 Adjunct Island

The adjunct island is a type of island within an adjunct clause. Wh-movement is forbidden to be out of an adjunct clause. Adjunct clauses refer to clauses introduced by *because*, *if*, and *when*, as well as *relative clauses*. Here is an example:

(12) *[$_{CP1}$ What$_i$ did [$_{IP1}$ the policeman recognize [$_{DP}$ the man [$_{CP2}$ who$_j$ *e* [$_{IP2}$ $t_j$ had stolen $t_i$]]]]]?

In this sentence, the spec-CP2 position is taken by the wh-word *who*, which prevents the Wh-word *what* from landing on this position but forces it to move directly to the spec-CP1 position in a single step. The word *what* thus crosses three bounding nodes in this case: IP2, DP, and IP1, evidently violating the Subjacency Principle.

### 1.3.3 Wh-Island

A Wh-island is an island created by an embedded clause which is introduced by a Wh-word. Sentence (9) examined previously is such an example, and it is repeated here:

(9) *[$_{CP1}$ What$_i$ did [$_{IP1}$ Jane believes [$_{CP2}$ how [$_{IP2}$ John finished $t_i$]]]]?

Here, the spec-CP position of the embedded clause is filled with the Wh-word *how*. Extracting the word *what* from the subordinate clause has to cross two bounding nodes, the IP2 and IP1, which is not permitted by the Subjacency principle.

### 1.3.4 Appositive Clause

Extraction out of complex noun phrases such as an appositive clause also brings ungrammaticality. For example:

(13)*[$_{CP1}$ Which film star$_i$ did [$_{IP1}$ Bob hear [$_{DP}$ the news [$_{CP2}$ $t_i$ that [$_{IP2}$ Jerry had married $t_i$]]]]]?

Firstly, the Wh-phrase *which film star* successfully moves to the spec-CP2 position of the that-clause. While, when it continues moving towards the front of the sentence, it crosses two bounding nodes, the DP and IP1. Needless to say, Subjacency violation arises again.

To sum up, we can see that extraction from an adjunct island crosses three bounding nodes in one single step, and that from a subject island, a Wh-island and an appositive clause all cross an equal number of two bounding nodes.

## 1.4 Studies on the Acquisition of Constraints on Wh-Movement in SLA

Many of the early studies investigating UG principles in SLA involved the Subjacency principle as their test case. Studies (Bley-Vroman, Felix, & Ioup, 1988; Johnson & Newport, 1991; Li 1998; Schachter, 1989, 1990; White & Juffs, 1998) concentrated on L2 learners' acquisition of English. Since English is a Wh-movement language, and the Subjacency principle regulates that the moved wh-phrase can only cross one bounding node in a single step. As a result, the phrases from which Wh-words or Wh-phrases cannot be extracted are called extraction islands. Researchers usually designed a grammaticality test with stimuli involving both grammatical and ungrammatical Wh-movement sentences. This kind of test is aimed to examine the L2 learners' knowledge of Wh-movement constraints put by the Subjacency principle.

The participants in most empirical studies usually include Learners of English as a second language, whose native languages are wh-in-situ languages, to form the experimental group and English native speakers to form a control group. The performance of the experimental group is usually comparer to that of the control group.

The logic underlying these studies is that if English learners, in whose L1s Wh-movement does not take place (or at least not in the range of structures that require it in English), can detect the violations of Subjacency Principle in English, then UG must be available in their acquisition of English as a second language since they cannot obtain relative linguistic knowledge via their L1s, neither can they induce it from the L2 input which is always thought to be insufficient (White, 1989).

## 2. METHODOLOGY

The present study aims to provide some evidence of whether UG is still accessible and operative in SLA. It took the task to test Chinese students' acquisition of constraints on Wh-movement in English. A grammaticality judgment test was designed, which has usually been the method in relevant studies. Many researchers have proved that grammaticality judgment test is a both reliable and stable measure (Hsia, 1993; Leow, 1996; Ito, 1997, 1998, etc.). The focus of the test was on whether or not the participants will display target-like intuitions about the ungrammatical sentences. If they can detect the ungrammaticality of the sentences, then it might prove that UG functions in helping them reject the incorrect language information; if they cannot, then we might get the conclusion that UG is not available in SLA.

The grammaticality judgment test was composed of all together 48 English sentences, twenty-four grammatical sentences and twenty-four ungrammatical sentences. All of the sentences were taken from the published articles and books on syntactic theory read by the author. And some modifications were made to certain sentences in order to control the sentence length and to make the meanings of words and sentences clearer and easier to understand. All of the participants were asked to take the grammaticality judgment test. They were required to tick "√" to indicate their acceptance of the sentence and "X" to indicate their rejection of it. The students took the test individually and independently without any interference. Also, the author told them to record the time they spent on the test.

The current research only included an experimental group of 68 Chinese university students. They were all advanced English learners from the School of Foreign Languages in Dalian University of Technology: a group of twenty-one sophomores, a group of twenty-six juniors, and a group of twenty-one seniors. The grammaticality judgment test requires that the participants should be proficient English learners so that they are capable of dealing with complex English sentence structures.

The data of the grammaticality judgment task were put into computer and analyzed with the use of the statistical tool SPSS 12.0 (Statistical Package for Social Science), and it produced several groups of mean scores. Besides, the author made several sample paired *T*-tests to examine the differences between two mean scores, namely to check whether the difference is significant.

## 3. RESULTS AND DISCUSIION

### 3.1 Overall Performance on Grammatical Wh-Questions

There are twenty-four grammatical Wh-questions in the test. The reason for the existence of them is to ensure that the participants reject ungrammatical Wh-movement sentences due to the fact that they have acquired some relevant knowledge but not that they simply reject all the Wh-questions. Some researchers have investigated Chinese students' knowledge of long-distance Wh-movement and got the conclusion that they did not accept those long-distance Wh-movement sentences in the same way as English native speakers did. Though this is not the major concern of the present study, the author still likes to have a brief look at the participants' performance on long-distance Wh-movement. Averagely, the sophomores correctly judged 72.7% of the Wh-questions, while the juniors performed better with an accuracy rate of 78.4%, and surprisingly, the seniors should have accepted only 71.6% of the sentences. Obviously, the overall performance was highly above the chance level, indicating that the students allowed extracting Wh-element from embedded clause in a successful way. However, one thing is out of the author's expectation. It was assumed that students' ability to correctly judge grammatical Wh-questions improved with longer exposure to English. There might be some individual factors that influenced some senior students' performance.

### 3.2 Performance on Ungrammatical Sentences With Subjacency Violations

As introduced before, twenty-four ungrammatical sentences were presented to the informants: six sentences for each type of violations, namely sentences with extractions from strong islands (subject island and adjunct island) and sentences with extractions from weak islands (Wh-island and appositive clause). Extractions from these constructions violate the Subjacency principle by crossing more than one bounding node. However, these violations vary in the degree of ungrammaticality. Extracting Wh-phrases from strong islands will lead to a greater degree of deviance than from weak islands. Therefore the author aims to check whether Chinese students are sensitive enough to correctly reject the sentences with Subjacency violations as well as whether their responses are in accordance with the varying degrees of deviance.

#### 3.2.1 Experimental Results of All the Participants as a Whole

As mentioned before, several paired *T*-tests have been made of the experimental data of all the participants. Then let's have a look at the results: ***T*-test** (Subject Island vs. Wh-Island & Subject Island vs. Appositive Clause)

**Table 1**
**Paired Samples Statistics**

| | | Mean | *N* | Std. deviation | Std. error mean |
|---|---|---|---|---|---|
| Pair 1 | Subject Island | .68273 | 62 | .246510 | .031307 |
| | Wh-Island | .49981 | 62 | .259331 | .032935 |
| Pair 2 | Subject Island | .68273 | 62 | .246510 | .031307 |
| | Appositive Clause | .52423 | 62 | .319065 | .040521 |

**Table 2**
**Paired Samples Test**

| | | Paired differences | | | | | *t* | *df* | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. deviation | Std. error mean | 95% confidence interval of the difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Subject island - Wh-island | .182919 | .280382 | .035609 | .111716 | .254123 | 5.137 | 61 | .000 |
| Pair 2 | Subject Island - appositive clause | .158500 | .299398 | .038024 | .082467 | .234533 | 4.168 | 61 | .000 |

***Note. T*-test** (Adjunct island vs. Wh-island & adjunct island vs. appositive clause)

**Table 3**
**Paired Samples Statistics**

| | | Mean | *N* | Std. deviation | Std. error mean |
|---|---|---|---|---|---|
| Pair 1 | Adjunct island | .70850 | 62 | .217836 | .027665 |
| | Wh-island | .49981 | 62 | .259331 | .032935 |
| Pair 2 | Adjunct island | .70850 | 62 | .217836 | .027665 |
| | Appositive clause | .52423 | 62 | .319065 | .040521 |

**Table 4**
**Paired Samples Test**

| | | Paired differences | | | | | *t* | *df* | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. deviation | Std. error mean | 95% confidence interval of the difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Adjunct island - Wh-island | .208694 | .251983 | .032002 | .144702 | .272685 | 6.521 | 61 | .000 |
| Pair 2 | Adjunct island - appositive clause | .184274 | .285319 | .036236 | .111817 | .256732 | 5.085 | 61 | .000 |

##### 3.2.1.1 Overall Performance

From the tables shown above, the average accuracy rate of different types of violations can be put into the following table:

**Table 5**
**Accuracy Rate of Judging Subjacency Violations**

| | Strong island | | Weak island | |
|---|---|---|---|---|
| | Subject island | Adjunct island | Wh-island | Appositive clause |
| Accuracy rate | 68.3% | 70.9% | 50.0% | 52.4% |

From Table 5, we can see that the Chinese participants showed certain degree of sensibility to ungrammatical wh-movement. They correctly rejected the extractions from the two types of strong islands both with an accuracy rate around 70%, and rejected extractions from the two types of weak islands with an accuracy rate around 50%, just around the chance level. It requires our attention that the students regarded sentences with greater degree of ungrammaticality as more unacceptable. Compared with the results of Bley-Vroman et al. (1988), study the accuracy rate in the present study is a little bit lower, but it will be unwise to conclude that these subjects do not have relevant knowledge of the Subjacency principle, because they did show a distinction between their performances regarding strong violations and weak violations. Obviously they took the judgment task above chance. This would be impossible if the students had no access to the Subjacency principle. Bley-Vroman et al. also made their conclusion that UG is still operative in SLA, which was based on similar kind of analysis. Therefore, though Chinese students might not take the test as well as the English speakers did as showed by other studies, they demonstrated certain degree of sensitivity to the constraints on wh-movement put by the Subjacency principle.

What needs our notion is that the subjects in Bley-Vroman et al. (1988) and Johnson and Newport's study (1991) all experienced immersion in native English speaking environment, while the subjects in the current

study did not, which might explain for their lower scores reported in the results.

#### 3.2.1.2 Comparisons of Performance on Strong Violations and Weak Violations

Then let's move on to compare the subjects' performance in different types of extraction violations. Did they show different degrees of rejection to the four types of violations?

a) Subject Island vs. Wh-Island & Subject Island vs. Appositive Clause

As mentioned above, it has been made clear that Wh-extraction from the subject island brings a greater degree than that from wh-island and appositive clause. There are three example sentences, one for each type of island, selected from the grammaticality judgment test:

(13) * [$_{CP}$ Who$_i$ did [$_{IP}$ [$_{DP}$ stories about $t_i$] frighten Mary and her friends]]?

(subject island)

(14)* [$_{CP1}$ What$_i$ did [$_{IP1}$ Mary wonder [$_{CP2}$ where [$_{IP2}$ John had bought $t_i$] for his wife]]]]?

(Wh-Island)

(15)* [$_{CP1}$ Which film star$_i$ did [$_{IP1}$ Bob hear [$_{DP}$ the news [$_{CP2}$ $t_i$ that [$_{IP2}$ Jerry had married $t_i$]]]]]? (Appositive Clause)

Sentence (13) is more ungrammatical than sentence (14) and sentence (15). Then how did the Chinese participants respond in the experiment?

In order to see whether the stark difference exist in their treatment of subject-island extraction & wh-island extraction as well as subject-island extraction & appositive clause extraction, we should refer to the results of the *T*-test as shown in Table 1. The mean score of correctly judging subject island type is 68.3%, that of wh-island type 50.0%, and that of appositive clause type 52.4%. Obviously, the former figure is greatly higher than the latter two ones. Table 2 mainly reports the significant value (i.e. sig or *p*) of the difference between the two pairs of mean scores. In Table 2, the significance values of pair 1 (subject island - Wh-island) and that of pair 2 (subject island - appositive clause) are both 0.000 ($p$=0.000<0.05), indicating that the difference within each pair of extraction islands are significant.

The result is in accordance with the author's expectation. The students' score in correctly rejecting ungrammatical extractions from subject islands is greatly higher than that in rejecting extractions from weak islands.

b) Adjunct Island vs.Wh-Island & Adjunct Island vs. Appositive Clause

Subjects' judgment of extractions out of the other type of strong islands, the adjunct island, will be compared with that out of the two types of weak islands concerned in the study, namely the Wh-island and the appositive clause. Example sentences for each type of extractions are shown as follows:

(16) *[$_{CP1}$ What did [$_{IP1}$ the policeman recognize [$_{DP}$ the man [$_{CP2}$ who$_j$ $e$ [$_{IP2}$ $t_j$ had stolen $t_i$]]]]]? (Adjunct island)

(17) * [$_{CP1}$ What$_i$ did [$_{IP1}$ Mary wonder [$_{CP2}$ where [$_{IP2}$ John had bought $t_i$] for his wife]]]]?

(Wh-Island)

(18) * [$_{CP1}$ Which film star$_i$ did [$_{IP1}$ Bob hear [$_{DP}$ the news [$_{CP2}$ $t_i$ that [$_{IP2}$ Jerry had married $t_i$]]]]]? (Appositive Clause)

Sentence (16) violates the Subjacency principle to a greater extent than sentence (17) and sentence (18) for crossing three bounding nodes in one single step, with the latter two sentences crossing just two bounding nodes. Did the subjects perform accordingly?

Once again, we need to go back to Table 3 and Table 4 presented previously. The average accuracy of correct judgment of extractions out of adjunct islands is 70.9%, the highest one, compared to extractions out of the two types of weak islands. Table 4 mainly reports the significance value of the difference between two pairs of mean scores. There exists a significant difference among subjects' responses to the three types of Subjacency Violations, indicated by the significance value ($p$=0.000<0.05). This result is consistent with Martohardjono's study (1993). He mentioned that extraction from adjunct clauses was categorized as "strong violation", while the extraction from wh-islands and appositive clauses as "weak violations". Students in this study did score greatly higher in rejecting "strong violations".

### 3.2.2 Experimental Results of Each Group of Students

After having an analysis of the overall performance of the participants as a whole, next we will see how each group of students performed in the study.

#### 3.2.2.1 Sophomores

The scores of the sophomores were counted and the data were analyzed in SPSS, also several sample paired *T*-tests were runt to see whether there is a distinct difference among their responses to each type of violations. The results are reported in the following tables:

***T*-test** (Subject Island vs. Wh-Island & Subject Island vs.Appositive Clause) (Sophomores)

**Table 6**
**Paired Samples Statistics**

| | | Mean | *N* | Std. deviation | Std. error mean |
|---|---|---|---|---|---|
| Pair 1 | Subject island | .56246 | 24 | .234823 | .047933 |
| | Wh-island | .43000 | 24 | .254080 | .051864 |
| Pair 2 | Subject island | .56246 | 24 | .234823 | .047933 |
| | Appositive clause | .4306 | 24 | .33652 | .06869 |

**Table 7**
**Paired Samples Test**

| | | Paired differences | | | | | *t* | *df* | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. deviation | Std. error mean | 95% confidence interval of the difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Subject island - Wh-island | .132458 | .324617 | .066262 | -.004615 | .269532 | 1.999 | 23 | .058 |
| Pair 2 | Subject island - appositive clause | .131833 | .333318 | .068038 | -.008915 | .272581 | 1.938 | 23 | .065 |

***T*-test** (Adjunct Island vs. Wh-Island & Adjunct Island vs. Appositive Clause)(Sophomores)

**Table8**
**Paired Samples Statistics**

| | | Mean | *N* | Std. deviation | Std. error mean |
|---|---|---|---|---|---|
| Pair 1 | Adjunct island | .6945 | 24 | .23907 | .04880 |
| | Wh-island | .4300 | 24 | .254080 | .051864 |
| Pair 2 | Adjunct island | .6945 | 24 | .23907 | .04880 |
| | Appositive clause | .4306 | 24 | .33652 | .06869 |

**Table 9**
**Paired Samples Test**

| | | Paired differences | | | | | *t* | *df* | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. deviation | Std. error mean | 95% confidence interval of the difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Adjunct island - wh-island | .264500 | .289604 | .059115 | .142211 | .386789 | 4.474 | 23 | .000 |
| Pair 2 | Adjunct island - appositive clause | .26388 | .26425 | .05394 | .15229 | .37546 | 4.892 | 23 | .000 |

From the tables above, the average accuracy rate of judging each type of Subjacency violations can be put into the following table for better analysis:

**Table 10**
**Accuracy Rate of Judging Subjacency Violations (Sophomores)**

| | Strong island | | Weak island | |
|---|---|---|---|---|
| | Subject island | Adjunct island | Wh-island | Appositive clause |
| Accuracy rate | 56.2% | 69.5% | 43.0% | 43.1% |

As shown in Table 10, the sophomores got relatively higher scores in rejecting strong violations than in rejecting weak violations. However, their overall accuracy rate is quite low, with an accuracy rate even below the chance level in judging weak violations. It might be due to that the sophomores are not proficient enough to deal with the complicated sentence structures involved in the grammaticality judgment task they took; but they are very familiar with adjunct clauses (including relative clauses), therefore their performance in rejecting Wh-movement out of adjunct islands is relatively higher among the four sorts of violations.

From Table 7 and Table 9, we can find there does not exist a significant difference in sophomores treatment of extractions out of subject island vs. Wh-island ($p$=0.058>0.05) and subject island vs. appositive clause ($p$=0.065>0.05). By comparison, when dealing with extractions out of adjunct island vs. wh-island and adjunct island vs. appositive clause, the students showed distinct dissimilarity.

#### 3.2.2.2 Juniors

The responses of the junior participants in the study have also been collected and the data were processed in the same way as those of sophomores, so how did that turn out?

***T*-test** (Subject Island vs. Wh-Island & Subject Island vs. Appositive Clause) (Juniors)

**Table 11**
**Paired Samples Statistics**

| | | Mean | *N* | Std. deviation | Std. error mean |
|---|---|---|---|---|---|
| Pair 1 | Subject island | .71042 | 19 | .259684 | .059576 |
| | Wh-island | .46500 | 19 | .245849 | .056402 |
| Pair 2 | Subject island | .71042 | 19 | .259684 | .059576 |
| | Appositive clause | .49995 | 19 | .272064 | .062416 |

**Table 12**
**Paired Samples Test**

| | | Paired differences | | | | | *t* | *df* | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. deviation | Std. error mean | 95% confidence interval of the difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair1 | Subject island - Wh-island | .245421 | .238040 | .054610 | .130689 | .360153 | 4.494 | 18 | .000 |
| Pair 2 | Subject island - appositive clause | .210474 | .265435 | .060895 | .082538 | .338409 | 3.456 | 18 | .003 |

***T*-test** (Adjunct Island vs. Wh-Island & Adjunct Island vs. Appositive Clause) (Juniors)

**Table 13**
**Paired Samples Statistics**

| | | Mean | *N* | Std. deviation | Std. error mean |
|---|---|---|---|---|---|
| Pair 1 | Adjunct island | .69800 | 19 | .227304 | .052147 |
| | Wh-island | .46500 | 19 | .245849 | .056402 |
| Pair 2 | Adjunct island | .69800 | 19 | .227304 | .052147 |
| | Appositive clause | .49995 | 19 | .272064 | .062416 |

**Table 14**
**Paired Samples Test**

| | | Paired differences | | | | | *t* | *df* | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. deviation | Std. error mean | 95% confidence interval of the difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Adjunct island - Wh-island | .233000 | .210137 | .048209 | .131717 | .334283 | 4.833 | 18 | .000 |
| Pair 2 | Adjunct island - appositive clause | .198053 | .277154 | .063584 | .064469 | .331637 | 3.115 | 18 | .006 |

The junior students' average accuracy rate in judging the four types of ungrammatical Wh-movement can be seen in the following table.

**Table 15**
**Accuracy Rate of Judging Subjacency Violations** (Juniors)

| | Strong island | | Weak island | |
|---|---|---|---|---|
| | Subject island | Adjunct island | Wh-island | Appositive clause |
| Accuracy rate | 71.0% | 69.8% | 46.5.0% | 43.1% |

Obviously, the junior participants did a better job in rejecting ungrammatical extractions from Subject islands than the sophomores did, with an accuracy rate of 71.0% vs. sophomores' 56.2%. How to explain this? The juniors students might have become proficient enough to better comprehend complex noun phrases functioning as subjects of sentences. Self-evidently, Table 15 reveals the obvious difference in juniors' processing of strong violations (averagely 70.4) and weak violations (49.8%). The subjects were still not sensitive enough to reject those weak violations, indicated by the two right rates (46.5% and 43.1%), greatly below the chance level. The assumption was that the students simply accepted the Wh-movement sentences with weak violations for the reason that they thought they could completely understand the sense of the sentences, namely the violations did not seem to block their understanding, so they just accepted them.

What's more, Table 12 and Table 14 shows the existence of significant difference in junior subjects' treatment of wh-phrases moved out of subject island vs. wh-island ($p$=0.000<0.005), subject island vs. appositive clause ($p$=0.003<0.05), adjunct island vs. Wh-island ($p$=0.000<0.005) and adjunct island vs. appositive clause ($p$=0.006<0.05).

#### 3.2.2.3 Seniors

Last but not least, how did the senior subjects react to the ungrammatical sentences in the test? Did they perform better than the former two groups due to longer exposure to professional English learning? The results of the sample paired *T*-tests below will give answers to these questions.

***T*-test** (Subject Island vs. Wh-Island & Subject Island vs. Appositive Clause)(Seniors)

**Table 16**
**Paired Samples Statistics**

| | | Mean | *N* | Std. deviation | Std. error mean |
|---|---|---|---|---|---|
| Pair 1 | Subject island | .80695 | 19 | .177916 | .040817 |
| | Wh-island | .62279 | 19 | .247466 | .056773 |
| Pair 2 | Subject island | .80695 | 19 | .177916 | .040817 |
| | Appositive clause | .66674 | 19 | .304199 | .069788 |

**Table 17**
**Paired Samples Test**

| | | Paired differences | | | | | *t* | *df* | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. deviation | Std. error mean | 95% confidence interval of the difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Subject island - Wh-island | .184158 | .259970 | .059641 | .058856 | .309460 | 3.088 | 18 | .006 |
| Pair 2 | Subject island - appositive clause | .140211 | .295306 | .067748 | -.002122 | .282544 | 2.070 | 18 | .053 |

***T*-test** (Subject Island vs. Wh-Island & Subject Island vs. Appositive Clause)(Seniors)

**Table 18**
**Paired Samples Statistics**

| | | Mean | *N* | Std. deviation | Std. error mean |
|---|---|---|---|---|---|
| Pair 1 | Adjunct island | .73668 | 19 | .186814 | .042858 |
| | Wh-island | .62279 | 19 | .247466 | .056773 |
| Pair 2 | Adjunct island | .73668 | 19 | .186814 | .042858 |
| | Appositive clause | .66674 | 19 | .304199 | .069788 |

**Table 19**
**Paired Samples Test**

| | | Paired differences | | | | | *t* | *df* | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. deviation | Std. error mean | 95% confidence interval of the difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Adjunct island - Wh-island | .113895 | .222691 | .051089 | .006561 | .221229 | 2.229 | 18 | .039 |
| Pair 2 | Adjunct island - appositive clause | .069947 | .295620 | .067820 | -.072537 | .212432 | 1.031 | 18 | .316 |

Following the same step, a clear presentation of the subjects' average accuracy score in judging each type of Subjacency deviances is given.

**Table 20**
**Accuracy Rate of Judging Subjacency Violations (Seniors)**

| | Strong island | | Weak island | |
|---|---|---|---|---|
| | Subject island | Adjunct island | Wh-island | Appositive clause |
| Accuracy rate | 80.7% | 73.7% | 62.3% | 66.7% |

Just as expected, the senior students did score higher than the sophomores and junior students discussed earlier. Their accuracy rate in judging all the four types of violations went up amazingly. They successfully rejected 80.7% of the extractions out of subject islands, and 73.7% of those out of adjunct islands, both high above the chance level. Also, 62.3% of the wh-movement from wh-islands was detected, and so were 66.7% of the wh-movement from appositive clauses, both above the chance level. Needless to say that scores in judging "strong violations" are definitely higher that those in judging "weak violations". The satisfactory performance of the senior students could be reasoned by their longer exposure to professional English studies. They have mastered more types of complex sentence structures and have become more sensitive to the ungrammaticality of English wh-movement sentences. Surely, they have not been taught about the Subjacency principle by lecturers, while their English language intuition has been enhanced and strengthened.

From Table 17 and Table 19, we can see the difference in senior participants' responses to extractions out of "subject island vs. Wh-island" ($p$=0.006<0.05) and "adjunct island vs. Wh-island" ($p$=0.039<0.05) is quite significant; in contrast, the difference in their judgment of extractions out of "subject island vs. appositive clause" ($p$=0.053>0.05) and "adjunct island vs. appositive clause" ($p$=0.316>0.05) is not that obvious.

## CONCLUSION

All together, the Chinese participants showed certain degree of sensitivity to the ungrammatical Wh-movement sentences with Subjacency Violations. Their scores in rejecting strong violations are higher than those in rejecting weak violations, which accords with the syntactic analysis of the four types of Subjacency Violations.

To treat each group of participants separately, the author find that students with longer exposure to professional English studies performed better in detecting the ungrammaticality of the test sentences, namely the senior subjects did the best work, followed by the junior subjects and then the sophomores. This finding might be due to the fact that students with longer time of English studies master better those complex sentence structures and have a stronger English language intuition.

In the end, we must go back to the issue of the accessibility of UG in SLA which serves as the ultimate purpose of the current study. Based on the experimental results, the author concludes that Chinese university students have partial access to UG Principle, which only concerns the Subjacency Principle here. If students had no access at all to this principle, it would be impossible that there existed such a significant difference in the participants' treatment of strong violations and weak violations. However, to what degree is UG access in SLA? This issue requires further researches. At least, the UG is not completely accessible to L2 learners; otherwise, some of the Chinese participants would not have gained such an accuracy rate, sometimes even below the chance level. Then based on the present study, UG is partially or indirectly accessible to Chinese students, because they did show certain degrees of sensitivity to the ungrammatical Wh-movement sentences and display significant difference in responding to different types of Subjacency Violations, and the relevant knowledge could not be acquired by learning from formal English lectures or their first language Chinese (Wh-in-situ).

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