

L2 Syntax-Discourse Interface: Wh-Parameter and D-Linking*

Sang-Kyun Kang
(University of Iowa)

Kang, Sang-Kyun. (2014). L2 Syntax-Discourse Interface: Wh-Parameter and D-Linking. *Language Research*, 50.2, 239-274.

In English, the Superiority Condition (Chomsky 1973) is overtly observed; in multiple *wh*-questions, the *wh*-phrase that is closest to SpecCP gets moved. But this condition is overridden by discourse-linking *which*-phrases (Pesetsky 1987) ; i.e., any one of the *which*-phrases can move to SpecCP. However, these phenomena are overt only in a *wh*-movement language such as English, but not in *wh-in-situ* languages such as Korean. For Koreans to learn the syntactic contrast in English, resetting the *wh*-parameter is crucial. By examining L2 acquisition of superiority and discourse-linking, this study tests the Interpretability Hypothesis and the Interface Hypothesis. 51 Korean ESL learners and 18 native English speakers participated. The results suggest the learners' parameter resetting regardless of the uninterpretability of the target feature.

Keywords: Interface, un/interpretable features, *wh*-parameter, superiority, discourse-linking

1. Introduction

This paper has two goals. The first is to provide an answer to the classic question of whether or not a parameter can be reset from the setting of the first language (L1) to that of the second (L2). (See Chomsky 1988, 1995 for the theory of Principles and Parameters.) Both parameter resetting and no-resetting positions have been supported by a number

* A version of this study has been published in the *Proceedings of the 13th Seoul International Conference of Generative Grammar (SICOGG)* and is also presented SICOGG in August 2011 and Second Language Research Forum (SLRF) in October 2011. My sincere thanks go to the members of the audiences of the two conferences as well as the three anonymous *Language Research* reviewers, for their very helpful comments. Lastly, the responsibility for this paper and any of the mistakes are solely mine.

of studies in the literature. To introduce a few significant proposals, Epstein *et al.* (1996: Full Access Hypothesis) and Schwartz and Sprouse (1994, 1996: Full Access Full Transfer Hypothesis) argue that L2 learners have access to the Universal Grammar (UG) and do acquire the parameter settings of the L2. On the other side are Hawkins and Chan (1997: Failed Functional Feature Hypothesis) and Smith and Tsimpli (1995: No Parameter Resetting Hypothesis) whose central claim is that because UG access is not available to L2ers, only those parameter settings that have been realized in L1 could be adopted in L2 acquisition; therefore, despite abundant L2 input, L1 settings remain unchanged.

A new articulation of the No Resetting of parameters position focuses on uninterpretable features. Tsimpli (2003) and Tsimpli and Dimitrakopoulou (2007) put forth the Interpretability Hypothesis, claiming that L2 parameter values involving uninterpretable features are unavailable. The findings of Hawkins and Hattori (2006) have supported the Interpretability Hypothesis. In Hawkins and Hattori's study, advanced Japanese learners of English failed to correctly interpret the scope of *wh*-words. Their findings indicated an insensitivity to constraints (the Principles of Subjacency and Superiority) that are conditioned by the uninterpretable [*wh*] feature. The present study focuses on native speakers of Korean for their knowledge pertaining also to the [*wh*] feature in L2 English.

The second goal of the study is to give an account of L2 acquisition of an interface phenomenon. The property discussed in this study is calculated at the syntax-discourse interface, and thus is relevant to the Interface Hypothesis (Sorace and Filiaci 2006; White 2009 for overview). The central claim of the Interface Hypothesis is that structures of L2 involving external interfaces are persistently problematic and potentially impossible to acquire. This hypothesis offers an explanation for *residual optionality*, that is, a persisting non-target like divergence even at advanced stages of L2 acquisition. A number of recent accounts have examined the acquisition of structures involving the syntax-discourse interface (Sorace and Filiaci 2006; Belletti, Bennati & Sorace 2007; Rothman 2009). These studies have shown that advanced L2 learners accept choices differing from those of the native speakers. Such advanced learners' vulnerability in the knowledge of the syntax-discourse interface is contrasted

with their native-likeness on structures involving L2 narrow syntax.

The present study employs what is known as Discourse (D) -Linking effect (Pesetsky 1987) and investigates the Superiority Condition (Chomsky 1973: 'superiority' henceforth). Superiority is a restriction governing syntactic movements, particularly those that occur by the attraction of strong features (See Adger 2003 for discussion of feature strength). D-linking, on the other hand, is a cross-linguistic phenomenon in which certain information in the previous discourse is being referred to by a subsequently appearing expression. As discussed in Pesetsky (1987), it is assumed that *wh*-phrases are D-linked or non-D-linked depending on their linkedness to the context. When a particular set of information is presented earlier, the D-linked *wh*-phrase is the felicitous choice in a successive question because it asks about a subset or a member of the previously mentioned set. Thus, among the two questions (a) and (b) in example (1), question (a) is the felicitous one.

- (1) *Jake*: Have you read the Harry Potter books?
 Becky: Yes. I've read all seven of them.
 Jake: a. Which one is your favorite?
 b. What is your favorite?

Conversely, using a D-linked *wh*-phrase without such a context is infelicitous. Making a choice between D-linked and non-D-linked *wh*-phrases, therefore, requires knowledge pertaining to the lexicon-discourse interface. Also, as discussed in the next section, there are syntactic differences between *who/what* versus *which*-phrases in English owing to their interaction with the strong [wh] feature. Therefore, the knowledge of these syntactic differences is dependent upon the operations at syntax-discourse interface.

The findings of this study strongly indicate the L2ers' resetting of the parameter despite the uninterpretable [wh] feature involved in the parameter. The learners of the study showed a native-like sensitivity to superiority, and the degree of sensitivity is found to be correlated with the learner's L2 proficiency level. Secondly, the data support, at least weakly, the Interface Hypothesis. The L2ers' performances are more na-

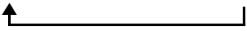
tive-like when the wh-phrases in the questions are non-D-linked than when they are D-linked.

Section 2 discusses the properties of the study: the wh-movement parameter, and its attendant constraints: superiority (syntactic), and D-linking (discourse-based). The predictions for L2 acquisition are in section 3, the experiment and the results are in sections 4 and 5 respectively. Section 6 discusses the results of the study, and finally, section 7 concludes the study.

2. The Property

2.1. Wh-Movement Parameter (Chomsky and Lasnik 1977)

The first property is the parameter of wh-movement. Chomsky and Lasnik (1997) captured the two values of this parameter as the strength and weakness of the feature [wh]. Languages have an option of either strong or weak [wh] feature. If wh-movement occurs, such as in English, the feature [wh] of the language is strong, that is [wh*] as indicated by '*'. If the language lacks wh-movement, such as Korean, the feature is weak: [wh] (without the asterisk). Item (2) illustrates it.

- (2) a. English [wh*]: **What** did Jane read **what**?

 b. Korean [wh]: Jane-un **mwues-ul** ilg-ess-ni?
 Jane-TOP what-ACC read-PAST-Q
 'What did Jane read?'

As in (2a), the wh-phrase is moved to the front in English wh-question, but the wh-phrase in Korean remains *in situ* as in (2b).

2.2. The Superiority Condition (Chomsky 1973)

Among the restrictions on syntactic movements is the superiority condition. It states that when there is more than one possible candidate for the required movement, the closest one to the landing site is moved.

Consider the following example in (3). (3a) is the pre-wh-movement form, and (3b) and (c) are post-wh-movement forms.

- (3) a. *You asked who to read what?*
 b. Who did you ask ~~who~~ to read what?
 ↑—————↓
 c. *What did you ask who to read what?
 ↑—————↓

(3b) and (3c) contrast sharply in acceptability. (3b) satisfies superiority but (3c) does not because *what* is not the closest one to the landing site.

Superiority, understood as a universal principle, can be considered as a universal restriction.¹⁾ However, because it is a restriction on movement, it may show its effects only when a movement occurs. Therefore, such effect is not visible in weak [wh] languages such as Korean.

2.3. Discourse Linking (Pesetsky 1987)

D-linking is known as a property of certain linguistic expressions which make a reference to the previous discourse. Pronouns and definite noun phrases are among those expressions (Pesetsky 1987:119). For current purposes, the focus is on wh-phrases among which some are D-linked while others are not. Consider again the following dialogue in (4), a copy of (1).

- (4) *Jake*: Have you read the Harry Potter books?
 Becky: Yes. I've read all seven of them.
 Jake: a. Which one is your favorite?
 b. # What is your favorite?

(a) is the appropriate question for Jake to ask in the above context because the set of possible answers to the question is given in the previous exchange, namely, the seven *Harry Potter* books that Becky read.

1) However, an anonymous reviewer kindly pointed out that Superiority may not be a universal principle. For example, in German, according to the reviewer, the wh-movement is overt but not restricted by Superiority, and in Bulgarian, where multiple wh-phrases may occupy the landing site, Superiority is not observed.

The speaker recognizes the given set of possible answers and chooses the *wh*-expression that links to the set. The *which*-phrase is the one that makes the link, that is, the *which*-phrase is the one that can be discourse-bound, while *what* and *who* are not.

D-linked *wh*-expressions are available in Korean as well. Consider item (5).

- (5) *Jake*: Harry Potter chayk ilge-po-ass-ni?
 Harry Potter book read-see-PAST-Q
 ‘Have you read Harry Potter books?’

Becky: Eng, ilkop-kwen ta ilg-ess-e.
 Yes, seven-CL all read-PAST-IND
 ‘Yes. I’ve read all seven of them.’

- Jake*: a. **etten**-key cayil co-ass-ni?
 which-thing:NOM best like-PAST-Q
 ‘Which one is your favorite?’
 b. # **mwues**-i cayil co-ass-ni?
 what-NOM best like-PAST-Q
 ‘What is your favorite?’

Choice (a) is acceptable; its *wh*-expression is a D-linked one (*etten-ke* ‘which one’), while *mwues* in (b) is non-D-linked (If preceded by *kejwung* ‘among them,’ *mwues* becomes felicitous).

2.4. Interactions of the Constraints on Wh-Movement

Pesetsky’s (1987) major contribution involves the claim that the interaction among the two constraints on *wh*-movement discussed above affects the surface position of *wh*-phrases in multiple *wh*-questions. In order to see the surface effect, consider the following examples:

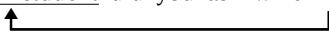
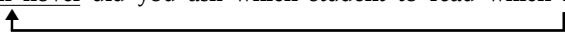
- (6) a. Which student did you ask to read which novel?
 b. Which novel did you ask which student to read?

The two sentences in (6) do not contrast each other in acceptability as

the two sentences in (7) below (a copy of (3b) and (c)).

- (7) a. Who did you ask to read what?
 b. *What did you ask whom to read?

(6b) is acceptable but its syntactic twin, (7b) is not. The only difference between them is the wh-phrases in the sentence. The sentences in (6) have *which*-phrases that are D-linked, and the ones in (7) are non-D-linked *what* and *who*. Pesetsky concluded that it is the D-linking of *which*-phrases that allows them to escape superiority. In other words, any one of *which*-phrases can move to the front and satisfy the wh-fronting requirement of the language as shown in (8), and this is what causes the syntactic difference between multiple *which*-questions and multiple *who/what*-questions. If the wh-phrases are non-D-linked, on the other hand, the wh-fronting requirement must be met by the closest wh-phrase.

- (8) a. Which student did you ask ~~which student~~ to read which novel?

 b. Which novel did you ask which student to read ~~which novel~~?


3. Acquisition of the Property and Predictions

3.1. The Predictions of the Interpretability Hypothesis

Like superiority, D-linking appears to be a universal property, at least in English and Korean and the other languages discussed in Pesetsky (1987). Again, D-linking elements' escaping superiority is attested in [wh*] languages only. Considering the L2 acquisition of English interrogatives by a native speaker of Korean, the first question to ask would be whether or not she knows (or, is able to learn) the acceptability differences among the four sentences in (6) and (7) above, particularly, the fact that (7b) is ill-formed one while (6b) is acceptable because *which*-phrases evade superiority. In order to learn the differences, the learner must *know* what native speakers of English know, which is the following.

- (9) a. D-linking (universal)
 b. The Superiority Condition (universal)
 c. That *which*-phrases are D-linked wh-phrases in English (lexical)
 d. The wh-movement setting of English: i.e. [wh*]-strong (language-specific parameter value)

The property of D-linking and superiority are known to the learners since, as discussed above, they are universal conditions. (9c) and (d) are, however, what they need to learn. The knowledge of (9c) can be tested explicitly (Test II in section 3.2 below), and as long as the learner knows (9c), all she needs to know is the parametric difference between English and Korean, that is, unlike Korean, English is a language with a strong [wh*] feature. If the resetting of the parameter is done fully and correctly, the superiority effects will show up: non-D-linking wh-phrases observe superiority, while D-linking ones do not. The learner's judgment on sentences (6) and (7), therefore, will reveal the status of the wh-movement parameter value of her L2. This in turn, provides an answer to the question of this study: Does the L2 learner reset the parameter involving an uninterpretable feature? As mentioned earlier, the Interpretability Hypothesis predicts the following.

- (10) The Interpretability Hypothesis predicts that:
 a. The Korean learner of English will fail to reset the wh-movement parameter.

In addition, (10a) may lead to the consequence that the learner exhibits the failure stated in the following.

- (10) b. The learner fails to discriminate between types (7a) and (7b).

On the other hand, any systematic sensitivity to superiority, that is, favoring (7a) over (7b), would indicate that the learner has the strong [wh*] feature in the L2 and so would argue against the Interpretability Hypothesis.

3.2. The Predictions of the Interface Hypothesis

It is mentioned above that the Interface Hypothesis predicts that the learner, even an advanced one, will show *indeterminacy* in making the felicitous choice of wh-phrase. Particularly for the test properties of the study, the Interface Hypothesis predicts that the learner's performance will diverge from the natives' on the acceptability of English interrogatives containing *which*-phrases because it involves an operation at the syntax-discourse interface.

Again, making an appropriate choice between D-linking and non-D-linking wh-phrases involves the lexicon-discourse interface. But once the learner has learned that *which*-phrases are D-linked in English, the learner will apply the D-linking knowledge that she acquired during her L1 acquisition. But the acquisition of the possible syntactic structures of multiple *which*-questions requires a further piece of knowledge pertaining to the syntax-discourse interface. To repeat, superiority is a mandatory condition for *who/what*, but not for *which-phrase*; therefore, among the sentences in (11), (11b) is ill-formed while all others are well-formed.

(11) Wh-question types and examples

Types	Examples
a. Non-D-linked / Superiority -----	<i>Who read what?</i>
b. Non-D-linked / No Superiority --	* <i>What did who read?</i>
c. D-linked / No Superiority -----	<i>Which novel did which student read?</i>
d. D-linked / Superiority -----	<i>Which student read which novel?</i>

To the learner, however, the knowledge of D-linking is independent of the knowledge of which wh-phrase between the two in the sentence should be fronted to satisfy the [wh*] requirement; these two pieces of knowledge are what the learner should know. The learner's L1 does not help because, again, there is no wh-movement. Therefore, according to the Interface Hypothesis, the syntax of multiple *which*-questions, particularly the fact that both (11c) and (d) are well-formed, will be problematic to the learner because it is a calculation at the syntax-discourse interface; on the other hand, the syntax of *who/what*-phrases in (11a) and (b) will be relatively easy because it is a calculation at the narrow-syntax. Given

this, The Interface Hypothesis predicts that the learner's performance, depending on proficiency perhaps, will fall in one of the two situations in (12):

- (12) a. Appropriately judge (11a) and (b) but fail on (11c) and (d).
 b. Fail to appropriately judge (11a) and (b) and also (11c) and (d).

(12a) means that only syntax is acquired; (12b), on the other hand, means that neither the syntax nor the syntax-discourse interface is acquired. Finally, given the interface problems persisting even at advanced stages, the Interface Hypothesis also expects a developmental pattern stated in (12c).

- (12) c. A pattern of development is expected on judgment of (11a) and (b) but not on (11c) and (d).

4. The Experimental Study

4.1. The Participants

Fifty-one native speakers of Korean learning English as an L2 participated as the L2ers of this study, and eighteen native speakers of English were recruited as L1 control. Table 1 summarizes the participant information.

Table 1. Participants Information

Participants	Age (years)	Length of Residence (months)
L2 group (n=51)		
Range	15 - 36	3 - 132
Mean	25.2	40.7
SD	5.6	31.9
L1 group (n=18)		
Range	23 - 58	---
Mean	39.7	---
SD	14.0	---

Except for two L2ers that were high school students, all L2ers were undergraduate or graduate college students in the United States. About 90 percent of them were students at the University of Iowa. All members of the L1 group were either students or employees at the University of Iowa.

L2ers were split into three groups in terms of their TOEFL scores, and their Length of Residence (LOR, henceforth) as shown in Tables 2 and 3. Given the correlation between LOR and the level of L2 proficiency discussed in the literature (e.g., Piske, *et al.* 2001), if the acquisition of the properties is related to the level of proficiency as measured by TOEFL scores, it may also be related to LOR.

Table 2. L2 TOEFL Groups and their LOR

Level	Score Range	N	6y ↑	3-6y	3y ↓
Advanced	96 - 120	14	5	6	3
High Intermediate	79 - 95	17	3	4	10
Low Intermediate	65 - 78	17	1	7	9

Table 3. L2 LOR Groups

LOR	N
6 years or over (6y ↑)	10
3 to 6 years (3-6y)	18
Under 3 years (3y ↓)	23

All TOEFL scores were converted to Internet Based Test scores (based on score comparison tables at <<http://www.ets.org>>). Forty-eight L2ers provided their TOEFL scores. The three columns on the right in Table 2 show how many members in each TOEFL group fall into each of the LOR groups. For example, among the ten LOR-6y ↑ learners, there are five advanced, three high and one low intermediate learners respectively, and one who did not report his or her TOEFL score.

4.2. The Test Materials²⁾

4.2.1. Grammaticality Judgment (Test I)

The learner's knowledge of wh-fronting was tested in Test I. If the learner is not sensitive to wh-movement in English, the obvious conclusion would be that she has not reset the parameter, which is a criterion for exclusion. Two of the test items are presented in (13).

(13) a. Who did you invite for dinner this Friday? Correct / Incorrect

→ _____

b. Made you what think that coffee is bad for teeth? Correct / Incorrect

→ What made you think that coffee is bad for teeth?

The participants were instructed to judge the grammaticality of the sentences by circling *Correct* or *Incorrect*, and if they judged *Incorrect*, they were asked to suggest a correct version of the sentence as seen in (13b). Twenty test items were given in five different conditions: four subject *who/what*-questions, four subject *which*-questions, four object *who/what*, four object *which*, and finally, four adjunct wh-questions with wh-adverbs such as *how, when, where, why*. The test also included 10 fillers.

4.2.2. Felicity Judgment (Test II)

As long as the learner knows what the D-linked items are in the L2, she would transfer the knowledge of D-linking learned in her L1 acquisition to the L2 items. Hence, the Korean learner of English must first know that *which*-phrases are D-linked in English. Testing such knowledge is the purpose of Test II. Two items of Test II are shown in (14). The dialogue in (14a) provides a set of possible answers, while no such set is provided in (14b). The participant's task is to pick the choice that fits felicitously in the given blank.

(14) a. A: Have you read the Harry Potter books?

B: Yes. I've read all seven of them.

A: Okay. _____

2) All test items are presented in the Appendix.

- i. What is your favorite?
- Ⓐ. Which one is your favorite?
- b. A: Hey, I've talked to the new professor today. He seemed really nice!
B: What? We have no new professors this semester. _____
- i. I don't know which one you are talking about.
- Ⓑ. I don't know who you are talking about.

Speaker B in (14b) knows that there are no possible answers given in the context, so choice (ii) is felicitous. If there was a set of new professors known to Speaker B, choice (i) would be the felicitous response. Test II consists of ten test items (six D-linking contexts and four non-D-linking ones) as well as five fillers.

4.2.3. Acceptability Test (Test III)

This is the major test of the study. An example item is given in (15). In each item of the test, there is a short story creating a context in which two matching sets of entities are provided. The story ends with a multiple wh-question that a person in the story asks, such as the underlined sentence in the story in (15). Then, the test question follows the story prompted by 'Q', which asks about the acceptability of the underlined multiple wh-question. The participant's task is to evaluate the wh-question on the scale of 1 (Bad) to 7 (Perfect).³

- (15) *John teaches an advanced grammar class. He has five students in the class. One day, he asked his students to pick a topic that they wanted to talk about. Everyone picked one from the textbook. The topics were voice, mood, agreement, tense, and to-infinitives. They discussed each one of the topics in the class. After class, John talked about the discussion to his officemate, Tom, who knows John's students very well. During their conversation, Tom asked John: "So, who picked what?"*

Q. Is the underlined sentence a good way to ask the question?

1	2	3	4	5	6	7
Bad						Perfect

3) 7-point scale is chosen, as opposed to 2-, 3- or 5-points scale, to simply provide more options to the participants. However, as pointed out by a reviewer, it is possible that different scales may render different results.

There are four stories in the test, and each story appears four times, each time coupled with one of the four types of multiple wh-question; therefore, there are 16 test items. For example, the four wh-questions that appear with the story in (15) are shown in (16). There are 9 fillers as well: 3 stories paired up with one of three multiple or non-multiple wh-questions.

(16) Wh-question types and examples

Types	Examples
a. Non-D-linked / Superiority -----	<i>Who picked what?</i>
b. Non-D-linked / No Superiority -- *	<i>What did who pick?</i>
c. D-linked / No Superiority -----	<i>Which topic did which student pick?</i>
d. D-linked / Superiority -----	<i>Which student picked which topic?</i>

A question may arise regarding Test III. The given context provides the range of possible answers; hence, only *which*-questions should fit in the story. Then, how would the non-D-linked wh-questions such as (16a) and (b) be evaluated? In fact, it is argued that *who/what*-phrases can be forced to be D-linked (See Pesetsky 1987: 108-109). Thus, even when the wh-phrases are *who/what*, the participant would interpret the story-end wh-question accordingly to the given context, which means that they force *who/what* to be linked to the previous information. But then, this leads to another question: do forcefully D-linked *what/who*-phrases still observe superiority? The answer is found to be affirmative. A pilot study showed that the native speakers of English (n=16) consistently accept (16a) but reject (16b), which indicated that they observed superiority consistently if the wh-words are *who* or *what*; therefore, D-linking does not override superiority with *who-* or *what-*phrases.

4.3. Procedure

The researcher met with the majority of participants individually or in groups of two or three at places on the University of Iowa campus and gave each one of them a printed version of the test. In the test-set, Test III, the major test for the study, is given first, followed by Test I

and II. This was done because what the participant has seen in Test II may affect their judgment on Test III. The whole session took from 25 to 75 minutes. 13 of them (2 natives and 11 Koreans) were given the test electronically via the university email system. A small number of participants took home a hard copy of the test and returned it in a few days' time. Other than "Please do not think too much," which was given in order to get their first intuitions, no particular verbal instruction was given. Specific tasks and instructions are as stated in section 4.2 above.

5. Results

5.1. Grammaticality Judgment Test (Test 1)

As expected, almost all L1 and L2 participants received 19 or 20 out of 20 on Test I as presented in Table 4.

Table 4. Test I Result (Full marks = 20)

Group	Average Score	SD	Range
L2 (n = 51)	19.3	1.3	14 - 20
L1 (n = 18)	19.8	0.4	19 - 20

Among the L2ers, forty-three scored 19 or 20 (95 or 100%). The distribution of participants into score ranges is shown in Table 5.

Table 5. Test I Scores and the Number of L2 Participants for Each Score Range

Score	14 (70%)	16 (80%)	17 (85%)	18 (90%)	19 (95%)	20 (100%)
N	1	2	2	2	8	35

Given the vast majority of all members of the three TOEFL groups and the three LOR groups received 80% or higher, it is concluded that the learners have little problems in positioning the wh-phrase in English single wh-questions.

5.2. Felicity Judgment Test (Test II)

The L2ers' performances on Test II varied slightly more than on Test I. Table 6 below shows the overall result, and Table 7 the average Test II scores of each TOEFL and LOR group.

Table 6. Test II Result (Full marks = 10)

Group	Average Score	SD	Range
L2	7.8	1.8	1 - 10
L1	9.1	1.1	7 - 10

Table 7. Average Test II Scores of the TOEFL and LOR Groups

	TOEFL Groups			LOR Groups		
	Adv	High-Int	Low-Int	6y ↑	3-6y	3y ↓
Test II Average	8.78	7.71	7.12	8.44	8.37	7.26
SD	1.12	2.39	1.53	1.13	1.74	2.05

Table 7 shows that the higher TOEFL and the greater LOR groups received higher Test II scores. It is noteworthy, however, that the Advanced group's average is particularly higher than the other two TOEFL groups, and the Under-3-year LOR group seems particularly low compared to the other LOR groups.

The significance of this test has been mentioned in section 3.1. To repeat, D-linking is universal, but the L2 wh-phrases that are D-linked must be learned. Test II is given to find out whether or not the L2ers know that *which*-phrases are D-linked in English. Then, the learner's Test II score should be put into consideration in analyzing the Test III results, particularly for D-linked multiple wh-questions. However, as discussed in the next section, Test II scores are not found to be related to Test III; i.e., knowing *which*-phrases' being D-linked does not have much to do with knowing of the syntax of multiple *which*-questions.

5.3. Acceptability Test (Test III)

First, the four types of multiple wh-questions are repeated in (17).

(17) Wh-question types and examples

- | Types | Examples |
|--------------------------------------|--|
| a. Non-D-linked / Superiority ----- | <i>Who picked what?</i> |
| b. Non-D-linked / No Superiority --- | <i>*What did who pick?</i> |
| c. D-linked / No Superiority ----- | <i>√ Which topic did which student pick?</i> |
| d. D-linked / Superiority ----- | <i>Which student picked which topic?</i> |

The overall averages for Test III are presented in Figure 1 with a bar graph, and in Figure 2 with dots, each of which represents the participant's average evaluation of four questions, again on a scale of 1 (bad) to 7 (Perfect). Therefore, the number above each column in Figure 1 represents the mean evaluation of the group. On the other hand, a dot in column (a), for example, in Figure 2 represents an individual participant's mean evaluation of the four wh-questions that are type (a). The results of a Repeated Measures ANOVA for intergroup and intragroup comparisons of the difference of responses between question types are shown in Tables 8 and 9.

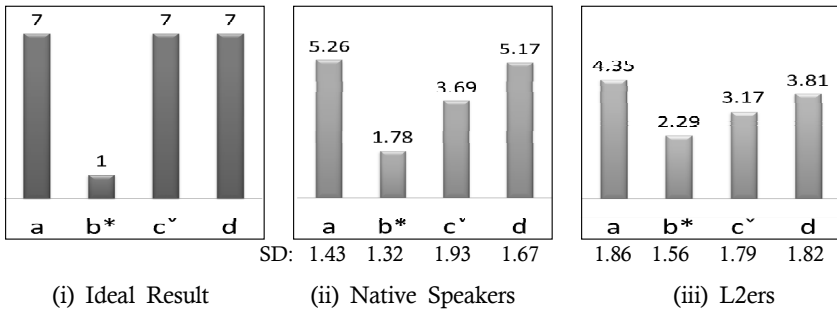


Figure 1. Overall Averages of Test III.

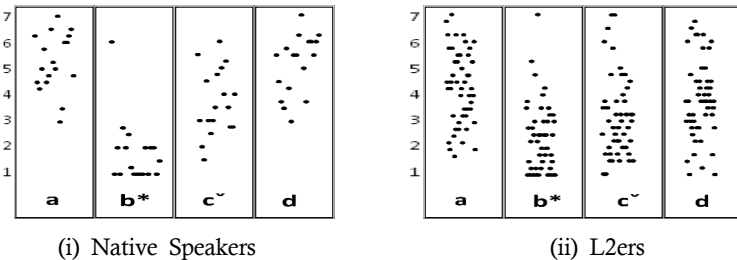


Figure 2. Test III Results: Individual Distribution.

Table 8. ANOVA Test Results - Intergroup Comparisons

Question Type	a	b*	c [✓]	d
<i>p</i> (Natives vs. L2ers)	<0.001	<0.001	<0.001	<0.001

Table 9. ANOVA Test Results - Intragroup Comparisons

Question Types	a vs. b*	b* vs. c [✓]	c [✓] vs. d	b* vs. d	a vs. d
<i>p</i> (Natives)	< 0.001	< 0.001	< 0.001	< 0.001	= 0.71
<i>p</i> (L2ers)	< 0.001	< 0.001	< 0.001	< 0.001	= 0.004

Table 8 demonstrates that the native speakers judged all four types of multiple wh-questions significantly differently from what the L2ers did. Certainly however, what is important is whether the learners have the contrast in their grammar between good and bad constructions as the native speakers do. Table 9 shows that the learners' grammar is correct except for the inappropriate contrast between types (a) and (d). It also shows that superiority has a significant effect on the judgment to both the native speakers and the learners. Regardless of the wh-phrase types, both groups considerably more preferred the superiority-observing sentences to the superiority-violating ones.

An important point here is that although both groups judged type (c) questions significantly higher than type (b) (Column b* vs. c[✓] in Table 9), which was predicted, they also judged type (c) significantly lower than type (d) questions (Columns c[✓] vs. d), which is problematic from the point of view of the theory. This problem is discussed further in the next section and a preliminary conclusion is drawn that type (c) questions are marginally grammatical and less acceptable than their superiority-observing counterparts, that is, type (d) questions.

Given the learners' significant judgment differences between types (a) and (b), L2ers' sensitivity to superiority is quite clear. The surface manifestation of superiority, that is, attracting the closest wh-phrase to the sentence-initial position, is only visible when the feature [wh] is strong. This argues for a successful resetting of the parameter of wh-movement, which is against the predictions of the Interpretability Hypothesis. As for the predictions of the Interface Hypothesis, the overall averages confirm (12a): the learner will appropriately judge types (a) and (b) but fail

to do so on types (c) and (d). For example, unlike the native speakers, the learners treated types (a) and (d) significantly differently (Table 9, Column a vs. d). But again, the fact that the native speaker discriminated types (c) from (d) raises a problem. It will be dealt with in the next section. For this reason, based on the overall results, no more than a weak support is given to the Interface Hypothesis.

In the previous section, it was mentioned that the L2ers' Test II scores may be related to their performances on types (c) and (d) in Test III. But this expectation was not borne out. For an analysis, the L2ers were split, first, into two groups and then, into four groups based on their Test II scores. Below, the two-group analysis is briefly presented. The two groups are the thirty-four L2ers who scored from 8 to 10 (High-Felicity: HighF), and the rest seventeen who scored below 8 (Low-Felicity: LowF) on Test II; in other words, they had problems with D-linked interrogatives as lexical items.⁴⁾ Figure 3 compares the mean Test III scores of the two groups, and an ANOVA is used for intragroup comparisons as shown in Table 10.

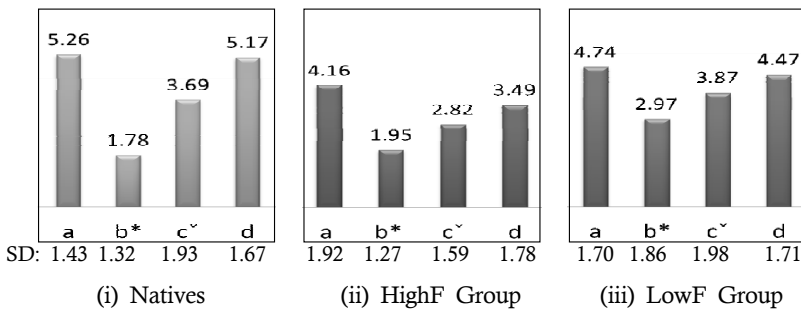


Figure 3. Mean Test III Scores of HighF and LowF Groups.

Table 10. Test III ANOVA Test Results - HighF and LowF Groups

Question Types	a vs. b*	b* vs. c ^v	c ^v vs. d	b* vs. d	a vs. d
<i>p</i> (Natives)	< 0.001	< 0.001	< 0.001	< 0.001	= 0.71
<i>p</i> (HighF)	< 0.001	< 0.001	= 0.001	< 0.001	= 0.003
<i>p</i> (LowF)	< 0.001	= 0.007	= 0.06	< 0.001	= 0.37

4) The Four groups corresponded to the Test II scores of 10 (n=11), 8-9 (n=23), 6-7 (n=11), and 1-5 (n=6).

As seen in Figure (3ii), the HighF group discriminated type (b) quite sharply from type (a). But the LowF group performed better on types (a) and (d) giving them similar evaluations that are higher than those of the HighF group. Particularly, given the *p* values on the rightmost column in Table 10, the LowF group treated types (a) and (d) equally as did the natives. This grouping, therefore, is not found revealing. In other words, although the knowledge that *which*-phrases are D-linked is a must, it is not an indicator of the knowledge that *which*-phrases are free of superiority. These findings may indicate the difficulty of the syntax-discourse interface compared to the lexicon-discourse interface. Discourse conditioned wh-phrases are easily identified and learned, but the syntactic peculiarity of such wh-phrases are difficult to acquire.

The comparisons among the LOR groups and among the TOEFL groups reveal successful acquisition from the start. First, consider Figure 4.

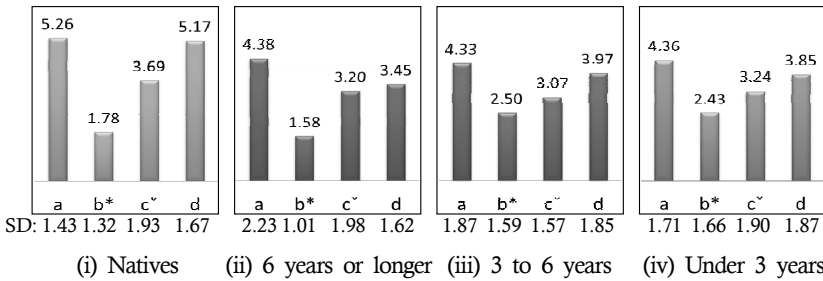


Figure 4. LOR Groups and Test III Averages.

Table 11. Test III Results and LOR

Question Types	a vs. b*	b* vs. c [✓]	c [✓] vs. d	b* vs. d	a vs. d
<i>p</i> (Natives)	< 0.001	< 0.001	< 0.001	< 0.001	= 0.71
<i>p</i> (6 y ↑)	< 0.001	< 0.001	= 0.54	< 0.001	= 0.037
<i>p</i> (3-6 y)	< 0.001	= 0.032	= 0.002	< 0.001	= 0.24
<i>p</i> (3y ↓)	< 0.001	= 0.003	= 0.029	< 0.001	= 0.055

We are looking here for a pattern of discrimination between sentence types (a) and (b), which would mean that participants observe superiority. As Table 11 indicates, all groups demonstrate a significant contrast between (a) and (b) sentences, showing sensitivity to superiority. The

contrast only grows sharper with more exposure to the language.

Comparing type (d) with type (a), the *p* values in the rightmost column in Table 11 indicates that the longest LOR group failed to treat types (a) and (d) equally while the other two groups did. This is consistent with the L2ers' indeterminacy about the syntax of *which*-phrases. They are less confident in judging *which*-questions than in judging *who/what*-questions. An exposure of 6 years or more to the target language has not helped the learners to acquire the syntax of multiple *which*-questions. In summary, it is indicated that LOR is not a good predictor of L2 competence.

The most robust pattern emerges when the three TOEFL groups' Test III results are compared. Figure 5 presents the comparison among groups and Table 12 the result of the ANOVA test.

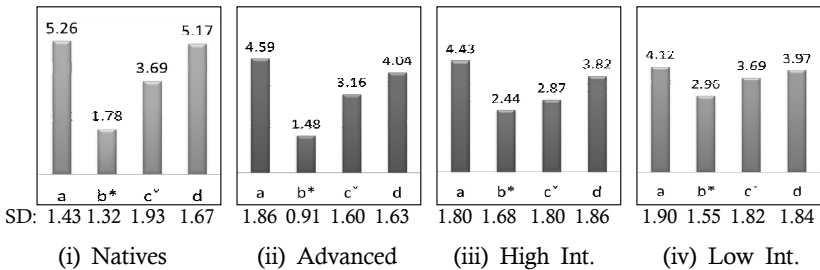


Figure 5. TOEFL Groups and Test III Average.

Table 12. Test III Results and the TOEFL Score.

Question Types	a vs. b*	b* vs. c ^v	c ^v vs. d	b* vs. d	a vs. d
<i>p</i> (Natives)	< 0.001	< 0.001	< 0.001	< 0.001	= 0.71
<i>p</i> (Advanced)	< 0.001	< 0.001	= 0.005	< 0.001	= 0.09
<i>p</i> (High Int)	< 0.001	= 0.15	= 0.002	< 0.001	= 0.057
<i>p</i> (Low Int)	< 0.001	= 0.012	= 0.37	< 0.001	= 0.64

Again, all TOEFL-based groups treated types (a) and (b) as significantly different, although the means of acceptance of type (a) decreases and the means of acceptance of type (c) increases as the level of proficiency drops from high to low. This is shown in Figure 6 as well; the dots in columns (a) spread down, while those in (b) columns spread up as the proficiency lowers.

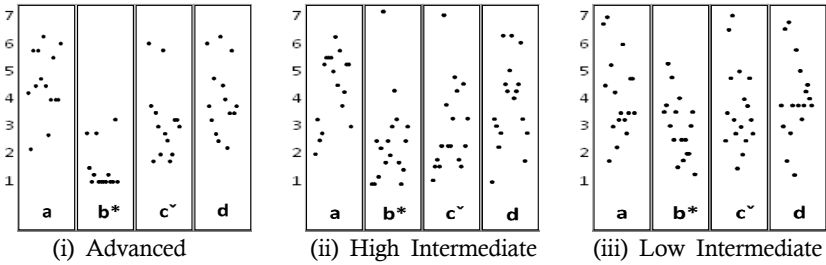


Figure 6. Test III and TOEFL Groups: Individual Distribution.

There are two advanced learners that judged type (a) very low: 2.3 and 2.8, the two lowest dots in Figure (6i), column (a). But they made a good distinction between (a) and (b) by giving type (b) 1.5 and 1 respectively. In fact, no advanced learners judged type (b) higher than (a). To compare, in the High Intermediate group, two members judged (a) and (b) types equally and one judged (b) higher, and two Low Intermediate learners judged (b) higher than (a). In more general terms, learners of higher L2 proficiency exhibit higher compliance with the L2 parametric requirement and their data pattern more closely with the native speakers. This is a strong indication that the resetting the wh-parameter occurs as the learner's proficiency of the target language grows.

It is an unexpected but important issue that the native speakers significantly discriminated types (c) from (d) ($p < 0.001$ in Table 9), although they favored type (d) as good as type (a), as expected. If this is representative of all native speakers of English, then this is the type of grammar the L2ers are exposed to, and the Advanced group's performances are the nearest to the natives' results. Moreover, as seen in Table 12, the High Intermediates and the Low Intermediates failed to discriminate types (b) and (c), and types (c) and (d) respectively. According to this argumentation, the conclusion could be that the higher-proficiency learners do have advanced knowledge about the syntax of both D-linking and non-D-linking multiple wh-questions. With respect to Pesetsky's theory, however, the Low Intermediate group is the nearest to the expectation of the theory. In particular, the Low Intermediate group treated types (c) and (d) without any significant differences ($p =$

0.37). In sum, the TOEFL-based grouping has provided strong evidence against the Interpretability Hypothesis, and has confirmed that, with respect to wh-movement, the learners' knowledge of the syntax-discourse interface is weaker than their knowledge of narrow syntax.

6. Discussion

The study investigated three properties: superiority, D-linking, and the [wh] movement parameter, in order to determine, first whether or not a parameter involving an uninterpretable feature can be reset; and second, whether or not L2 learners, advanced learners in particular, have persisting problems in acquiring the part of L2 syntax that interfaces with discourse. The data strongly suggest that resetting of parameter occurs, which means, in particular, that the learners obey the L2 parametric requirement of wh-movement. The learners of all levels preferred superiority-observing wh-questions to those violating it. More importantly, the higher the level of the learner's proficiency, the fuller the contrast between grammatical and ungrammatical construction becomes. An interpretation of this is that they have access to the Universal Grammar where both parametric options are available. These data, therefore, contradict the Interpretability Hypothesis but side with theories claiming UG accessibility in L2 acquisition (again, Epstein *et al.* 1996: Full Access Hypothesis, and Schwartz and Sprouse 1994, 1996: Full Access Full Transfer Hypothesis). As can be seen in the results of the longest LOR and the Advanced groups, the learners may even develop a stronger sensitivity toward superiority (differentiating between type (a) and (b) questions) than the native speakers. Given this, a possible conclusion is that parameter resetting is a *degree* of change that is proportional to the amount of exposure to L2 as well as their proficiency level. Certainly, however, there could be other factors, some yet unrevealed parameters, for example, that come into play in the speaker's syntactic processing.

The second goal of this project was to provide an account regarding the persisting vulnerability at the area of syntax that interfaces with discourse contexts. But, as mentioned above, the data did not successfully

address this issue. The performance of the native speakers made it problematic to address this question. It was originally expected, following the literature, that there will be a contrast between the native speakers and the learners in terms of their evaluations of types (b) and (c). More specifically, it was expected that the native speakers would show a distinction between them as the ideal result in Figure (1-i), while the learners would reject both (b) and (c) types equally.

Certainly, Pesetsky did not specifically claim that type (c) would be as good as type (d). He argued that “the superiority effects do not show up” (1987: 106) in questions of type (c), while they do in questions of type (b); thus, type (c) is well-formed while (b) is not. The native speakers’ results, therefore, are not entirely inconsistent with his claim. It is possible that the natives’ results could have been different if the rating scale had been different; for example, from 1 to 3, 1 to 5, or simply *good* and *bad*. If we take the current native speakers’ judgment averages as the basis of comparison, however, the advanced group performed in a similar manner to the natives, contrasting clearly between types (b) and (c) as well as between types (c) and (d), but not contrasting between (a) and (d).

It is interesting to elaborate on the low acceptance on type (c) questions by the native speakers. Only two among the eighteen native speakers judged types (c) and (d) equally, and all of the others preferred (d) over (c), showing the superiority effect in D-linked contexts. There was some inter-item variation as well. It turned out that among the four type (c) questions shown in Table 13 (one for each of the four stories), the native speakers particularly liked the first two in the table, suggesting there is an effect of the story contexts or the type of noun phrases involved. L2ers did not show such a pattern.

Table 13. Average Judgment on Type (c) Questions

Type (c) questions	Natives	L2ers	Adv	H-I	L-I	6y ↑	3-6y	3y ↓
i. <i>Which gift did which friend bring?</i>	4.4	3.2	3.2	2.8	3.8	3.1	3.2	3.2
ii. <i>Which topic did which student pick?</i>	4.2	3.2	3.4	2.9	3.8	3.0	3.1	3.4
iii. <i>Which dish did which of you order?</i>	3.2	3.5	3.7	2.8	3.9	4.1	3.2	3.4
iv. <i>Which play did which person read?</i>	3.1	2.8	2.4	2.9	3.3	2.9	2.7	3.0

A question one may ask is whether *which*-phrases do really escape superiority, or they simply *relieve* the effect of the violation of it. A restriction on syntactic movements evaded by an element because of its D-linking is quite intriguing, and Pesetsky's proposal is of great importance for the very reason of making a connection between them. But it seems to be an open-ended question.

There are other possible factors that could have influenced the results. They are listed below and subsequently discussed.

- a. Different sentence structures
- b. Adverb wh-questions
- c. Wh-questions with no explicitly given context
- d. Stimuli in *spoken* English
- e. Wider or narrower scale of evaluation (discussed above)

First, all of the test items in Test III were double wh-questions of a simple SVO structure, and the wh-phrases were either the subject or the object of the sentence where violation or satisfaction of superiority was clear. Different sentence structures with different number of wh-phrases could have been used such as the following:

Which teacher gave which novel to which student?

Which of you asked which student to read which novel?

Caution should be taken, however, because when a longer movement is involved, other restrictions such as the Island Condition (See Adger 2003) may come into play. According to Kroch (1989) *which*-phrases safely move out of wh-islands.

Multiple wh-questions with one or more wh-adverbs (*when* or *where*) such as the following could also be considered:

Who did John kill when?

When did John kill who?

When did John kill Tom where?

Where did John kill Tom When?

However, besides the rarity of such multiple wh-questions and the difficulty in judging their acceptability, their status with respect to superiority does not seem neatly classifiable due to the fact that wh-adverbs are adjuncts in the sentence.

Also, multiple wh-questions without an explicit context could have been used in the study. As mentioned in section 4.2.3, the test taker was forced to make a D-linked interpretation for *who* and *what*. Conversely, by means of the phenomenon of *accommodation* (Heim 1982, discussed in Pesetsky 1987: 120), *which*-phrases may be used without a context provided explicitly. In such a case, however, the sentence could be judged based strictly on the syntax of the sentence, not on the interface of syntax and discourse because there is no discourse to make a link to. In fact, this leaves a question of whether *which*-phrases would still escape superiority without being D-linked, or whether *which*-phrases must be D-linked either explicitly or implicitly.

Lastly, spoken stimuli could be very effective in obtaining intuitive responses of the participant. Lack of visual presentation of the stimuli and limited time to examine them would force the participant to rely heavily on their first intuition. For that reason, however, it could be particularly advantageous to the native speakers, and their results would have been more like the ideal results (Figure 1i) because they could have been focused more on the meaning interpreted right off the sentence than on the sentence itself. But this would require a test design much more meticulous than the one in this study.

Before concluding the study, a short survey is presented below given to native speakers of English regarding the aforementioned problem of the native speakers' significant evaluation difference between *which*-questions that are observing and violating superiority. Consider (19) below.

- (19) a. Who killed which animal?
 b. Which animal did who kill?
 c. Which trainer killed what?
 d. What did which trainer kill?

The prediction, based on Pesetsky (1987: 120-121), was that (19a) and

(c) are well-formed because they are superiority-satisfying. Among the superiority-violating ones, (19b) and (d), the latter is well-formed because the *which*-phrase does not have to move, and so the *what* has moved up, instead of the *which* *trainer*, to locally check the [wh*] feature. Therefore, (19c) alone is supposed to be ill-formed. Fifty-eight native speakers of English were recruited and all of them were students at the University of Iowa. They were asked to evaluate the four sentences on the scale of 1 (bad) to 7 (perfect).⁵ The average evaluations of the four sentences in (19) are shown in Figure 7.

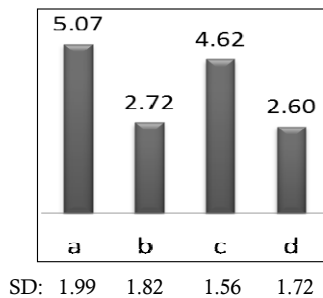


Figure 7. Mean Acceptance of Questions in (19).

The prediction on sentences (19a), (b), and (c) was borne out, but not the one on sentence (19d). Superiority only, but not D-linking, seems to be the factor splitting (19a) and (c) *versus* (19b) and (d). If these results are compared to the average evaluations by the native speakers on Test III in Figure (1ii), an interesting pattern emerges as shown in Table 14.

Table 14. Natives' Acceptance of Superiority-Violated Wh-Questions

Number of <i>which</i>	Example	Mean Acceptance
No <i>which</i>	<i>What did who pick?</i> (Fig. 1ii-b*)	1.78
One <i>which</i>	<i>What did which trainer kill?</i> (Fig. 5d)	2.60
	<i>Which animal did who kill?</i> (Fig. 5b)	2.72
Two <i>which</i> 's	<i>Which topic did which student pick?</i> (Fig. 1ii-c)	3.69

5) A weakness of this test is that the interpretation of the *which*-phrases in these sentences was dependent on each of the participants because no particular context was given to them. A reviewer correctly pointed out this issue.

Among the superiority-violating sentences, the speakers' tolerance increased proportionally to the number of *which*-phrases. Although more research must be conducted, the suggestion here is that there can be something other than D-linking of *which*-phrases, possibly sentence prosody, which may diminish the negative effect of superiority violation. (See Pesetsky's 1987: 107 for a discussion of two other possible causes.) If this is correct, the ideal result in Figure (1i), crucially column (c), should be disregarded, and also, the interface under investigation would indeed be the interface of syntax and something other than discourse.

7. Conclusion

Three properties: the wh-movement parameter, superiority, and D-linking, and interactions of them were investigated in this study in order to determine (i) whether or not L2ers learn the parameter which involves the uninterpretable feature [wh]; and (ii) whether or not the L2ers' acquisition of interface properties is delayed. The results of the study support *resetting* of a parameter. The learners show a native-like pattern of sensitivity to superiority, and the sharpness of this sensitivity correlates with their proficiency level.

As for the Interface Hypothesis, the overall findings of this study have failed to lend a sufficient support, but some aspects of the data appear to conform to it. The L2ers showed weak knowledge of *which*-questions, giving them lower evaluations compared to their *what/who*-counterparts. Possibly, this weakness is due to the D-linking *which*-phrases whose syntax is conditioned, in part, by the discourse. Another possibility is that these phrases are not as frequent in the input as *who* and *what*. The most advanced learners, however, patterned with the native speakers in judging the complete wh-question paradigm investigated in this study.

Appendix - Test Instruments

Test I

1. Subject *Who/What*
 - Who had pizza for lunch?
 - Who has seen the movie before?
 - What do you think is the best way to write a good essay?
 - What made you think that coffee is bad for teeth?
2. Subject *Which*
 - Which schools offered you a fellowship?
 - Which problem confused you the most in the final exam?
 - Which one of you has a college degree in biology?
 - Which movie is the one that came out last week.
3. Object *What/Who*
 - What did you give to your brother?
 - What was your final essay about?
 - Who else did you hire this year?
 - Who did you invite for dinner this Friday?
4. Object *Which*
 - Which city in Italy will you visit next summer?
 - Which politician did John talk about?
 - Which flavor do you like the best?
 - Which part of the story don't you understand?
5. Adjunct
 - Where did you find this necklace?
 - When did you tell us about the field trip?
 - How did you first meet each other?
 - Why did the teacher cancel the class?
6. Fillers
 - Will those who read *Hamlet* discuss it today?
 - Did I tell you how tall my sister is?
 - Tell me where Tom bought his computer?
 - Did you get the engine out of your car?
 - They gave what to the first place winner?
 - Did you see the doctor whenever she was available?
 - He got what from the cable company?
 - How small is the smallest state in the US?
 - Did you know how long we talked about her?
 - Is the president the one who has the authority?

Non-Discourse-Linking Context

1. **A:** I am really hungry now.
B: _____ a. Oh, me too. What do you want to eat?
b. Oh, me too. Which food do you want to eat?
2. **A:** Hey, today, I've talked the new professor today. He seemed really nice!
B: What? We have no new professors this semester. _____
a. I don't know which one you are talking about?
b. I don't know who you are talking about?
3. **A:** May I help you?
B: Yes. I'm looking for a birthday gift.
C: Ok. _____ a. Which one is that for?
b. Who is that for?
4. **A:** I saw you talking to someone at the bus stop yesterday.
B: Oh, did you? That young man had a lot of questions about this town.
A: _____ a. Who was he?
b. Which man was he?
B: I didn't ask. Maybe he is just a new student here.

Fillers

1. **A:** Last summer, I visited three East Asian countries.
B: Oh, did you? _____ a. What were those countries?
b. What countries were they?
2. **A:** Someday, I will be a story writer.
B: _____ a. What kind of stories do you want to write?
b. What do you want to write about?
3. **A:** I believe you are a new student in our program?
B: Yes, I am. I'm glad to meet you.
A: Glad to meet you too. _____ a. Which country are you from?
b. Where are you from?

4. **A:** I have a few questions about your graduate program.
B: _____ a. What questions do you have?
 b. What questions are they?
5. **A:** Where's all the food? The refrigerator is empty.
A: Right. We need to get some groceries.
B: Well, okay. _____ a. What groceries do we need to get?
 b. What do we need to get?

Test III

1. Yesterday, Dan went to a Korean restaurant with three of his friends. After they all ordered food, Dan's another friend, Jim, came to the restaurant to join them. Since Jim didn't know anything about Korean food, he was curious to know what they all ordered. So, he asked:

"Um.., who ordered what?"

- * "Um.., what did who order?"

"Um.., which of you ordered which dish?"

"Um.., which dish did which of you order?"

2. John teaches an advanced grammar class. He has five students in the class. One day, he asked his students to pick a topic that they wanted to talk about. Everyone picked one from the text book. The topics were voice, mood, agreement, tense and *to*-infinitives. They discussed each one of the topics in the class. After class, John talk about the discussion to his officemate, Tom, who knows John's students very well. During their conversation, Tom asked John:

"So, who picked what?"

- * "So, what did who pick?"

"So, which student picked which topic?"

"So, which topic did which students pick?"

3. Today is Christy's sixteen's birthday. Her four best friends have been invited to the party and they all came with an exciting gift. They brought an MP3 player, a sweat shirt, a pair of jeans, and a digital

camera. During the party, Christy's sister came home and saw Christy's friends and the gifts they brought. Amazed with the gifts, her sister asked Christy: _____

"Wow, who brought what?"

* "Wow, what did who bring?"

"Wow, which friend brought which gift?"

"Wow, which gift did which friend bring?"

4. Ashley is the leader of a college reading club. Including Ashley, there are six students in the club. Every week, they choose an author, and every one picks a different work of the author to read. On Fridays, they gather together to talk about what they have read. For this week, the author is "Shakespeare" and each member picked one of his plays. They picked *Romeo and Juliet*, *Hamlet*, *Othello*, *Henry VI*, *King Lear*, and *The Merchant of Venice*. Today is a Friday. Everybody has gathered together, and Ashley asked the members:

"So, who read what?"

* "So, what did who read?"

"So, which person read which play?"

"So, which play did which person read?"

The filers

1. This semester, Jason, Carl, Eric, and Peter are sharing an apartment. They all go to the same college, but their majors are different. Jason's major is economics, Carl's is engineering, Eric's is mathematics, and Peter's is physics. One day, Jason's sister visited them and had a casual conversation with them. During the conversation, Jason's sister asked them: _____

"So, what are you studying?"

"So, which department do you belong to?"

"So, what major are you in?"

2. There is a potluck party tonight at Jennifer's house, and nine people will be there at the party. Jennifer is the one who will prepare the

drinks, and everyone else will bring a dish to share. Jennifer's brother, Peter, has just learned about the party and decided to join in. Peter wants to bring a dish to the party too, but before he decides, he first needs to know what everybody will bring. So, he asks Jennifer:

"So, what is everyone bringing?"

"So, who will bring what?"

"So, what will they all bring?"

3. Last summer, Sam and three of his friends went on a road trip in Sam's van. One day, Sam found the van very messy with lots of stuff on the floor. He wanted to clean the van. But before cleaning it, he wanted his friends to take their belongings, so that he could throw away the rest of the stuff. So, he asked his friends:

"Who does all of stuff belong to?"

"What belongs to whom?"

"Which one belongs to which person?"

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Sang-Kyun Kang
University of Iowa
556EPB, Iowa City, IA 52242 USA
E-mail: sangkyun-kang@uiowa.edu

Received: June 29, 2014
Revised version received: July 24, 2014
Accepted: July 30, 2014