

# Sensitivity to Parasitic Gaps Inside Subject Islands in Native Speakers of English and Najdi Arabic Learners of English

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## Abstract

This study examined second language (L2) learners' sensitivity to parasitic gaps (PGs) in English. In PG constructions, an unacceptable gap inside an island becomes acceptable when it is combined with an acceptable gap (e.g., *what<sub>i</sub> did [ISLAND the attempt to repair \_\_\_<sub>pg</sub>] ultimately damage\_\_\_<sub>i</sub>?*). Linguists have often viewed PGs as marginally acceptable by native speakers, but recent studies have shown that they are fully acceptable. This phenomenon, however, has received little attention in L2 research. Thus, this study's purpose was to test sensitivity to PGs in L2 learners. In an acceptability judgment task, native speakers of English ( $n = 32$ ) and Najdi Arabic learners of English ( $n = 38$ ) used a 10-point scale to rate their acceptability of *wh*-questions with PGs, *wh*-questions with gaps inside subject islands, and *wh*-questions with gaps inside non-island structures. Like native speakers of English, Najdi Arabic learners of English rated *wh*-questions with PGs not only more acceptable than they rated ungrammatical *wh*-questions with gaps inside subject islands but also as highly as they rated grammatical *wh*-questions with gaps inside non-island structures. These results suggest that PGs are fully acceptable by Najdi Arabic learners. The Najdi Arabic learners' sensitivity to PGs in English supports the Full Transfer/Full Access Hypothesis (Schwartz & Sprouse, 1996), which claims that advanced adult L2 learners can acquire L2 properties regardless of L1.

**Keywords:** parasitic gaps, subject islands, Najdi Arabic, L2 learners, acceptability judgments

## 1. Introduction

Second language (L2) research has focused on the acquisition of island constraints on *wh*-movement to answer the question of whether universal grammar (UG) is accessible to L2 learners (e.g., Belikova & White, 2009; Hawkins & Chan, 1997; Hawkins & Hattori, 2006; Johnson & Newport, 1991; Li, 1998; Martohardjono, 1993; Tsimpli & Dimitrakopoulou, 2007). In English, *wh*-questions are formed via *wh*-movement (Chomsky, 1981, 1986). In (1), the *wh*-phrase *what* originates in the object position after the verb *want* and then moves to the beginning of the sentence, leaving a gap at its original site.

(1) **What<sub>i</sub>** do you want \_\_\_<sub>i</sub>?

However, it has been observed that *wh*-phrases cannot move from certain syntactic constituents, called *islands* (Ross, 1967). These islands include, but are not limited to, adjunct islands (2a), subject islands (2b), and *wh*-islands (2c).

(2)

- a. \***What<sub>i</sub>** did he close the door [**before he took** \_\_\_<sub>i</sub>]?
- b. \***What<sub>i</sub>** did [**the offer to change** \_\_\_<sub>i</sub>] solve the problem?
- c. \***What<sub>i</sub>** did he wonder [**whether he found** \_\_\_<sub>i</sub>]?

Both native speakers (e.g., Sprouse, Caponigro, Greco, & Cecchetto, 2016; Sprouse, Wagers, & Phillips, 2012) and L2 learners (e.g., Aldosari, 2021; Aldosari, Covey, & Gabriele, 2024) have been shown to give low acceptability judgments to sentences violating island constraints, suggesting sensitivity to islands in both populations. However, a linguistic grammatical phenomenon in which island constraints are not respected exists, called *parasitic-gap construction* (Culicover, 2001; Engdahl, 1983). In this construction, a *wh*-phrase is associated with two gaps in a sentence, one inside an island and the other outside the island. An example is shown in (3).

(3)

- a. \***What<sub>i</sub>** did [**the attempt to repair** \_\_\_<sub>i</sub>] ultimately damage the car?
- b. **What<sub>i</sub>** did [**the attempt to repair the car**] ultimately damage \_\_\_<sub>i</sub>?
- c. **What<sub>i</sub>** did [**the attempt to repair** \_\_\_<sub>pg</sub>] ultimately damage\_\_\_<sub>i</sub>? (Phillips, 2006, p. 796)

The gap in (3a) is unacceptable because it violates a subject island constraint. However, the gap in (3b) is acceptable because it does not violate an island constraint. Interestingly, when the unacceptable gap in (3a) is combined with the acceptable gap in (3b), the unacceptable

gap in (3a) becomes acceptable as in (3c). The first gap in (3c), which is inside a subject island, is called a parasitic gap (PG) because its acceptability relies on the presence of another gap. However, for a PG to be rescued by another gap, the verb inside the island must be non-finite.

As noted by Phillips (2013), linguists have often viewed PG constructions as in (3c) to be marginally acceptable. However, recent studies using controlled acceptability experiments have shown that these PG constructions are fully acceptable by native speakers (e.g., Boxell & Felser, 2017; Phillips, 2006; Wagers & Phillips, 2009). Although PGs have been investigated in L1 research, this phenomenon has received little attention in L2 acquisition research. Boxell and Felser (2017) appears to be the only study that examined sensitivity to PGs in L2 using a controlled acceptability experiment. To fill the gap in L2 research, the present study aimed to further investigate sensitivity to PGs in L2 learners. Specifically, the present study tested native speakers of English and Najdi Arabic learners of English to answer two questions. The first question is whether Najdi Arabic learners of English, whose L1 exhibits island constraints, can show sensitivity to subject islands in English. The second question is whether Najdi Arabic learners of English, whose L1 lacks obligatory PGs, can show sensitivity to PGs inside subject islands in English.

## 2. Literature Review

I first give an overview of island constraints and parasitic gaps in Najdi Arabic. Next, I review relevant acceptability studies that examined sensitivity to island constraints and parasitic gaps in L1 speakers and L2 learners. Finally, I discuss the details of the present study.

### 2.1 Island Constraints and PGs in Najdi Arabic

*Wh*-questions in Najdi Arabic can be formed via *wh*-movement (4a; Albaty, 2013), which is sensitive to island constraints (e.g., Aldosari, 2021), as is the case in English and many varieties of Arabic (e.g., Modern Standard Arabic; Tucker, Idrissi, Sprouse, & Almeida, 2019; Lebanese Arabic; Aoun, Benmamoun, & Choueiri, 2010; Palestinian Arabic; Shlonsky, 2002). The *wh*-questions in (4b) and (4c) are ungrammatical in Najdi Arabic because they violate a *wh*-island constraint and a relative clause island constraint respectively.

(4)

- a. **min<sub>i</sub>** kalam Ahmad \_\_\_<sub>i</sub> il-yum?  
who called Ahmad the-day  
'Who(m) did Ahmad call today?' (Albaty, 2013, p.1)

- b. \***ayy rjal<sub>i</sub>** 9alima-ni Ali [**mita zar \_\_\_<sub>i</sub>**]?  
which man told.3ms-me Ali [when visited.3ms]  
'Which man<sub>i</sub> did Ali tell me [when he visited \_\_\_<sub>i</sub>]?'

- c. \***ayy rsalah<sub>i</sub>** shakr ar-rjal [**al-bint alli kitab-t \_\_\_<sub>i</sub>**]?  
which letter thanked.3ms the-man [the-girl that wrote-3fs]  
'Which letter<sub>i</sub> did the man thank [the girl who wrote \_\_\_<sub>i</sub>]?' (Aldosari, 2021, p. 45)

With respect to PGs, Engdahl (1983) defined a PG as "a gap that is dependent on the existence of another gap in the same sentence" (p. 5). Engdahl divided PGs into two types: optional PGs and obligatory PGs. The optional PGs follow a real gap as in (5a), and they can be replaced by an NP, as in (5b). The obligatory PGs, however, precede a real gap as in (6a), and they cannot be replaced by an NP as in (6b).

(5)

- a. **Which articles<sub>i</sub>** did John file \_\_\_<sub>i</sub> without reading \_\_\_<sub>pg</sub>?  
b. **Which articles<sub>i</sub>** did John file \_\_\_<sub>i</sub> without reading **them**?

(6)

- a. **Which girl<sub>i</sub>** did you send a picture of \_\_\_<sub>pg</sub> to \_\_\_<sub>i</sub>?  
b. \***Which girl<sub>i</sub>** did you send a picture of **her** to \_\_\_<sub>i</sub>? (Engdahl, 1983, p. 5)

Like English, Najdi Arabic exhibits optional PGs that follow a real gap as in (7a). The optional PG and the real gap in (7a) can be replaced by NPs, as in (7b). However, unlike English, Najdi Arabic does not allow obligatory PGs that precede a real gap, as in (8a), and NPs have to be realized in the same environment, as in (8b; Aljutaili, 2015).

(7)

- a. **ay al-maqalat<sub>i</sub>** saddar Khlaed \_\_\_<sub>i</sub> bedoun mraja'ach \_\_\_<sub>pg</sub>?  
which the-articles<sub>i</sub> filed Khlaed \_\_\_<sub>i</sub> without revising \_\_\_<sub>pg</sub>?  
'Which articles<sub>i</sub> did Khlaed file \_\_\_<sub>i</sub> without revising \_\_\_<sub>pg</sub>?'  
b. **ay al-maqalat<sub>i</sub>** saddar **-hn<sub>i</sub>** Khlaed bedoun mraja'aet-**hn<sub>i</sub>**?  
which the-articles<sub>i</sub> filed-**them<sub>i</sub>** Khlaed without revising-**them<sub>i</sub>**?

‘Which artiles<sub>i</sub> did Khlaed filed them<sub>i</sub> without revising them<sub>i</sub>?’

(8)

- a. \*ay      bint<sub>i</sub>      arsal-t      sora      \_\_\_pg      lm      \_\_\_i?
- which      girl<sub>i</sub>      sent-you      a picture-of      \_\_\_pg      to      \_\_\_i?

‘Which girl<sub>i</sub> did you send a picture of \_\_\_pg to \_\_\_i?’

- b. ay      bint<sub>i</sub>      arsal-t      sora-th<sub>i</sub>      lm-h<sub>i</sub>?
- which      girl<sub>i</sub>      sent-you      a picture-of-her<sub>i</sub>      to-her<sub>i</sub>?

‘Which girl<sub>i</sub> did you send a picture of her<sub>i</sub> to her<sub>i</sub>?’

(Aljutaili, 2015, pp. 10, 11)

2.2 Studies on L1 and L2 Sensitivity to Islands and PGs

Many studies have shown that both native speakers and L2 learners are sensitive to islands, as reflected in their low acceptability judgments of island violation sentences (e.g., Aldosari, 2021; Aldosari et al., 2024; Goodall, 2015; Li, 1998; Martohardjono, 1993; White & Juffs, 1998). The first study that tested L2 acquisition of island constraints under the Barriers framework (Chomsky, 1986) was Martohardjono (1993). Martohardjono examined island sensitivity by testing learners of English with various L1s including Italian learners of English. In Italian, as in Najdi Arabic, *wh*-questions are formed via *wh*-movement, which is sensitive to island constraints. The participants were presented with *wh*-questions with *wh*-extractions from adjunct islands, relative clause islands, complex NP islands, and *wh*-islands. For each *wh*-question, participants were asked to judge whether it was a good or bad sentence in English. The results showed that Italian learners, like English native speakers, rejected *wh*-questions with *wh*-extractions from islands, suggesting they were sensitive to islands.

A more recent study that examined L2 island sensitivity was Aldosari (2021), which tested Najdi Arabic learners of English. Aldosari specifically examined whether island sensitivity was similar in nature in L2 learners and native speakers. The study used an acceptability judgment task (AJT) in which participants were asked to judge whether each sentence sounded natural or unnatural in English, using a 7-point scale, with 7 being *perfectly natural*. The results showed that Najdi Arabic learners of English, like native speakers of English, rated *wh*-extractions from *wh*-islands (9a) and relative clause islands (10a) lower than *wh*-extractions from non-islands (9b/10b), suggesting they were sensitive to islands.

(9)

- a. \*What does he wonder why she might hate \_\_\_?
- b. What does he think that she might hate \_\_\_?

(10)

- a. \*What did the author who wrote \_\_\_ win the prize?
- b. What did the author who wrote the article win \_\_\_?

Aldosari et al. (2024) was another recent study that tested Najdi Arabic learners of English to examine L2 island sensitivity. They tested four island types: adjunct islands, subject islands, complex NP islands, and *whether* islands. Unlike Aldosari (2021), Aldosari et al. (2024) used a 2 × 2 factorial design to test each island type. They manipulated the *wh*-dependency length and the presence of an island structure in four conditions as in (11), which shows an example set of sentences to test sensitivity to subject islands.

(11)

NONISLAND/ MATRIX

The old man thinks the speech interrupted the TV show.

- a. Which man\_\_ thinks the speech interrupted the TV show?

NONISLAND/ EMBEDDED

The man thinks the speech by the president interrupted the TV show.

- b. Which speech does the man think\_\_ interrupted the TV show?

ISLAND/ MATRIX

The old man thinks the speech by the president interrupted the TV show.

- c. Which man\_\_ thinks the speech by the president interrupted the TV show?

ISLAND/ EMBEDDED

The man thinks the speech by the Italian president interrupted the TV show.

- d. \*Which president does the man think [the speech by\_\_] interrupted the TV show?

The first three conditions are grammatical, while the last condition is ungrammatical because of an island violation. The study used an AJT in which participants were asked to judge whether each sentence sounded natural or unnatural in English, using a 7-point scale, with

7 being *perfectly natural*. Interestingly, both native speakers of English and Najdi Arabic learners of English rated the ungrammatical island violation condition (11d) lower than they rated the other three grammatical conditions, suggesting sensitivity to islands.

Many L2 studies, including the studies reviewed above, showed that both native speakers and L2 learners are sensitive to islands. This finding suggests that both native speakers and L2 learners avoided associating extracted *wh*-phrases with gaps inside islands from which *wh*-extractions are not grammatically permissible. However, there is a linguistic phenomenon in which native speakers can associate extracted *wh*-phrases with gaps inside islands when it is grammatically permissible. This phenomenon is called a *PG construction* (Culicover, 2001; Engdahl, 1983). Phillips (2006) investigated PGs inside subject islands, which are ungrammatical, as in (12a), unless they are rescued by subsequent gaps, as in (12b). However, for PGs to be rescued by other gaps, the verb inside the island must be non-finite.

(12)

- a. \***What<sub>i</sub>** did [**the attempt to repair** \_\_\_<sub>i</sub>] ultimately damage the car?
- b. **What<sub>i</sub>** did [**the attempt to repair** \_\_\_<sub>pg</sub>] ultimately damage \_\_\_<sub>i</sub>?

To examine sensitivity to PGs inside subject islands, Phillips (2006) used a  $2 \times 3$  factorial design that manipulated gap type (i.e., good gap, bad gap, both gaps) and verb finiteness inside the island (finite vs. non-finite) in six conditions as in (13). In the bad-gap conditions (13a/13b), the gap was unacceptable because it was inside a subject island. In the good-gap conditions (13c/13d), the gap was acceptable because it was not inside an island. In the both-gaps conditions (13e/13f), a bad gap was combined with a good gap to create a potential PG construction. The verb inside the subject island was either non-finite, as in (13a/13c/13e), or finite, as in (13b,13d/13f). The first two conditions (13a/13b) were ungrammatical, while the third and fourth conditions (13c/13d) were grammatical. The fifth condition (13e) was grammatical because the verb inside the island was non-finite, while the sixth condition (13f) was ungrammatical because the verb inside the island was finite.

(13) BAD GAP, INFINITIVAL

- a. The outspoken environmentalist worked to investigate [what the local campaign to preserve \_\_\_] had harmed the annual migration.

BAD GAP, FINITE

- b. The outspoken environmentalist worked to investigate [what the local campaign that preserved \_\_\_] had harmed the annual migration.

GOOD GAP, INFINITIVAL

- c. The outspoken environmentalist worked to investigate [what the local campaign to preserve the important habitats] had harmed \_\_\_.

GOOD GAP, FINITE

- d. The outspoken environmentalist worked to investigate [what the local campaign that preserved the important habitats] had harmed \_\_\_.

BOTH GAPS, INFINITIVAL

- e. The outspoken environmentalist worked to investigate [what the local campaign to preserve \_\_\_] had harmed \_\_\_.

BOTH GAPS, FINITE

- f. The outspoken environmentalist worked to investigate [what the local campaign that preserved \_\_\_] had harmed \_\_\_.

The study tested native speakers of English who were asked to judge whether each sentence sounded acceptable or unacceptable in English, using a 5-point scale, with 5 being *acceptable*. The native speakers of English rated the bad-gap conditions with unacceptable gaps inside subject islands lower than the good-gap conditions with acceptable gaps, which suggests they were sensitive to subject islands. They also rated the non-finite, both-gaps condition higher than the finite, both-gaps condition, which suggests they were sensitive to PGs.

Unlike Phillips (2006), Boxell and Felser (2017) tested sensitivity to PGs not only in native speakers, but also in L2 learners. Boxell and Felser tested native speakers of English and German learners of English who lack PGs inside subject islands in their L1. Like Phillips (2006), Boxell and Felser used a  $2 \times 3$  factorial design that manipulated gap type (i.e., good gap, bad gap, both gaps) and verb finiteness inside the island (finite vs. non-finite) in six conditions, as in (14).

(14) BAD GAP, INFINITIVAL

- a. It was not clear which animals [the plan to look after \_\_\_] would protect the forest.

BAD GAP, FINITE

- b. It was not clear which animals [the plan that looked after \_\_\_] would protect the forest.

GOOD GAP, INFINITIVAL

- c. It was not clear which animals [the plan to look after the forest] would protect \_\_\_.

## GOOD GAP, FINITE

- d. It was not clear which animals [the plan that looked after the forest] would protect \_\_\_.

## BOTH GAPS, INFINITIVAL

- e. It was not clear which animals [the plan to look after \_\_\_] would protect\_\_\_.

## BOTH GAPS, FINITE

- f. It was not clear which animals [the plan that looked after \_\_\_] would protect\_\_\_.

The study used an AJT in which participants were asked to judge whether each sentence sounded acceptable or unacceptable in English, using a 10-point scale, with 10 being *the most structurally well-formed and semantically meaningful*. The German learners of English patterned similarly to the native speakers of English on the AJT. Both groups rated the bad-gap conditions with unacceptable gaps inside subject islands lower than they rated the good-gap conditions with acceptable gaps, which suggests both groups were sensitive to subject islands. They both also rated the non-finite, both-gaps condition higher than the finite, both-gaps condition, which suggests they were sensitive to PGs.

### 2.3 The Present Study

The primary goal of the present study was to examine whether sensitivity to subject islands and obligatory PGs is similar in nature in L2 learners and native speakers. Although L1 and L2 sensitivity to islands has been tested by many studies, sensitivity to PGs has received little attention in L1 and L2 research. Phillips (2006), who tested native speakers, and Boxell and Felser (2017), who tested both native speakers and L2 learners, are among the few studies that examined sensitivity to PGs using a controlled acceptability experiment.

The present study further explored sensitivity to PGs in both native speakers and L2 learners using a controlled acceptability experiment. Specifically, this study tested native speakers of English and Najdi Arabic learners of English to answer two questions. The first question was whether Najdi Arabic learners of English, whose L1 exhibits island constraints, can show sensitivity to subject islands in English. The second question was whether Najdi Arabic learners of English, whose L1 lacks obligatory PGs, can show sensitivity to obligatory PGs inside subject islands in English. The Full Transfer/Full Access Hypothesis (Schwartz & Sprouse, 1996) claims that L1 grammar constitutes the initial state of L2 acquisition, but it is possible for adult learners at advanced levels of proficiency to acquire L2 properties, regardless of L1. If this claim is correct, Najdi Arabic learners of English are predicted to be sensitive to PGs inside subject islands in English.

## 3. Method

### 3.1 Participants

Thirty-eight Najdi Arabic learners of English (35 males, mean age = 23) participated in the study. They started learning English at the age of 13 in public schools in Saudi Arabia and were undergraduate students at Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia. They received extra course credit for participating in the study. They completed the Michigan Listening Comprehension Test to assess their English proficiency. The test consisted of 45 listening-comprehension questions that targeted various grammatical constructions. Their scores ranged from 34 to 45 out of 45 possible correct answers ( $M = 41.22$ ,  $SD = 2.41$ ), suggesting that the learners were at an advanced level of proficiency in English.

Thirty-two native speakers of English (23 females, mean age = 41) also participated in the study as a control group. They were tested at the University of Kansas, USA. Each participant was paid \$10 for participating.

### 3.2 Materials

Following Phillips (2006) and Boxell and Felser (2017), the stimuli of this study were designed to test the PG construction in a  $2 \times 3$  factorial design that manipulated gap type (i.e., good gap, bad gap, both gaps) and verb finiteness inside the subject island (finite vs. non-finite), as in (15). In the bad-gap conditions (15a/15b), the gap was unacceptable because it was inside a subject island. These two conditions provided a measure of sensitivity to subject islands. In the good-gap conditions (15c/15d), the gap was acceptable because it was not inside an island. These two conditions provided a baseline measure of acceptable sentences. In the both-gaps conditions (15e/15f), an unacceptable gap was combined with an acceptable gap to create a potential PG construction. The verb inside the subject island was either non-finite, as in (15a/15c/15e), or finite, as in (15b,15d/15f). The first two conditions (15a/15b) were ungrammatical, while the third and fourth conditions (15c/15d) were grammatical. The fifth condition (15e) was grammatical because the verb inside the island was non-finite, while the sixth condition (15f) was ungrammatical because the verb inside the island was finite.

## (15) BAD GAP, INFINITIVAL

- a. They hoped to discover what [the threat to destroy \_\_\_] had caused the fire.

## BAD GAP, FINITE

- b. They hoped to discover what [the threat that destroyed \_\_\_] had caused the fire.

## GOOD GAP, INFINITIVAL

- c. They hoped to discover what [the threat to destroy the books] had caused \_\_\_.

## GOOD GAP, FINITE

- d. They hoped to discover what [the threat that destroyed the books] had caused \_\_\_.

## BOTH GAPS, INFINITIVAL

- e. They hoped to discover what [the threat to destroy \_\_\_] had caused \_\_\_.

## BOTH GAPS, FINITE

- f. They hoped to discover what [the threat that destroyed \_\_\_] had caused \_\_\_.

Twenty-four sets of sentences, as in (15), were created and distributed among six lists using a Latin square design. Thus, every participant was presented with only one sentence from every set. Each list included 24 experimental sentences—four sentences targeting each of the six conditions. To balance the number of grammatical and ungrammatical sentences on each list, 48 filler sentences (half grammatical, half ungrammatical) were added to each of the six lists. The grammatical fillers included sentences with embedded *wh*-questions or embedded relative clauses, while ungrammatical ones included sentences with *wh*-extractions from *wh*-islands, relative clause islands, complex NP islands, adjunct islands or subject islands. Thus, each list contained 72 sentences. All the experimental and filler sentences were created by the author. The full stimuli set is in the Appendix.

### 3.3 Procedure

An AJT was conducted using SurveyMonkey. Participants were presented with one sentence at a time and judged test sentences using a 10-point scale that ranged from *least acceptable* to *most acceptable*, as shown in the sample in Figure 1; there was no time limit on the task, and the task began with 6 practice trials. All participants completed the AJT in a laboratory and gave informed consent before the session. The AJT was preceded by a background questionnaire.

Figure 1. Experiment stimulus

### 3.4 Predictions

#### 3.4.1 Native Speakers

Because English exhibits island constraints and obligatory PGs, native speakers of English were expected to be sensitive to subject islands and obligatory PGs inside subject islands. Specifically, native speakers of English were predicted to rate the two bad-gap conditions (15a/15b) with unacceptable gaps inside subject islands lower than they rated the two good-gap conditions (15c/15d) with acceptable gaps. As for the both-gaps conditions, native speakers of English were predicted to rate the non-finite condition (15e) higher than the finite one (15f).

#### 3.4.2 L2 Learners

Because Najdi Arabic, like English, exhibits island constraints, Najdi Arabic learners of English were expected to be sensitive to subject islands in English. Specifically, Najdi Arabic learners of English, like native speakers of English, were predicted to rate the two bad-gap conditions (15a/15b) with unacceptable gaps inside subject islands lower than they rated the two good-gap conditions (15c/15d) with acceptable gaps. Unlike native speakers of English, however, Najdi Arabic learners of English lack obligatory PGs inside subject islands in their L1. According to the Full Transfer/Full Access Hypothesis (Schwartz & Sprouse, 1996), L2 learners at advanced levels of proficiency can acquire L2 properties, regardless of L1. If this claim is correct, Najdi Arabic learners of English were expected to be sensitive to PGs inside subject islands in English. Specifically, Najdi Arabic learners of English were predicted to rate the non-finite both-gaps condition (15e) higher than the finite one (15f).

## 4. Results

This section first presents the results from native speakers of English and then presents the results from Najdi Arabic learners of English.

### 4.1 Native Speakers

A two-way repeated measures ANOVA with Finiteness (two levels: finite and non-finite) and Gap Type (three levels: good gap, bad gap and both gaps) as two independent variables was conducted for acceptability ratings of native speakers of English. The results of ANOVA revealed main effects of Finiteness [ $F(1,31) = 96.129, p = .000$ ] and Gap Type [ $F(2,31) = 62.062, p = .000$ ]. The analysis also revealed an interaction between Finiteness and Gap Type [ $F(1,31) = 29.948, p = .000$ ].

To further explore the interaction between Finiteness and Gap Type, planned comparisons using *t* tests were run that compared each of the pairs for each gap type. For the good-gap pair, the non-finite condition was rated significantly higher than the finite one [ $t(31) = 5.734, p = .000$ ]. For the bad-gap pair, the non-finite condition and finite one were rated low and almost the same [ $t(31) = .567, p = .575$ ]. As shown in Figure 2, native speakers of English rated the bad-gap conditions lower than they rated the good-gap conditions, which suggests they were sensitive to subject islands. For the both-gaps pair, however, the non-finite condition was rated significantly higher than the finite one [ $t(31) = 9.183, p = .000$ ], which suggests they were sensitive to parasitic gaps.

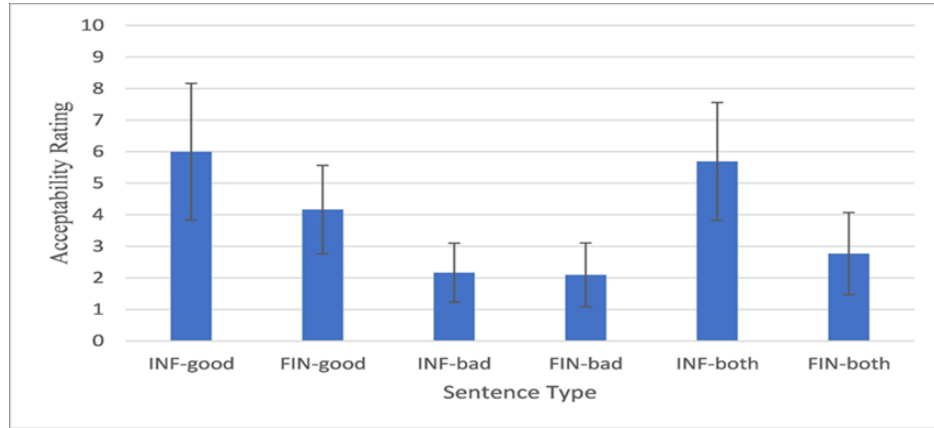


Figure 2. Native speakers' mean acceptability ratings of experimental conditions (error bars indicate SDs)

#### 4.2 L2 Learners

A two-way repeated measures ANOVA with Finiteness (two levels: finite and non-finite) and Gap Type (three levels: good gap, bad gap and both gaps) as two independent variables was conducted for acceptability ratings of Najdi Arabic learners of English. The ANOVA results revealed main effects of Finiteness [ $F(1,37) = 21.516, p = .000$ ] and Gap Type [ $F(2,37) = 27.047, p = .000$ ]. The analysis also revealed an interaction between Finiteness and Gap Type [ $F(1,37) = 47.489, p = .000$ ].

To further explore the interaction between Finiteness and Gap Type, planned comparisons using *t* tests were run, comparing each of the pairs for each gap type. For the good-gap pair, the non-finite condition and finite condition were rated high and almost the same [ $t(37) = .144, p = .886$ ]. For the bad-gap pair, the non-finite condition and finite condition were rated low and almost the same [ $t(37) = -.668, p = .508$ ]. As shown in Figure 3, Najdi Arabic learners, like native speakers of English, rated the bad-gap conditions lower than the good-gap conditions, which suggests they were sensitive to subject islands. For the both-gaps pair, however, the non-finite condition was rated significantly higher than the finite one [ $t(37) = 10.303, p = .000$ ], which suggests they were sensitive to parasitic gaps.

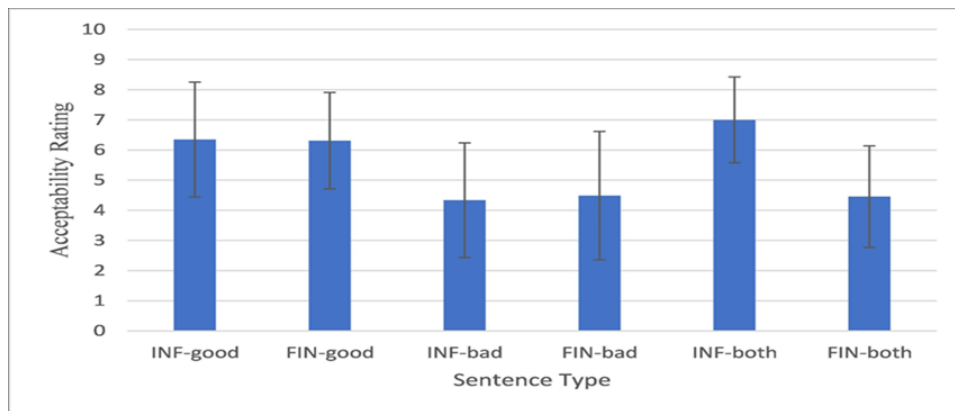


Figure 3. L2 learners' mean acceptability ratings of experimental conditions (error bars indicate SDs)

### 5. Discussion

The first question tested in this study is whether Najdi Arabic learners of English, whose L1 exhibits island constraints, can show sensitivity to English subject islands. The Najdi Arabic learners in this study, like native speakers of English, showed sensitivity to English subject islands. This island sensitivity was reflected in their lower acceptability ratings of the two bad-gap conditions with unacceptable gaps inside subject islands, as compared to their acceptability ratings of the two good-gap conditions with acceptable gaps, as shown in Figures 2 and 3. These results suggest that both native speakers of English and Najdi Arabic learners avoided associating extracted *wh*-phrases with gaps inside subject islands from which *wh*-extraction is not grammatically permissible. This pattern of results suggests that *wh*-dependencies in

both L1 and L2 grammars are similarly constrained by syntax.

The results from Najdi Arabic learners in this study are consistent with previous research that showed that Najdi Arabic learners were sensitive to English subject islands (e.g., Aldosari et al., 2024) and other types of English islands (Aldosari, 2021; Aldwayan, 2009). To conclude, then, and in answer to the first question of this study, Najdi Arabic learners did, in fact, show sensitivity to English subject islands, just as native speakers of English did.

The second question tested in this study was whether Najdi Arabic learners of English, whose L1 lacks obligatory PGs, can show sensitivity to PGs inside subject islands in English. The Najdi Arabic learners in this study, like native speakers of English, rated the non-finite, both-gaps condition higher than they rated the finite, both-gaps condition and the two bad-gap conditions, as shown in Figures 2 and 3. These results suggest that both native speakers of English and Najdi Arabic learners were sensitive to obligatory PGs inside subject islands in English. The Najdi Arabic learners' sensitivity to English PGs inside subject islands supports the Full Transfer/Full Access Hypothesis (Schwartz & Sprouse, 1996), which claims that advanced adult L2 learners can acquire L2 properties regardless of L1.

Contrary to the previous view that PGs inside subject islands are marginally acceptable by native speakers, the pattern of results exhibited by both native speakers and L2 learners in this study indicates that PGs inside subject islands are fully acceptable not only by native speakers, as shown in this study and Phillips (2006), but also by L2 learners, as shown in this study and Boxell and Felser (2017). To conclude, then, and in answer to the second question of this study, Najdi Arabic learners did, in fact, show sensitivity to PGs inside subject islands in English, just as native speakers of English did.

One possible concern in this study is that the mean ratings for acceptable conditions were rather low, ranging from 4.16 to 6.00 for native speakers, and from 6.30 to 7.00 for L2 learners on a 10-point rating scale. Boxell and Felser (2017), who used the same rating scale, also showed low mean ratings for acceptable conditions, ranging from 5.33 to 6.96 for native speakers and from 6.39 to 7.66 for L2 learners, as shown in Table 1. However, Phillips (2006) pointed out that syntactically complex sentences, like the acceptable sentences used in Boxell and Felser and the present study, are expected to receive low acceptability ratings because of their processing difficulty. One piece of evidence that supports Phillips's view comes from very high acceptability ratings of one type of syntactically simple sentences used in the present study as fillers (e.g., *she wondered where he had found the map*). This type of sentence, which involved embedded simple *wh*-questions, received a mean rating of 9.79 by native speakers of English and 8.74 by Najdi Arabic learners of English.

Table 1. Mean acceptability ratings in Boxell and Felser (2017) and the present study (*SDs* in parentheses)

Condition	Boxell and Felser (2017)		Present study	
	Native speakers	L2 learners	Native speakers	L2 learners
Bad gap, non-finite	4.60 (1.78)	4.83 (1.96)	2.16 (0.93)	4.33 (1.90)
Bad gap, finite	3.61 (1.69)	5.16 (2.29)	2.09 (1.01)	4.48 (2.13)
Good gap, non-finite	5.84 (2.27)	6.39 (2.71)	6.00 (2.16)	6.34 (1.90)
Good gap, finite	5.33 (2.10)	6.85 (2.36)	4.16 (1.40)	6.30 (1.59)
Both gaps, non-finite	6.96 (1.59)	7.66 (1.93)	5.68 (1.86)	7.00 (1.42)
Both gaps, finite	4.53 (1.83)	4.97 (2.41)	2.76 (1.30)	4.45 (1.68)

As shown in Table 1, the Najdi Arabic learners of English in the present study showed patterns similar to the German learners of English in Boxell and Felser (2017). Interestingly, the L2 learners in both studies gave similar ratings to all six experimental conditions. Moreover, the L2 learners in both studies rated all six experimental conditions higher than did native speakers of English. For example, the L2 learners in both studies rated the two bad-gap conditions with unacceptable gaps inside subject islands higher than native speakers rated them, which suggests that L2 learners were less sensitive than native speakers to English subject islands. The L2 learners in both studies also rated the unacceptable, finite, both-gaps condition higher than native speakers did, which suggests that L2 learners were less sensitive to the verb finiteness inside subject islands that affects the acceptability of PGs.

However, the native speakers of English in the present study rated the unacceptable conditions lower than did the native speakers of English in Boxell and Felser (2017). Specifically, the native speakers in the present study rated the two bad-gap conditions with unacceptable gaps inside subject islands lower than did native speakers in Boxell and Felser, showing more sensitivity to subject islands. The native speakers in the present study also rated the unacceptable, finite, both-gaps condition lower than native speakers did in Boxell and Felser, showing more sensitivity to the verb finiteness inside subject islands that affects the acceptability of PGs.

The present study showed that both native speakers of English and Najdi Arabic learners were sensitive to subject islands as reflected in their low acceptability judgments. However, there is a current debate in psycholinguistics as to the source of this island sensitivity. According to the syntactic account (e.g., Chomsky, 1973, 1986; Ross, 1967), the island sensitivity is caused by a violation of syntactic constraints that prohibit *wh*-extraction from islands. Specifically, speakers avoid associating an extracted *wh*-phrase with a gap inside an island because they respect syntactic island constraints. However, according to the processing account (e.g., Hofmeister & Sag, 2010; Kluender & Kutas, 1993), island sensitivity is caused by processing difficulty. Specifically, the unacceptability of island violation sentences, as in (16a), arises because the speaker's limited processing resources are exhausted as a result of simultaneously processing both the long-distance *wh*-dependency and the complex island structure before the speaker can associate the extracted *wh*-phrase with a gap inside an island.



(16)

- a. \*They hoped to discover **what<sub>i</sub>** [<sub>ISLAND</sub> the threat to destroy \_\_\_<sub>i</sub>] had caused the fire.
- b. They hoped to discover **what<sub>i</sub>** [<sub>ISLAND</sub> the threat to destroy \_\_\_<sub>pg</sub>] had caused \_\_\_<sub>i</sub>.

However, both native speakers of English and Najdi Arabic learners showed sensitivity to PGs inside subject islands, which suggests that they could associate extracted *wh*-phrases (e.g., *what*) with a gap inside subject islands (e.g., [<sub>ISLAND</sub> the threat to destroy \_\_\_<sub>pg</sub>]), as in (16b). This pattern of results challenges the processing account of island sensitivity, which claims that speakers cannot associate an extracted *wh*-phrase with a gap inside an island because of processing difficulty. The sensitivity to PGs inside subject islands exhibited by native speakers and L2 learners in this study suggests that island sensitivity is not driven by processing difficulty and is more likely caused by violations of syntactic constraints.

## 6. Conclusion

This study contributes to the L1 and L2 literature on sensitivity to subject islands and PGs in English. The results of this study suggest that sensitivity to subject islands and PGs is similar in nature in native speakers and L2 learners. Like German learners of English in Boxell and Felser (2017), Najdi Arabic learners of English in this study showed sensitivity to PGs inside subject islands that do not exist in their L1. The results of this study, combined with the results of Boxell and Felser (2017), suggest that it is possible for adult L2 learners to acquire syntactic properties that do not exist in their L1. These results support theories, like the Full Transfer/Full Access (Schwartz & Sprouse, 1996), which argues that L2 learners are not ultimately constrained by the properties of their L1. An interesting next step would be to further examine sensitivity to subject islands and PGs in English using online tasks (e.g., self-paced reading, eye-tracking). Unlike AJTs that measure conscious judgments of sentences, online tasks measure unconscious processing of sentences.

In conclusion, this study may have some limitations. One limitation may be the small number of participants in this study. Testing larger samples in future studies is necessary to generalize the findings and enhance the statistical power. Furthermore, this study employed an offline task that may allow participants to adopt a certain response strategy. Moreover, this study did not control for some potential confounding variables, such as age, language exposure, and working memory, which may affect L2 learners' sensitivity to PGs.

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## Data sharing statement

No additional data are available.

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## Appendix

### Experimental Sentences

1.
  - a. He hoped to know what the attempt to repair had damaged.
  - b. He hoped to know what the attempt that repaired had damaged.
  - c. He hoped to know what the attempt to repair the car had damaged.
  - d. He hoped to know what the attempt to repair had damaged the tire.
  - e. He hoped to know what the attempt that repaired had damaged the tire.
  - f. He hoped to know what the attempt that repaired the car had damaged.
2.
  - a. They wanted to see what the idea to create had produced.
  - b. They wanted to see what the idea that created had produced.
  - c. They wanted to see what the idea to create the project had produced.
  - d. They wanted to see what the idea to create had produced the book.
  - e. They wanted to see what the idea that created had produced the book.
  - f. They wanted to see what the idea that created the project had produced.
3.
  - a. She wanted to learn what the request to finish had changed.
  - b. She wanted to learn what the request that finished had changed.
  - c. She wanted to learn what the request to finish the project had changed.
  - d. She wanted to learn what the request to finish had changed the process.
  - e. She wanted to learn what the request that finished had changed the process.
  - f. She wanted to learn what the request that finished the project had changed.
4.
  - a. She planned to discuss what the effort to expand had helped.
  - b. She planned to discuss what the effort that expanded had helped.
  - c. She planned to discuss what the effort to expand the project had helped.
  - d. She planned to discuss what the effort to expand had helped the neighborhood.
  - e. She planned to discuss what the effort that expanded had helped the neighborhood.
  - f. She planned to discuss what the effort that expanded the project had helped.
5.
  - a. She struggled to understand what the effort to treat had caused.

- b. She struggled to understand what the effort that treated had caused.
  - c. She struggled to understand what the effort to treat the disease had caused.
  - d. She struggled to understand what the effort to treat had caused the cough.
  - e. She struggled to understand what the effort that treated had caused the cough.
  - f. She struggled to understand what the effort that treated the disease had caused.
- 6.
- a. They wanted to understand what the idea to improve had changed.
  - b. They wanted to understand what the idea that improved had changed.
  - c. They wanted to understand what the idea to improve the course had changed.
  - d. They wanted to understand what the idea to improve had changed the situation.
  - e. They wanted to understand what the idea that improved had changed the situation.
  - f. They wanted to understand what the idea that improved the course had changed.
- 7.
- a. He hoped to learn what the attempt to prepare had caused.
  - b. He hoped to learn what the attempt that prepared had caused.
  - c. He hoped to learn what the attempt to prepare the party had caused.
  - d. He hoped to learn what the attempt to prepare had caused the problem.
  - e. He hoped to learn what the attempt that prepared had caused the problem.
  - f. He hoped to learn what the attempt that prepared the party had caused.
- 8.
- a. She wanted to know what the offer to change had solved.
  - b. She wanted to know what the offer that changed had solved.
  - c. She wanted to know what the offer to change the room had solved.
  - d. She wanted to know what the offer to change had solved the problem.
  - e. She wanted to know what the offer that changed had solved the problem.
  - f. She wanted to know what the offer that changed the room had solved.
- 9.
- a. He needed to understand what the suggestion to add had required.
  - b. He needed to understand what the suggestion that add had required.
  - c. He needed to understand what the suggestion to add a class had required.
  - d. He needed to understand what the suggestion to add had required the approval.
  - e. He needed to understand what the suggestion that added had required the approval.
  - f. He needed to understand what the suggestion that added a class had required.
- 10.
- a. They failed to see what the offer to expand had changed.
  - b. They failed to see what the offer that expanded had changed.
  - c. They failed to see what the offer to expand the course had changed.
  - d. They failed to see what the offer to expand had changed the homework.
  - e. They failed to see what the offer that expanded had changed the homework.
  - f. They failed to see what the offer that expanded the course had changed.
- 11.
- a. She needed to hear what the plan to remove had destroyed.
  - b. She tried to hear what the plan that removed had destroyed.
  - c. She tried to hear what the plan to remove the tree had destroyed.

- d. She tried to hear what the plan to remove had destroyed the backyard.  
e. She tried to hear what the plan that removed had destroyed the backyard.  
f. She tried to hear what the plan that removed the tree had destroyed.
- 12.
- a. They hoped to accept what the proposal to increase had needed.  
b. They expected to accept what the proposal that increased had needed.  
c. They expected to accept what the proposal to increase the salaries had needed.  
d. They expected to accept what the proposal to increase had needed the information.  
e. They expected to accept what the proposal that increased had needed the information.  
f. They expected to accept what the proposal that increased the salaries had needed.
- 13.
- a. He failed to understand what the plan to preserve had described.  
b. He failed to understand what the plan that preserved had described.  
c. He failed to understand what the plan to preserve the park had described.  
d. He failed to understand what the plan to preserve had described the trees.  
e. He failed to understand what the plan that preserved had described the trees.  
f. He failed to understand what the plan that preserved the park had described.
- 14.
- a. She tried to see what the request to help had added.  
b. She tried to see what the request that helped had added.  
c. She tried to see what the request to help the town had added.  
d. She tried to see what the request to help had added the rules.  
e. She tried to see what the plan that helped had added the rules.  
f. She tried to see what the plan that helped the town had added.
- 15.
- a. He wanted to see what the suggestion to improve had changed.  
b. He wanted to see what the suggestion that improved had changed.  
c. He wanted to see what the suggestion to improve the design had changed.  
d. He wanted to see what the suggestion to improve had changed the size.  
e. He wanted to see what the suggestion that improved had changed the size.  
f. He wanted to see what the suggestion that improved the design had changed.
- 16.
- a. They hoped to discover what the threat to destroy had caused.  
b. They hoped to discover what the threat that destroyed had caused.  
c. They hoped to discover what the threat to destroy the books had caused.  
d. They hoped to discover what the threat to destroy had caused the fire.  
e. They hoped to discover what the threat that destroyed had caused the fire.  
f. They hoped to discover what the threat that destroyed the books had caused.
- 17.
- a. She planned to report what the idea to expand had required.  
b. She planned to report what the idea that expanded had required.  
c. She planned to report what the idea to expand the schedule had required.  
d. She planned to report what the idea to expand had required the location.  
e. She planned to report what the idea that expanded had required the location.

- f. She planned to report what the idea that expanded the schedule had required.
- 18.
- a. He wanted to reject what the effort to change had suggested.
- b. He wanted to reject what the effort that changed had suggested.
- c. He wanted to reject what the effort to change the assignment had suggested.
- d. He wanted to reject what the effort to change had suggested the worker.
- e. He wanted to reject what the effort that changed had suggested the worker.
- f. He wanted to reject what the effort that changed the assignment had suggested.
- 19.
- a. They needed to understand what the demand to remove had required.
- b. They needed to understand what the demand that removed had required.
- c. They needed to understand what the demand to remove the data had required.
- d. They needed to understand what the demand to remove had required the change.
- e. They needed to understand what the demand that removed had required the change.
- f. They needed to understand what the demand that removed the data had required.
- 20.
- a. He failed to investigate what the plan to preserve had damaged.
- b. He failed to investigate what the plan that preserved had damaged.
- c. He failed to investigate what the plan to preserve the school had damaged.
- d. He failed to investigate what the plan to preserve had damaged the walls.
- e. He failed to investigate what the plan that preserved had damaged the walls.
- f. He failed to investigate what the plan that preserve the school had damaged.
- 21.
- a. She wanted to see what the plan to develop had produced.
- b. She wanted to see what the plan that developed had produced.
- c. She wanted to see what the plan to develop the idea had produced.
- d. She wanted to see what the plan to develop had produced the project.
- e. She wanted to see what the plan that developed had produced the project.
- f. She wanted to see what the plan that developed the idea had produced.
- 22.
- a. They expected to discuss what the plan to repair had included.
- b. They expected to discuss what the plan that repaired had included.
- c. They expected to discuss what the plan to repair the motorcycle had included.
- d. They expected to discuss what the plan to repair had included the engine.
- e. They expected to discuss what the plan that repaired had included the engine.
- f. They expected to discuss what the plan that repaired the motorcycle had included.
- 23.
- a. They tried to understand what the request to change had affected.
- b. They tried to understand what the request that changed had affected.
- c. They tried to understand what the request to change the order had affected.
- d. They tried to understand what the request to change had affected the schedule.
- e. They tried to understand what the request that changed had affected the schedule.
- f. They tried to understand what the request that changed the order had affected.
- 24.

- a. He needed to discover what the recommendation to improve had achieved.
- b. He needed to discover what the recommendation that improved had achieved.
- c. He needed to discover what the recommendation to improve the course had achieved.
- d. He needed to discover what the recommendation to improve had achieved the goal.
- e. He needed to discover what the recommendation that improved had achieved the goal.
- f. He needed to discover what the recommendation that improved the course had achieved.

#### **Filler Sentences**

#### **Ungrammatical Fillers**

##### *Whether* Island

1. \* They wanted to know what the mechanic wondered whether she drives.
2. \*They tried to know what the agent wondered whether he bought.
3. \*We failed to hear what the waitress wondered whether they ate.
4. \*She hoped to know what the teacher wondered whether he read.

##### Relative Clauses

5. \*They hoped to see the man that you told me when she will visit.
6. \*I needed to see the clerk that he told us when she will employ.
7. \*They failed to see the woman that you told me when he will meet.
8. \*We wanted to see the flat that my mother told me when she will rent.

##### Complex NP

9. \*She tried to know what the girl believed the lie that he took.
10. \*I struggled to know what the fisherman denied the fact that they caught.
11. \*They needed to hear what the man discovered the secret that she stole.
12. \*They wanted to know what the teacher reported the news that he received.

##### Adjunct Island

13. \*They wanted to know what the student passed the exam because he used.
14. \*I hoped to know what they closed the window after she saw.
15. \*They wanted to know what he saw the photo when she opened.
16. \*They wanted to learn what we sent the email before he checked.

##### Subject Island

17. \*We tried to know what she thought the picture of frightened the boy.
18. \*They tried to hear what she thought the discovery by surprised the world.
19. \*They failed to hear what we thought the loan from helped the victims.
20. \*I hoped to know what they thought the meeting with helped the school.

##### Null Subject

21. \*We wanted to know if they cried when lost their way.
22. \*She tried to know if he played games when attended the lesson.
23. \*We tried to know if she felt sick when took the examination.
24. \*They wanted to know if she burned her fingers when cooked the chicken.

#### **Grammatical Fillers**

1. She remembered what the driver said the mechanic had fixed.
2. He knew what the neighbor believed the children had destroyed.
3. We understood what the man thought the police had said.
4. He forgot what the doctor thought the patient had decided.

5. She asked who the story about our cat was meant to frighten.
6. He asked who the book about their house was written to scare.
7. We asked who the film about them was shown to influence.
8. We asked who the report about them was hidden to protect.
  
9. She said the medicine that the pharmacy sold had helped the man.
10. We said the song that the girl played had delighted the audience.
11. He said the horse that the boy rode had won the race.
12. She said the cat that the boy saw had caught the rat.
  
13. She discovered the secret that he had stolen the pizza.
14. They reported the news that we had received the award.
15. She repeated the story that he had written the letter.
16. He learned the truth that the they had broken the window.
  
17. She wondered where he had found the map.
18. We knew how he had stolen the necklace.
19. They wondered why he had taken the passport.
20. She wondered whether we had sold the television.
  
21. He wanted to know what they had used to fix the car.
22. They wanted to know what she had done to help the students.
23. She tried to remember what we had suggested to finish the project.
24. We struggled to understand what she had suggested to solve the problem.