

# Investigating Relative Clause Island Effects in Native and Nonnative Adult Speakers of Japanese

Nozomi Tanaka and Bonnie D. Schwartz

## 1. Introduction

A *wh*-question whose *wh*-phrase originates inside of a relative clause (RC) is ungrammatical in English. The example in (1b), derived from (1a), shows an object *wh*-question whose *wh*-phrase originates within a (subject) RC.

- (1) a. John saw [the girl [that \_\_ bought an apple]].  
b. \* What did John see [the girl [that \_\_ bought <what>]]?

The impossibility of *wh*-movement in this type of syntactic configuration instantiates one of the island constraints proposed by Ross (1967), and this type of island is called the RC island, a subtype of the complex NP island. While RCs constitute islands, complement *that*-clauses do not. As a result, long-distance *wh*-movement is possible, as seen in (2b), derived from (2a).

- (2) a. John said [that the girl bought an apple].  
b. What did John say [that the girl bought <what>]?

In *wh-in-situ* languages like Chinese, Japanese, and Korean, on the other hand, there is a grammatical *wh*-counterpart of the question in (1b) (Choe, 1987; Huang, 1982; Nishigauchi, 1986). This is illustrated in the Japanese example in (3b), derived from (3a).

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\* Nozomi Tanaka, Indiana University, tanakan@indiana.edu. Bonnie D. Schwartz, University of Hawai'i, bds@hawaii.edu. Our thanks to: Stewart Curry, Shirley Dang, Kamil Deen, Yasuharu Den, Shin Fukuda, Keiko Hata, Makiko Hirakawa, Yaihiro Hirakawa, Yuki Hirose, Kazue Kanno, Catherine Kobayashi, Sayaka Koyama, William O'Grady, Koki Shioda, Jon Sprouse, Kazunori Suzuki, Shigeo Tonoike, Tomokazu Ushitani, and Natsumi Yoshida; at the University of Hawai'i, the Elizabeth Carr-Holmes Scholarship fund from the Department of Second Language Studies and the Linguistics Beyond the Classroom program; at Indiana University, the School of Global and International Studies, the Second Language Studies Colloquium, and the Syntax and Processing Working Group; audiences at BUCLD 42, EuroSLA 27, JK25, JSL2017, and TEAL-11; and, of course, our participants.

- (3) a. Taro-wa [[ \_\_ ringo-o katta] onnanoko]-o mimashita.<sup>1</sup>  
 Taro-TOP [[ apple-ACC bought] girl]-ACC saw  
 ‘Taro saw [the girl [that \_\_ bought an apple]].’
- b. Taro-wa [[ \_\_ nani-o katta] onnanoko]-o mimashita ka?  
 Taro-TOP [[ what-ACC bought] girl]-ACC saw Q  
 ‘What did Taro see [the girl [that \_\_ bought <what>]]?’

However, much like English *why* questions in (4), Japanese *naze* ‘why’ questions are island sensitive, as shown in (5) (Nishigauchi, 1986; Richards, 2008). Although there is no overt *wh*-movement and *naze* ‘why’ stays *in situ*, it is not possible to form a *wh*-question in which *naze* ‘why’ originates and remains inside of an RC.

- (4) \* Why did you read [the books [that he wrote \_\_ <why>]]?
- (5) \* Kimi-wa [[kare-ga \_\_ naze kaita] hon]-o yomimashita ka?  
 you-TOP [[he-NOM why wrote] book]-ACC read Q  
 ‘Why did you read [the books [that he wrote \_\_ <why>]]?’  
 (Nishigauchi, 1986, p. 54 (60))

This distribution of absence vs. presence of island effects in Japanese poses interesting questions for a theoretical understanding of *wh*-movement and islands. Richards (2008) offers a comprehensive review of different approaches to phenomena related to Japanese *wh*-questions, including island effects. For the purpose of the current study, it suffices to say that compared to English (and other *wh*-movement languages), certain kinds of island effects are missing in Japanese (and other *wh-in-situ* languages), as the examples in (3b) and (5) indicate.

Because of such cross-linguistic differences, island constraints have been one of the most widely investigated phenomena in formal second language (L2) research. Previous studies suggest that L2 acquirers (L2ers) whose native language (L1) is a *wh-in-situ* language can come to know island constraints in the *wh*-movement target language (TL). Bley-Vroman, Felix, and Ioup (1988), for example, examined whether adult L1-Korean L2ers of English make target-like contrasts between grammatical and ungrammatical English *wh*-questions, specifically rejecting ungrammatical sentences instantiating various types of island violations. The results from the (written) acceptability judgment task (AJT) showed that the L2ers ( $n = 92$ ) correctly rejected RC island violations like (1b) 92% of the time. Similarly, Johnson and Newport (1991) tested L1-Mandarin L2ers of English ( $n = 23$ ) employing an (aural) AJT and found that their mean acceptance rate for RC-internal *wh*-questions was only about 20.83% (mean of 2.5 out of 12 items; this estimate based on their graph).

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1. List of abbreviations: ACC = accusative, C = complementizer, NOM = nominative, Q = question particle, TOP = topic

While there have been many studies on the L2 acquisition of English *wh*-questions by L1 speakers of *wh-in-situ* languages (two recent examples testing for island sensitivity, both of which employ AJT designs similar to ours, are Aldosari, 2015 and Kim, 2015), little attention has been paid to the reverse scenario, and none focusing on complex NP islands (Belikova & White, 2009, p. 220, fn. 5). The present study therefore addresses this gap by probing whether adult L1-English L2ers of Japanese can come to know that RC-internal *wh-in-situ* questions like (3b) are possible in Japanese, despite the ungrammaticality of their *wh*-moved L1 counterparts.

Much L2 research suggests that L2ers often make (extensive) use of their L1 grammar and develop their Interlanguage knowledge based on TL input. The Full Transfer/Full Access model (Schwartz & Sprouse, 1996) attempts to capture this by hypothesizing that the initial state of L2 acquisition is the L1 grammar (“Full Transfer”) but subsequent development is constrained by Universal Grammar (“Full Access”). Under this framework, L1-English L2ers of Japanese are expected to demonstrate RC island effects initially but be able to converge on the target Japanese grammar later in development.

In the following sections, we describe our study, including (a) the methodology of our AJT (modeled on Sprouse, Wagers, & Phillips, 2012) testing for Japanese RC island effects, (b) the Language History Questionnaire (LHQ; Li, Zhang, Tsai, & Puls, 2014), and (c) a Japanese cloze test designed by Marsden (2004), and report on results from these tasks.

## 2. Method

### 2.1. Participants

Our participants consisted of 20 L1-English L2ers of Japanese as well as 16 native speakers of Japanese as controls. Two of the L2ers were excluded from the analysis due to lack of cloze test results. In addition, outliers were detected based on the ratings of fillers in the AJT (see below); participants with sums of squares that were two standard deviations or more away from the mean were identified as outliers, and this led to the removal of two additional L2ers.<sup>2</sup> The remaining L2 participants ( $n = 16$ ) were further divided into the “Intermediate” group ( $n = 10$ ) and the “Advanced” group ( $n = 6$ ) based on the results from the 42-item cloze test used in Marsden (2004, 2009). The cloze test was scored using the exact-word scoring method, following Marsden (2004, 2009). The L2ers who scored 12 or higher were classified as Advanced, and the rest as Intermediate. This cut-off score was also used by Marsden (2004, 2009), as 12 was the lowest score among the Japanese native speakers in her study. Table 1 shows the participants’ age at testing, age of Japanese onset, years spent in Japan, and cloze test scores.

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2. Because the mean native-speaker rating for one of the two types of grammatical fillers (F2, multiple *wh*-question—see below) was marginal, this type was not used for outlier screening. Note also that all analyses reported on below were performed without removal of the outliers as well, with no change in results or in statistical significance.

**Table 1. Participant information**

	Native speakers ( <i>n</i> = 16)		L2ers ( <i>n</i> = 16)			
	Range	Mean	Intermediate ( <i>n</i> = 10)		Advanced ( <i>n</i> = 6)	
Age at testing	19–30	21	19–37	28	26–32	28.67
Age of Japanese onset			4–21 <sup>3</sup>	15.20	10–17	14.67
Years spent in Japan			0–9	4.17	1–5	2.25
Cloze test scores (max = 42)	18–34	25.56	1–11	5.70	12–22	17.83

Participants were recruited at both Chiba University and Chuo University in Japan and at the University of Hawai‘i at Mānoa as well as via social networking sites and e-mail. Out of the 32 participants included in the analysis, 15 (Native: *n* = 1, Intermediate: *n* = 8, Advanced: *n* = 6) completed the experiment remotely online. The remaining participants took part in the experiment at the testing sites with an experimenter present. They received a small monetary amount as compensation for participating in the study.

## 2.2. Materials

Our study comprised the LHQ, the cloze test, and, as the main task, an AJT. The questions in the LHQ were selected from those prepared by Li et al. (2014). While Li et al. provide the LHQ in multiple languages, they did not have one for Japanese. The LHQ was therefore translated into Japanese by the first author for use with the Japanese native speakers. As for the cloze test (see above), *furigana*—the phonetic guides written in the Japanese syllabary *hiragana*—were added for the *kanji* (Chinese characters) that did not have them in Marsden’s (2004) original version.

The AJT was constructed using a 2 × 2 crossed factorial design (Sprouse et al., 2012). The logic of the design is as follows: Because *wh*-questions and RCs both involve relatively complex structures that may induce some inherent processing difficulty, RC-internal *wh-in-situ* questions may receive relatively lower ratings—even by native Japanese speakers—by virtue of their complexity. Based on the assumption that the RC island effect is *independent* of any processing effect associated with *wh*-questions or RCs (Sprouse et al., 2012), it is necessary to compare RC-internal *wh-in-situ* questions with lexically matched sentences involving another type of question and another type of embedded clause that do not constitute islands. For this reason, the control conditions are *yes/no*-questions and complement *-to* ‘that’ clauses.

3. There was only one L2er whose age of Japanese onset was ≤ 7, thereby qualifying as a child L2er (e.g., Schwartz, 2004); however, this L2 participant’s cloze test score was a mere 5 (out of 42). All other L2ers started acquiring Japanese at the age of 10 or older.

The AJT thus treated QUESTION types and EMBEDDED-CLAUSE types as the two factors. Each factor had two levels: for QUESTION, *wh*-question [+WH] and *yes/no*-question [-WH]; for EMBEDDED CLAUSE (henceforth “EMBEDDED”), relative clause [+RC] and complement *-to* ‘that’ clause [-RC]. This design yields the critical condition as in (6a), and three control conditions as in (6b–d). Condition (6d), a matrix *yes/no*-question with a complement *-to* ‘that’ clause, was the baseline condition, as it is presumed to cause the least processing effort.

(6) A factorial design for measuring RC island effects: QUESTION × EMBEDDED

a. **Critical:** [+WH, +RC]

Momoko-wa [[ \_\_ nani-o katta] otokonohito]-o mimashita ka?  
 Momoko-TOP [[ what-ACC bought] man]-ACC saw Q  
 ‘What did Momoko see [the man [that \_\_ bought <what>]]?’

b. **Control 1:** [-WH, +RC]

Momoko-wa [[ \_\_ kaban-o katta] otokonohito]-o mimashita ka?  
 Momoko-TOP [[ bag-ACC bought] man]-ACC saw Q  
 ‘Did Momoko see [the man [that \_\_ bought a bag]]?’

c. **Control 2:** [+WH, -RC]

Momoko-wa [otokonohito-ga nani-o katta]-to iimashita ka?  
 Momoko-TOP [man-NOM what-ACC bought]-C said Q  
 ‘What did Momoko say [that the man bought <what>]?’

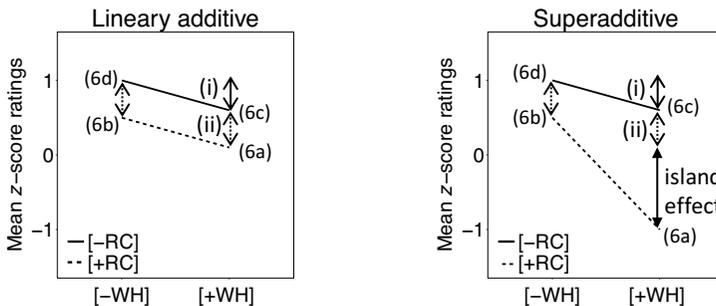
d. **Control 3:** [-WH, -RC]

Momoko-wa [otokonohito-ga kaban-o katta]-to iimashita ka?  
 Momoko-TOP [man-NOM bag-ACC bought]-C said Q  
 ‘Did Momoko say [that the man bought a bag]?’

Crucially, all four conditions should be acceptable in Japanese according to previous work (e.g., Nishigauchi, 1986; Richards, 2008), and only condition (6a) does not have an acceptable English counterpart. Our principal interest was whether the presence of the *wh*-phrase inside of the RC triggers the RC island effect for the L2ers, as the English *wh*-counterpart of (6a) is unacceptable.

Our factorial design isolates the RC island effect in the following ways. First, in order to account for the processing cost associated with *wh*-questions alone, *yes/no*-questions [-WH, -RC] (6d) and *wh*-questions [+WH, -RC] (6c) are compared, holding the embedded-clause type constant (complement clause instead of relative clause). Second, the processing cost associated only with RCs is captured as the difference between complement *-to* ‘that’ clauses [-WH, -RC] (6d) and RCs [-WH, +RC] (6b), both involving *yes/no*-questions. If there is no island effect associated with the critical condition (6a), then the cost of processing RC-internal *wh-in-situ* questions—captured as the difference between (6a) and the baseline condition (6d)—should basically equal the mere addition of the two aforementioned effects: (i) the acceptability difference between *yes/no*-questions

and *wh*-questions, i.e., (6d) vs. (6c), and (ii) the acceptability difference between complement *-to* ‘that’ clauses and RCs, i.e., (6d) vs. (6b). This kind of relationship is referred to as “linearly additive” in Sprouse et al. (2012), in which there is no statistically significant interaction between the two factors (here, QUESTION and EMBEDDED). This is what we expect for native speakers of Japanese. The same can be predicted for advanced L1-English L2ers of Japanese, if they have been able to develop target-like L2 knowledge of the lack of RC island effects in Japanese (“Full Access”). This prediction is visualized in the left panel of Figure 1, in which the slope of each line, i.e., (i), reflects the acceptability difference between (6d) and (6c), and the gap between the two parallel lines, i.e., (ii), reflects the acceptability difference between (6d) and (6b).



*Note.* (i) represents the acceptability difference between *yes/no*-questions (6d) and *wh*-questions (6c); (ii) represents the acceptability difference between complement *-to* ‘that’ clauses (6d) and RCs (6b).

**Figure 1. Predicted results for native Japanese speakers and advanced L1-English L2ers of Japanese, with a linearly additive relationship (left) and for intermediate L1-English L2ers of Japanese, with a superadditive interaction (right).**

On the other hand, if there is an RC island effect associated with (6a), there should be an additional unacceptability effect associated with (6a) that cannot be explained by the simple addition of (i) the acceptability difference between the two question types ((6d) and (6c)) and (ii) the acceptability difference between the two embedded-clause types ((6d) and (6b)). This is referred to as a “superadditive” interaction (Sprouse et al., 2012), i.e., a statistically significant interaction between the two factors, and is schematized in the right panel of Figure 1. Intermediate L1-English L2ers are predicted to exhibit this pattern, showing transfer of the RC island effect from their L1, English, to their Interlanguage Japanese (“Full Transfer”), as the presence of the *wh*-phrase inside the RC triggers an island effect in L1 English.

There were 40 test items ( $k = 10$  per condition), which were distributed to four lists using a Latin Square design such that each list contained 10 items of each condition. The RCs used in the [+RC] conditions (6a, b) were always subject RCs, in which the subject is relativized. This is because object RCs are associated

with increased processing difficulty, even for native speakers (for review, see Tanaka, 2016). As a result, the *wh*-questions were always object *wh*-questions. Half of the direct objects inside the embedded clauses were animate (*dare* ‘who’ in case of [+WH]) and the other half were inanimate (*nani* ‘what’ in case of [+WH]);<sup>4</sup> all were accusative and marked with the case marker *-o*. The canonical position for complement *-to* ‘that’ clauses is not sentence-initial; therefore, the RCs always modified a matrix object in conditions (6a, b), so that the overall structure of the types with RCs is parallel to that of the types with complement *-to* ‘that’ clauses in conditions (6c, d).

The four types of fillers, F1–F4, are illustrated in (7):

- (7) a. **F1: Matrix *wh*-question with an RC** (grammatical) ( $k = 10$ )  
 Dare-ga [[ \_\_ shatsu-o katta] otokonohito]-o sagashimashita ka?  
 who-NOM [[ shirt-ACC bought] man]-ACC looked.for Q  
 ‘Who looked for [the man [that \_\_ bought a shirt]]?’
- b. **F2: Multiple *wh*-question with an RC** (grammatical) ( $k = 10$ )  
 Dare-ga [[ \_\_ nani-o eranda] onnanohito]-o mimashita ka?  
 who-NOM [[ what-ACC chose] woman]-ACC saw Q  
 ‘Who saw [the woman [that \_\_ chose what]]?’
- c. **F3: Theta-criterion violation** (ungrammatical) ( $k = 10$ )  
 \*Nani-o Takao-wa mado-o warimashita ka?  
 what-ACC Takao-TOP window-ACC broke Q  
 ‘What did Takao break a window?’
- d. **F4: RC-internal *naze* ‘why’ *in-situ* question** (ungrammatical) ( $k = 10$ )  
 \*Akemi-wa [[ \_\_ kaban-o **naze** nusunda] dansee]-o  
 Akemi-TOP [[ bag-ACC why stole] man]-ACC  
 sagashimashita ka?  
 looked.for Q  
 ‘Why did Akemi look for [the man [that \_\_ stole the bag <why>]]?’

Of the 40 fillers, half were grammatical and half were ungrammatical. The two types of grammatical fillers, F1 and F2, were matrix subject *wh*-questions with a subject RC (7a) and multiple *wh*-questions with a subject RC (7b). The two types of ungrammatical fillers, F3 and F4, consisted of theta-criterion violations (7c) and *naze* ‘why’ *in-situ* questions that originate within a subject RC (7d). The latter two types were selected since the English counterparts are also ungrammatical; L1 transfer notwithstanding, L2ers should treat (7c) and (7d) as ungrammatical.

4. Animacy was controlled to address a possible confound: Animate objects may lower acceptability because objects are prototypically inanimate (Comrie, 1979, p. 19). See fn. 5.

In total, each participant saw 80 stimuli. All stimuli were constructed with words from the vocabulary lists used for the first two years of Japanese instruction at the University of Hawai‘i at Mānoa.

### 2.3. Procedure

Participants began with the computerized presentation of the AJT. They first read the instructions (adapted from Bley-Vroman et al., 1988), in which they were asked to rate the naturalness of each sentence based on their intuition by clicking on one of the numbers on a scale of 1 (*very unnatural*) to 4 (*very natural*) or on the off-scale “I don’t know” option. Next, one of the four lists was randomly assigned to each participant. Stimuli were presented in a randomized order, and the computer screen displayed 10 items at a time. After exiting a screen, participants were not able to go back.

The AJT was followed by the LHQ and then the cloze test. All tasks were completed by both native speakers and L2ers. The data were collected using a combination of two online survey tools: Qualtrics (<http://www.qualtrics.com>) for the AJT; JotForm (<https://www.jotform.com/>) for both the LHQ and the cloze test. Participants spent as much time as they wanted to finish the experiment; together, all three tasks took approximately 20–30 minutes for the native speakers and 30–60 minutes for the L2ers. The whole session was administered in Japanese to the Japanese native speakers. For the L2 participants, the experiment was administered in English, and when Japanese sentences were necessary, all the *kanji* characters were accompanied by *furigana*, phonetic guides written in *hiragana*. This is because L2ers of Japanese are typically taught *hiragana* before *kanji*, and it is possible for them to know certain words but not know how they are written in *kanji*.

### 3. Results

Twenty-one items (Native: 1, Intermediate: 17, Advanced: 3, for a total of 0.82% of all responses) were removed from analysis because the response was “I don’t know” or left blank. The raw acceptance ratings were converted into *z*-scores following Sprouse et al. (2012) to eliminate scale bias. Table 2 provides the means and standard deviations (SDs) of participants’ ratings in each condition by group. The first thing to notice in Table 2 is that all groups rate the critical condition lower than the other three conditions.

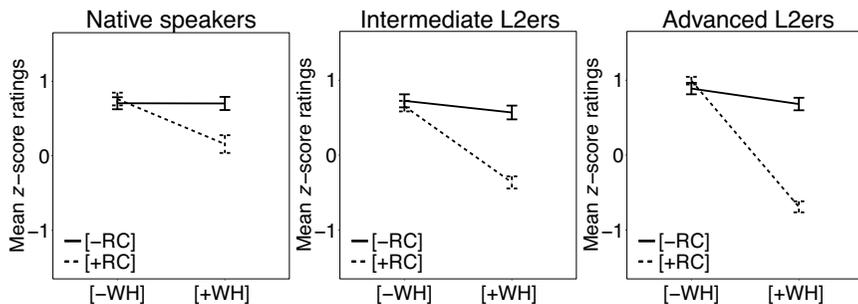
**Table 2. Means and standard deviations of participants' ratings (z-scores) in each condition**

	Native ( <i>n</i> = 16)		L2ers ( <i>n</i> = 16)	
			Intermediate ( <i>n</i> = 10)	Advanced ( <i>n</i> = 6)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Critical: [+WH, +RC]	0.16 (0.76)	-0.36 (0.79)	-0.69 (0.57)	
Control 1: [-WH, +RC]	0.76 (0.54)	0.65 (0.70)	0.99 (0.39)	
Control 2: [+WH, -RC]	0.70 (0.56)	0.57 (0.91)	0.68 (0.65)	
Control 3: [-WH, -RC]	0.70 (0.52)	0.72 (0.86)	0.89 (0.59)	

The results were fit to a linear mixed-effects model for each group (Native, Intermediate, and Advanced), with QUESTION ([+WH], [-WH]) and EMBEDDED ([+RC], [-RC]) as fixed factors and with items and participants as random factors. All *p*-values were estimated using the *lmerTest* package (Kuznetsova, Brockhoff, & Christensen, 2017) for R (R Core Team, 2017). Table 3 reports the *p*-values for each factor. The interaction plots for each group are given in Figure 2.

**Table 3. *p*-values for the linear mixed-effects models for each group**

	Native ( <i>n</i> = 16)	L2ers ( <i>n</i> = 16)	
		Intermediate ( <i>n</i> = 10)	Advanced ( <i>n</i> = 6)
Main effect of QUESTION	<.001	<.001	<.001
Main effect of EMBEDDED	.36	.65	.34
Interaction of QUESTION × EMBEDDED	.001	<.001	<.001

**Figure 2. Interaction plots per group (error bars represent 95% confidence intervals).**

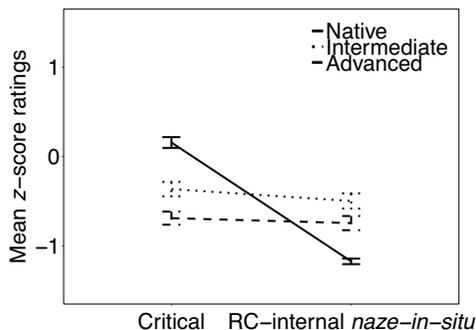
All three groups of participants showed a significant main effect of QUESTION as well as a significant interaction between QUESTION and EMBEDDED.<sup>5</sup> This means

5. When ANIMACY of the *wh*-phrase was added as a fixed factor to the models (see fn. 4), it, too, emerged as a main effect for native speakers ( $p < .001$ ) and Intermediate L2ers ( $p = .003$ ), but not for Advanced L2ers ( $p = .26$ ). Importantly, the QUESTION × EMBEDDED interaction remained significant (Native,  $p = .001$ ; Intermediate,  $p < .001$ ).

that contrary to the prediction based on previous work on Japanese (e.g., Nishigauchi, 1986), native Japanese speakers do exhibit a superadditive interaction for RC-internal *wh-in-situ* questions. And so do both groups of L2ers.

However, a closer look into the ratings on fillers suggests that the superadditivity we observed for the Japanese native speakers is not a true island effect. We came to this interpretation based on the comparison of ratings between the critical items in (6a) and the F4 ungrammatical fillers in (7d), i.e., the RC-internal *naze* ‘why’ *in-situ* questions. The latter type was not part of the original Latin square design, but because RC-internal *naze* ‘why’ *in-situ* questions like (7d) and their *wh*-moved English counterparts are ungrammatical in both languages, these F4 fillers, we reasoned, should be able to tell us whether in Japanese, RCs containing *naze* ‘why’ and RCs containing argument *wh*-phrases are equally island sensitive to native Japanese speakers and L2ers.

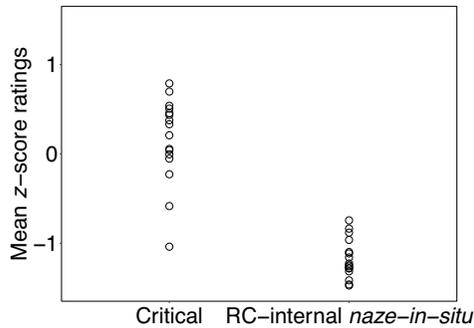
Figure 3 compares the mean acceptability ratings of these two question types by group. The first thing to note is that neither L2 group showed a significant difference between them (Intermediate,  $p = .28$ ; Advanced,  $p = .63$ ); in fact, there was very little unacceptability difference between the two question types for either L2 group.



**Figure 3. Ratings on critical items (type (6a)) and ungrammatical RC-internal *naze* ‘why’ *in-situ* fillers (type (7d)).**

By contrast, the native speakers of Japanese made a sharp distinction between the two question types: They rated the critical items significantly higher than the RC-internal *naze* ‘why’ *in-situ* fillers ( $p < .001$ ). This means that although, as we have seen, the native Japanese speakers rated the critical items, on average, significantly lower than the control items in conditions (6b–d), they did not rate these critical items, on average, as low as the F4 items, the RC-internal *naze* ‘why’ *in-situ* questions.

A question arises as to whether this mean z-score rating for the critical condition—viz., 0.16—is due to variation among individuals. Figure 4 shows this is not so by providing each native Japanese speaker’s mean ratings on the critical items and the F4 RC-internal *naze* ‘why’ *in-situ* items.



**Figure 4.** Each native Japanese speaker's mean *z*-score ratings on critical items (type (6a)) and RC-internal *naze* 'why' *in-situ* questions (type (7d)).

Despite the fact that Figure 4 indicates that the critical condition exhibited some rating variation, all except one native Japanese speaker rated the critical items higher than the F4 *naze* 'why' *in-situ* fillers (the mean ratings for which varied much less: critical,  $SD = 0.76$ ; F4,  $SD = 0.40$ ). It is therefore not the case that the native group's mean rating of the critical condition was due to a bimodal distribution in which some rated it high and others rated it low.

#### 4. Discussion

The results from the present study can be summarized as follows: All groups of participants, including native Japanese speakers, showed the superadditivity effect, which was designed to reflect an RC island effect. The native results contradict the findings of previous linguistic work on Japanese (e.g., Nishigauchi, 1986; Richards, 2008), which in turn makes it difficult to interpret the L2 results.

Closer examination of the data, however, revealed that Japanese native speakers rated critical items significantly higher than RC-internal *naze* 'why' *in-situ* questions, but that L2ers rated these two types equally low. These findings suggest two points: first, that the native speakers' lower ratings on critical items are likely not a true indication of an RC island effect; second, that the L2ers evinced the RC island effect transferred from their L1 with both critical items and *naze* 'why' *in-situ* fillers. That is, even though native-speaker and L2 groups alike show superadditivity, the source of the effect is different in the two groups: For the L2ers, we speculate that this is a grammatical effect transferred from their L1; for the native Japanese speakers, the superadditive interaction most likely represents some other type of effect that was not fully controlled in our design.

#### 5. Conclusion and Future Directions

This study investigated whether L1-English L2ers of Japanese (come to) know that questions like (8a), repeating (6a), in which an object *wh*-phrase originates and remains inside of a subject RC, are acceptable in Japanese.

(8) a. **Critical: [+WH, +RC]**

Momoko-wa [[ \_\_ **nani**-o katta] otokonohito]-o mimashita ka?  
 Momoko-TOP [[ what-ACC bought] man]-ACC saw Q  
 ‘What did Momoko see [the man [that \_\_ bought <what>]]?’

b. **Control 1: [-WH, +RC]**

Momoko-wa [[ \_\_ kaban-o katta] otokonohito]-o mimashita ka?  
 Momoko-TOP [[ bag-ACC bought] man]-ACC saw Q  
 ‘Did Momoko see [the man [that \_\_ bought a bag]]?’

c. **Control 2: [+WH, -RC]**

Momoko-wa [otokonohito-ga **nani**-o katta]-to iimashita ka?  
 Momoko-TOP [man-NOM what-ACC bought]-C said Q  
 ‘What did Momoko say [that the man bought <what>]?’

d. **Control 3: [-WH, -RC]**

Momoko-wa [otokonohito-ga kaban-o katta]-to iimashita ka?  
 Momoko-TOP [man-NOM bag-ACC bought]-C said Q  
 ‘Did Momoko say [that the man bought a bag]?’

The type in (8a) was compared with its *yes/no*-question counterpart in (8b) and with their complement *-to* ‘that’ clause counterparts in (8c) and (8d). The RC island effect was operationalized as the superadditive interaction that cannot be explained as a simple combination of (i) the processing effect of a *wh*-question (instead of a *yes/no*-question) with (ii) the processing effect of an RC (instead of a complement *-to* ‘that’ clause). Intermediate L2ers were predicted to show the superadditivity effect, transferring their L1 knowledge of the ungrammatical English *wh*-moved counterpart of (8a), whereas advanced L2ers were predicted not to show superadditivity, as were native Japanese speakers. The results from an acceptability judgment task revealed that not only (both groups of) the L2ers but also the native speakers exhibited superadditivity for the critical condition exemplified in (8a), contrary to what has been reported in the theoretical linguistics literature for Japanese.

As speculated above, however, it might be the case that the superadditivity effect exhibited by the native Japanese speakers does not truly indicate an RC island effect, given that they rated the critical items significantly higher than the ungrammatical fillers that unquestionably involve an RC island violation (i.e., RC-internal *naze* ‘why’ *in-situ* questions). By contrast, the L2ers did not show any statistically significant difference between these two types, which could arguably be explained by L1 transfer.

The question remains as to what the superadditivity effect means in the native-speaker group. It is possible that there were additional processing factors that were not fully captured by our factorial design. Further research with native Japanese speakers is therefore necessary in order to understand why superadditivity was observed in the native-speaker group, such as a replication

with facilitative contexts before the stimuli.<sup>6</sup> Another possible direction to pursue is to compare proficiency-matched groups of L2ers of Japanese who have various L1 backgrounds, more specifically, L2ers with a *wh-in-situ* L1, such as Korean, and L2ers with a *wh*-movement L1, like English. L1-Korean L2ers of Japanese are predicted both to behave like native Japanese speakers from the start and to differ significantly, at least initially, from L1-English L2ers of Japanese.

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6. In follow-up experiments, we conducted two AJTs that compared factives such as (i) and (ii) with RCs (e.g., (6a)/(8a) and (6b)/(8b)) and with complement *-to* ‘that’ clauses (e.g., (6c)/(8c) and (6d)/(8d)) to see whether the superadditivity effect we found is the result of processing *multiple dependencies*. Like RCs, factives are known to be island sensitive in English but not in Japanese. However, an RC-internal *wh-in-situ* question involves two dependencies—one between a *wh*-phrase and a question particle (Aoshima, Phillips, & Weinberg, 2004; Ishihara, 2002; Miyamoto & Takahashi, 2002; Ueno & Kluender, 2009), the other a filler-gap dependency—but a factive-internal *wh-in-situ* question has only one, since it does not have a filler-gap dependency.

- (i) Momoko-wa [[otokonohito-ga **nani**-o katta]-toiu setsumee]-o  
 Momoko-TOP [[man-NOM what-ACC bought]-C explanation]-ACC  
 shimashita ka?  
 did Q  
 ‘What did Momoko give [the explanation [that the man bought <what>]]?’
- (ii) Momoko-wa [[otokonohito-ga kaban-o katta]-toiu setsumee]-o  
 Momoko-TOP [[man-NOM bag-ACC bought]-C explanation]-ACC  
 shimashita ka?  
 did Q  
 ‘Did Momoko give [the explanation [that the man bought a bag]]?’

Preliminary results from Japanese native speakers showed no significant difference between RCs and factives, but there was a significant superadditive interaction between factives and complement *-to* ‘that’ clauses, thereby suggesting that the number of dependencies does not explain the native superadditivity effect that was obtained in our original experiment.

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