Reassembly of Uninterpretable Features in L2 Acquisition: Evidence from *Wh*-questions

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1. Introduction

The acquisition of *wh*-movement by speakers of *wh*-in-situ languages, such as Japanese and Chinese, has been one of the most important issues in generative approaches to second language acquisition (GenSLA) (e.g., Bley-Vroman et al., 1988; Schachter, 1989; Johnson & Newport, 1991; Martohardjono, 1993; White & Juffs, 1998; Hawkins & Hattori, 2006; Umeda, 2006, 2008; Choi, 2009; Kimura, 2022).

In English, *wh*-phrases are obligatory fronted, as in (1a), whereas they stay in situ in Japanese (1b).

(1) a. **What** do you think that Bill bought___?
b. Anata-wa Bill-ga **nani-o** katta to omoimasu ka?
you-TOP Bill-NOM what-ACC bought COMP think Q

The acquisition of obligatory *wh*-movement appears to be easy for Japanese learners of English (JLEs) because even in Japanese, *wh*-phrases can optionally be fronted via *scrambling*:

(2) **Nani-o** anata-wa Bill-ga *t* katta to omoimasu ka?

However, *wh*-scrambling is not constrained by some conditions that constrain obligatory *wh*-movement (see Section 2), and to acquire subtle and abstract properties of *wh*-movement, L2ers must acquire the uninterpretable feature that drives *wh*-movement. This study investigates whether JLEs can acquire the target-like feature configuration and *wh*-movement and proposes how L2 acquisition of abstract features occurs.

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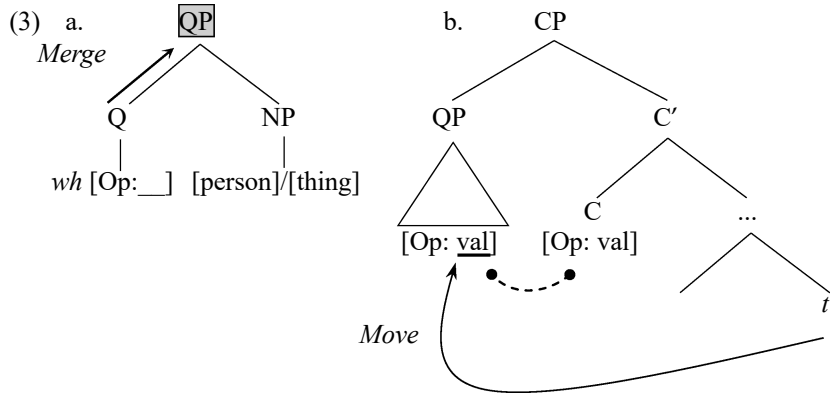
2. Syntax of *Wh*-questions
2.1. English

As mentioned above, *wh*-questions in English are formed via *wh*-movement. As illustrated in (3a), *wh*-phrases in English are composed of a Q-head and a restrictor NP. In this structure, the Q-head has the uninterpretable [Op:__] feature and is merged with a restrictor NP. The entire QP undergoes movement (i.e., *wh*-movement) due to the presence of the unvalued [Op:__] feature (see e.g., Chomsky, 2001, 2013; Cable, 2010; see Bošković, 2007 for the mechanism of *Move* and *Agree*), and the feature gets valued via *Agree* with the C-head (3b).



Various kinds of islands constrain *wh*-movement (Ross, 1967), and different types of islands induce different degrees of ungrammaticality (Chomsky, 1986). Extraction out of *noun complements* (NC) and *embedded question* (EQ) islands induce a relatively weak degree of ungrammaticality, and extraction out of *relative clause* (RC) and *adjunct* (ADJ) islands induce strong ungrammaticality:

(4) a. ??What do you believe [NC-ISLAND the claim that Alice saw___]?
b. ??What did you ask [EQ-ISLAND whether Edward bought___]?
c. *What did Kate find the woman [RC-ISLAND who fixed___]?
d. *What did you wake up [ADJ-ISLAND after Erika cooked___]?

Strong- and weak-island effects result from different causes. Strong islands such as RCs and ADJs are built up in the workspace separate from the core-clause spine and late-adjoined to it (Uriagereka, 1999; Nunes & Uriagereka, 2001). Elements that have been built freeze, and extraction out of the frozen unit is barred.[1] In contrast, extraction out of weak islands does not involve such a

[1] This "unit" is a spelled-out/transferred domain in the sense of Chomsky (2001). Once a relative or adjunct clause is formed, they constitute a phase, and the phase-internal element becomes inaccessible to extraction (Chomsky, 2001).

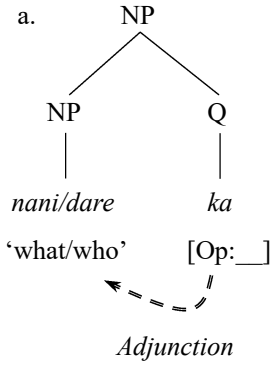
workspace-crossing movement; the ungrammaticality is milder than strong island violations. Instead, since *wh*-movement occurs in a cycle-by-cycle fashion, the extracted element must stop at the edge of intermediate cycles in extracting out of weak islands. However, these positions have already been filled by another element such as *the claim* or *whether*. Weak-island violations are caused by the presence of such elements at the intermediate edges (see e.g., Reinhart, 1981).

2.2. Japanese

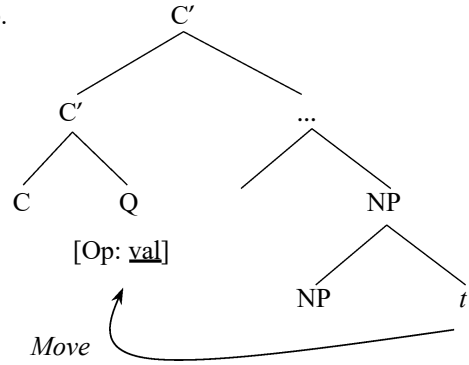
As noted above, Japanese is a *wh*-in-situ language, where *wh*-phrases stay within an embedded clause while taking matrix scope. In Japanese, it is not *wh*-phrases, but quantificational particles such as *ka* (existential/interrogative) or *mo* (universal), that have an Op-related property. If *nani* "what" occurs with *ka*, it receives an existential and/or interrogative interpretation, and if it occurs with *mo*, it receives a universal interpretation. For this reason, *wh*-phrases in Japanese have been considered as indeterminate pronouns (see e.g., Kuroda, 1965; Shimoyama, 2006) whose quantificational interpretation is given by quantificational particles. Therefore, in *wh*-questions in Japanese, *wh*-phrases function as nominal variables, and the existential/interrogative particle *ka* is a scope-taking operator, which must be present in the CP domain.

I assume, following Cable (2010), among others, that the Q-head has the [Op:__] feature and is adjoined to *wh*-NP (5a). Consequently, the Q-head alone undergoes movement to C (5b), leaving the *wh*-phrase behind (Hagstrom, 1998).

(5) a.



b.



Since *wh*-phrases stay in situ in Japanese, *wh*-questions in Japanese are generally insensitive to island constraints (6a) (Nishigauchi, 1999; Watanabe, 2001; Shimoyama, 2006). In contrast, they show sensitivity to the EQ island because the Q-movement across the intervening Q (*ka-douka* "*whether*") incurs a violation of Relativized Minimality (6b) (Rizzi, 1990).

(6) a. *Taro-wa [Hanako-ga **nani**-o katta ***ka douka***] Jiro-ni
Taro-TOP Hanako-NOM what-ACC bought whether Jiro-DAT
tazune mashita **ka**?
asked HONORIFIC Q
'What did Taro ask Jiro whether Hanako bought?'

b. [[nani ~~ka~~] ***ka douka*** ... **ka**]

Although *wh*-phrases basically stay in situ in Japanese, they can optionally be fronted via *wh*-scrambling, as already noted. *Wh*-scrambling is constrained by strong islands (7a) (e.g., Law, 2010: 465), whereas it is insensitive to weak islands, and *wh*-scrambling out of them is grammatical (7b) (cf. Saito 1992, see Tokimoto, 2019 for an empirical study).[2]

(7) a. *[**Nani-o**$_j$ [kyoo [$_{RC}$ [kinoo e_i t_j kiita] hito$_i$]-ga kitanodesu] ka?
What-ACC today yesterday heard person-NOM came Q
'What$_i$, the person who heard t_i yesterday came today?'

b. [**Nani-o** [Taro-ga [[Jiro-ga *t* katta ka] siritagatteirunodesu]] ka?
what-ACC Taro-NOM Jiro-NOM bought Q want-to-know Q
'What$_i$, Taro wants to know Jiro bought t_i?'

3. *Wh*-questions in GenSLA

3.1. A Brief Review of Previous Studies

A large number of studies have been conducted on the L2 acquisition of *wh*-questions in GenSLA (see e.g., Bley-Vroman et al., 1988; Schachter, 1989; Johnson & Newport, 1991; Martohardjono, 1993; White & Juffs, 1998; Hawkins & Hattori, 2006; Umeda, 2006, 2008; Choi, 2009). One of the most important findings in previous research is that Chinese learners of English (CLE), whose L1 lacks *wh*-movement, are sensitive to the strong/weak distinction of islands (Martohardjono, 1993; see also Johnson & Newport, 1991 and Belikova & White, 2009 for a comprehensive review). Since such a subtle syntactic distinction cannot be found in the input or is not taught in the classroom, the sensitivity to the strong/weak islands by CLEs can be taken as evidence for overcoming the poverty-of-the-stimulus problem (see Martohardjono, 1993).

However, an important fact that these studies overlook is that *wh*-topicalization in Chinese also makes a kind of strong/weak distinction of island violations (cf. Wu, 1999). If CLEs transfer their L1 operation to L2 English, the previous finding may be explained simply by L1 transfer. Another important fact shown by Bley-Vroman et al. (1988) is that Korean learners of English, who

[2] Note that scrambling is insensitive to weak islands in general (Kuno, 1973).

distinguished between RC and NC islands (rejected at 84% and 76%), strongly rejected the EQ island (rejected at 87%), which is one of the weak islands.[3]

Considering these issues, it is important to reexamine whether the "acquisition" (i.e., not transfer) of the strength of islands can truly happen in L2 acquisition. For this purpose, the acquisition of islands by JLEs is suggestive in that L1 transfer does not result in the same strong/weak distinction as in English.

3.2. The Feature Reassembly Hypothesis

Lardiere (2008, 2009), proposing the Feature Reassembly Hypothesis (FRH), claims that L2ers i) map features of a lexical item onto a perceived closest item in the L2 (Feature Mapping) and ii) may need to reconfigure the relevant features (Feature Reassembly). [4] In the case of acquisition of *wh*-questions by JLEs, they seem to map features of *nani/dare* (see (5a)) onto *what/who* (see (3a)) and are required to revise the feature structure. Thus, non-proficient JLEs will experience temporal problems in the process of Feature Reassembly caused by the configurational differences. However, according to the Full Access hypothesis that the FRH assumes (Schwartz & Sprouse, 1994, 1996), they are expected to overcome the problems in the course of development.

4. Experiment

The experiment aims to examine JLEs' syntactic representation of *wh*-questions by investigating their knowledge of island constraints.

4.1. Test Materials

Wh-questions with four kinds of islands (two strong and two weak islands), and corresponding grammatical Yes/No-questions were included as main test items in the task:

(8) *Target types: wh-questions with islands*
a. ??What do you believe [NC-ISLAND the claim that Alice saw___]?
b. ??What did you ask [EQ-ISLAND whether Edward bought___]?
c. *What did Kate find the woman [RC-ISLAND who fixed___]?
d. *What did you wake up [ADJ-ISLAND after Erika cooked___]?

[3] Korean exhibits syntactic properties similar to Japanese (cf. Han 1992).
[4] Hawkins and Hattori (2006) assume that Japanese lacks the feature that drives movement in *wh*-questions, and JLEs need to select a new feature (and not reassemble the feature). However, as we saw above, Japanese has the feature but is configured differently from English. See Kimura (2022) for a detailed discussion.

(9) *Control types: Yes/No-questions*
a. Do you believe [NC the claim that Alice saw a ghost]?
b. Did you ask [EQ whether Edward bought a car]?
c. Did Kate find [RC the woman who fixed her computer]?
d. Did you wake up [ADJ after Erika cooked a meal]?

Twelve tokens were prepared for each type, divided into two lists. Half of the tokens in each type were questions about a person (i.e., the use of *who*) and the other half about a thing (i.e., the use of *what*).

4.2. Participants

Thirty-three native speakers of English (NSEs) and 29 JLEs, who studied English and English literature at Chuo University, participated in this experiment. The mean age of the NSE group was 20.9 (*SD*=2.8) and 20.7 (*SD*=1.0) for the JLE group. Based on the Oxford Quick Placement Test (OQPT), the JLE group was divided into two proficiency groups, namely, lower-intermediate (LI) (*n*=18) and upper-intermediate (UI) (*n*=11) groups. The mean score of OQPT (max=60) for the LI group was 34.28 (*SD*=4.62, *range*=16 (23–39)) and 46.09 for the UI group (*SD*=4.54, *range*=14 (40–54)).

4.3. Results

The results showed that NSEs responded as the theory expected, accepting grammatical sentences while rejecting ungrammatical sentences (Figure 1). Importantly, they made a distinction between strong and weak islands.

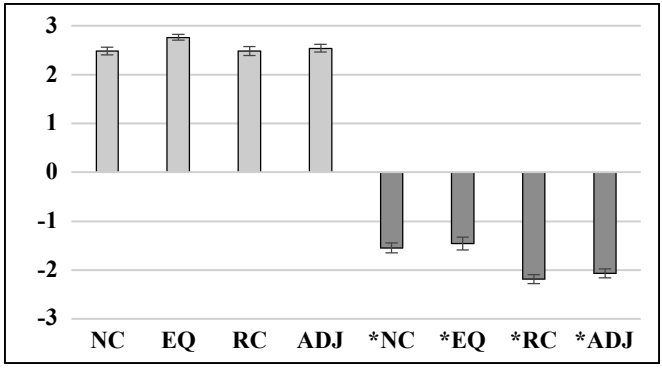


Figure 1. NSEs' results
Note. Error bars stand for standard errors of the mean.

The data were submitted to linear mixed-effect models in R using the *lmer()* function in the *lme4* package (Bates et al., 2020), and *p*-values were obtained with the *lmerTest* package (Kuznestsova et al., 2017). Judgment scores were *z*-transformed and included as the response variable, grammaticality, types, and

their interactions were included as the predictor variables, and participants and items with random slopes and intercepts were included as the random effects in the model. The maximal structure was gradually simplified by the backward stepwise reduction method until the model converged. Pairwise comparisons were performed with non-centered codes, and the coding value "0" was assigned to ungrammatical types, and "1" was assigned to grammatical types.

The results of inferential statistics for NSEs showed that the difference between *NC island and the two strong islands was significant (*NC–*RC: β = –.251, SE = .047, p < .0001; *NC–*ADJ: β = –.206, SE = .047, p < .0001), and the difference between *EQ island and the two strong islands was also significant (*EQ–*RC: β = – .291, SE = .047, p < .0001; *EQ–*ADJ: β = –.246, SE = .047, p < .0001). In contrast, the differences between *NC and *EQ islands (β = .040, SE = .047, p = .39) and between *RC and *ADJ (β = .040, SE = .047, p = .33) were not significant.

The behaviors of LI JLEs' (Figure 2) seem to be greatly different from those of NSEs. They failed to reject *NC islands, resulting in significant differences between *NC and the other three islands (*NC–*EQ: β = –.439, SE = .112, p < .0001; *NC–*RC: β = –.564, SE = .112, p < .0001; *NC–*ADJ: β = –.484, SE = .112, p < .0001). Furthermore, *EQ islands were strongly rejected, as confirmed by inferential statistics (*EQ–*RC: β = –.125, SE = .112, p = .27, *EQ–*ADJ: β = –.045, SE = .112, p = .69). The difference between the two strong island types was not significant (β = .080, SE = .112, p = .48). In contrast, the behaviors of UI JLEs (Figure 3) appear to become more similar to NSEs: No significant differences were found between the two weak islands (β = –.23, SE = .118, p =.06) or the two strong islands (β = .15, SE = .118, p=.21). Moreover, the difference between *EQ and *RC islands was significant (β = .26, SE = .118, p = .03), although *EQ and *ADJ islands were not significantly different (β = .109, SE = .118, p=.35).

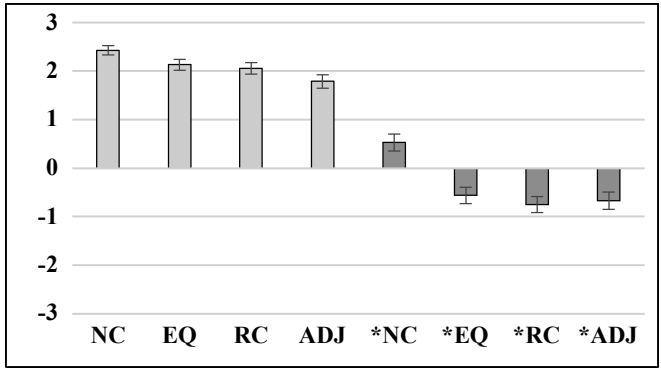


Figure 2. LI JLEs' results

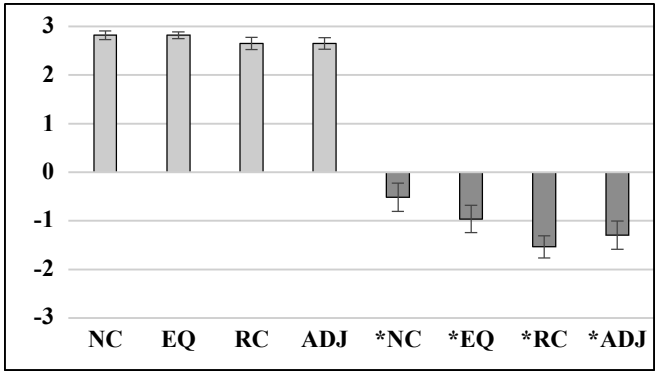


Figure 3. UI JLEs' results

5. Discussion

In summary, the results showed that LI-JLEs failed to reject the NC-island violation and strongly rejected the EQ-island violation, although they showed a strong sensitivity to strong islands like NSEs. The insensitivity to the NC-island violation and the strong sensitivity to strong islands can be explained by the use of *wh*-scrambling. Furthermore, the presence of the EQ-island effect implies that Q-movement occurs independently of *wh*-scrambling. Thus, the results suggest that LI-JLEs transfer the syntactic structure of *wh*-phrases from Japanese, leading to the employment of Q-movement. Q-movement leaves *wh*-phrases behind in Japanese, but the learners appear to be motivated by ample evidence for obligatory *wh*-fronting in the input to front *wh*-phrases to the clause-initial positions. In contrast, the behaviors of UI-JLEs, which generally distinguished between strong and weak islands, patterned with NSEs'.

All in all, overall results are consistent with the FRH in that less proficient learners appear to transfer a feature structure from their L1, and more proficient learners successfully acquire the target-like structure. However, it is not clear in the FRH how UG is accessed and how Feature Reassembly occurs. In Kimura (2022), I proposed the *Deductive Feature Acquisition Hypothesis* (DFAH), which claims that features can be acquired as long as the interlanguage system and detected cues for the presence of the relevant feature lead to the UG-based deduction and correction of the interlanguage system. Let us consider how the "UG-based deduction" works. It has been assumed that obligatory Move must be followed by Agree(*u*F) for a derivation to converge (Chomsky, 2001, 2013, 2018, among many others):

(10) *obligatory Move* → *Agree(uF)* → *Convergence*

In the case of acquisition of a *u*F and its Agree, the "Agree(*u*F)" box, which he learner must complete, is left blank, as shown below:

(11) *obligatory Move* → [ ] → *Convergence*

In this fill-in-the-blank process, the knowledge of the presence of obligatory Move suffices for inference of the blank because the UG formula given in (10) dictates that obligatory Move must be followed by Agree(*u*F). Therefore, according to the DFAH, if the evidence of obligatory Move (even if it is not a target-like operation) is available to learners, they are led to the UG-based deduction in (11).[5]

Our results show that LI-JLEs employ *wh*-scrambling. Moreover, production studies such as Wakabayashi and Okawara (2003) and Kimura (2022) showed that they know that *wh*-fronting applies obligatorily. Thus, it appears that they derive *wh*-questions in English via obligatory *wh*-scrambling (see also Hawkins & Hattori, 2006), which is not possible in natural language. The DFAH claims that UG functions as a corrective mechanism (Sharwood-Smith, 1988), where an inconsistency that occurs due to the adoption of a new L2 rule is removed by UG in the form of deduction. In the present case, JLEs, who are exposed to English *wh*-questions, attempt to incorporate a new rule of obligatory *wh*-fronting in the interlanguage system. However, due to the existing knowledge of their L1, they incorrectly analyze the syntax of *wh*-questions and create a rule of obligatory application of optional *wh*-scrambling. Then, the UG principle in (10) lead the interlanguages to a revision in a way that is consistent with UG. Since obligatory Move must be followed by Agree(*u*F) in (10), the learners come to tacitly know that obligatory *wh*-fronting must be *u*F-driven. Hence, obligatory *wh*-scrambling is replaced with *u*F-driven *wh*-movement (i.e., [Op:__]/*wh*-movement is acquired).

6. Conclusion

This paper, investigating the acquisition of the syntax of *wh*-questions by LI- and UI-JLEs, showed that i) lower proficiency L2ers transfer a feature configuration in their L1 and ii) higher proficiency L2ers successfully reconfigure the feature structure. Furthermore, I argue that UG functions as a corrective mechanism in L2 acquisition, and the incorrect analysis adopted by lower proficiency learners (i.e., obligatory *wh*-scrambling) is corrected by consulting UG.

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[5] It is predicted that covert movement will be difficult or even impossible to acquire, which is consistent with empirical evidence (Chu et al., 2013; Kimura, 2019, *to appear*).

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