

Acquisition of Japanese *Wh*-Questions: The Effects of Processing Strategies on L2 Sentence Judgment

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1. Introduction

The aim of this study is to strengthen the claim in Kumagami (2006) by showing empirical and cross-linguistic evidence. Kumagami (2006) investigates the acquisition of English *wh*-questions by Japanese learners, and claims that processing strategies affect L2 sentence judgment even in off-line tasks. However, she did not provide sufficient evidence. As for the processing bias of L2 learners, Lieberman *et al.* (2006) show that L1-English/L2-Japanese learners exhibit the strongly native-like processing bias when they resolve scopally ambiguous Japanese *wh*-questions. Following the method of Lieberman *et al.* (2006), we conducted the first experiment to show that L1-Korean and L1-Chinese learners of Japanese use the processing strategy called ‘short dependency’ strategy in this paper, which requires shorter dependency between a *wh*-phrase and a Question Morpheme (QM). Next, we tested whether the ‘short dependency’ strategy affects sentence judgment. We demonstrate that L2 judgment, even in off-line tasks, is influenced by the processing strategy. This paper also suggests that the differences among the experimental groups in the findings can be explained by the properties of each L1 grammar.

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2. Japanese questions

As a *wh*-phrase does not have to move to a sentence initial position in Japanese *wh*-questions, Question Morpheme (QM) is needed to mark the scope of *wh*-questions instead of *wh*-movement (see Chomsky and Lasnik, 1977; Cheng, 1991; Chomsky, 1996). Whether the scope of a *wh*-question is an embedded clause or a matrix clause depends on the position of the QM. When a *wh*-phrase is in the matrix clause, the scope of the *wh*-question is uniquely determined as it has only a matrix clause scope as in (1a). On the other hand, in the case where a *wh*-phrase is in an embedded clause, the scope of the *wh*-question is determined depending on the position of the QM; the scope is the embedded clause when the QM is in the embedded clause as in (1b), while the scope is the matrix clause as in (1c) when it is in the right edge of the sentence.

- (1) a. **Dare-ga** [Taro-ga Hanako-ni hon-o ageta-**KA**] iimasita-**KA**?
who-nom Taro-nom Hanako-dat book-acc gave QM said QM
'Who said whether Taro gave a book to Hanako?' **Wh-question**
- b. Jiro-ga [Taro-ga **dare-ni** hon-o ageta-**KA**] iimasita-**KA**?
Jiro-nom Taro-nom who-dat book-acc gave QM said QM
'Did Jiro say to whom Taro gave a book?' **Yes/No-question**
- c. Jiro-ga [Taro-ga **dare-ni** hon-o ageta-to] iimasita-**KA**?
Jiro-nom Taro-nom who-dat book-acc gave that said QM
'Who did Jiro say that Taro gave a book?' **Wh-question**

Scope ambiguities in Japanese derive from the properties of Japanese *wh*-questions. The sentence fragment in (2), for example, can have at least two possibilities, (2a) and (2b), as continuation to complete the sentence. Two nominative-marked NPs preceding the *wh*-phrase *dare-ni* in (2) indicate that the sentence is bi-clausal and the *wh*-phrase is an item in the embedded clause. As shown in (1b) and (1c), a sentence which contains a *wh*-phrase in its embedded clause has scope ambiguities.

- (2) Jiro-ga Taro-ga dare-ni...
Jiro-nom Taro-nom wh-dat...
- a. Jiro-ga Taro-ga dare-ni atta-KA iimasita.
Jiro-nom Taro-nom who-dat saw QM said
 'Jiro said who Taro saw.'
- b. Jiro-ga Taro-ga dare-ni atta-to iimasita-KA?
Jiro-nom Taro-nom wh-dat saw that said QM
 'Who did Jiro say that Taro saw?'

The sentence in (3) has two possible interpretations (3a) and (3b). The *wh*-phrase *dare-ni* in (3) can be interpreted as an argument of the embedded verb *okotta* or the matrix verb *kikimasita*, that is, it can be an item in the embedded clause or the matrix clause. As illustrated in (1a) and (1b), the scope of *wh*-questions is dependent on whether the position of the *wh*-phrase is in the embedded clause or matrix clause, in addition to the position of the QM.

- (3) Jiro-ga dare-ni Taro-ga okotta-KA kikimasita-KA?
Jiro-nom who-dat Taro-nom got angry QM asked QM
- a. Jiro-ga [dare-ni Taro-ga okotta-KA] kikimasita-KA?
 'Did Jiro ask who Taro got angry at?'
- b. Jiro-ga dare-ni [Taro-ga okotta-KA] kikimasita-KA?
 'Who did Jiro asked whether Taro got angry?'

These types of ambiguity shown in (2) and (3) are utilized in Experiments 1 and 2 respectively.

3. Experiment

3.1. Experiment 1

Lieberman *et al.* (2006) show that L1-English/L2-Japanese learners exhibit a strongly native-like locality bias when they complete sentence fragments as in (4). They preferred a sentence such as (4a), where the QM and *wh*-phrase are in the same

clause, while from the same fragments the participants can also generate a sentence like (4b).

- (4) Sensei-ga seito-ga tosyositu-de dare-ni...
teacher-nom student-nom library-loc who-dat...
- a. Sensei-ga [seito-ga toshyositu-de **dare-ni** atta-**KA**] iimasita.
teacher-nom student-nom library-loc who-dat saw QM said
- b. Sensei-ga [seito-ga toshyositu-de **dare-ni** atta-to] iimasita-**KA**?
teacher-nom student-nom library-loc who-dat saw that said QM

According to the results of Lieberman *et al.* (2006), some processing strategies are involved to cause this preference of the participants. We call this strategy the 'short dependency' strategy for the sake of convenience. The aim of Experiment 1 is to investigate whether L1-Korean and L1-Chinese learners of Japanese use this 'short dependency' strategy like the participants of Lieberman *et al.* (2006).

3.1.1. Participants

There were three groups with a total of 23 participants, and the breakdown is: 9 Koreans (8 women, 1 man; age: 21-33; years of residence: 1 month-8), 7 Chinese (5 women, 2 men; age: 23-32; years of residence: 1-4), and 7 Japanese (7 women; age: 19-28).

3.1.2. Materials

The materials consist of 2 types of sentence fragments as shown in (5). The test items were the same as Lieberman *et al.* (2006) in order to ascertain that our participants also show locality bias to resolve scope ambiguities in the manner similar to the participants in the above-mentioned study.

- (5) a. **NP-nom NP-nom WH-dat**¹
 Sensei-ga seito-ga tosyositu-de dare-ni...
teacher-nom student-nom library-loc who-dat...
- b. **WH-nom NP-dat NP-nom**
 Dare-ga sensei-ni seito-ga tosyositu-de...
who-nom teacher-dat student-nom library-loc...

As shown in the previous section, the dative-marked *wh*-phrase in (5a) is interpreted as an item in the embedded clause, because two nominative-marked NPs in (5a) indicate that the sentence is bi-clausal. Hence, the scope of *wh*-question is ambiguous. The sentence in (5b), on the other hand, is unambiguous because it is interpreted only as an item in a matrix clause. Materials consisting of 45 items (15 tokens of 3 types; see fn.1) were distributed among 3 lists, pseudo-randomized, and shown with 15 filler items. The examples in (6) are possible grammatical sentences.

- (6) a. **NP-nom NP-nom WH-dat**
- i. Sensei-ga [seito-ga toshyositu-de **dare-ni** atta-**KA**] iimasita.
teacher-nom student-nom library-loc who-dat saw QM said
 'The teacher said who the student saw in the library.'
- ii. Sensei-ga [seito-ga toshyositu-de **dare-ni** atta-to] iimasita-**KA**?
teacher-nom student-nom library-loc who-dat saw that said QM
 'Who did the teacher say that the student saw in the library?'
- iii. Sensei-ga [seito-ga toshyositu-de **dare-ni** atta-**KA**] iimasita-**KA**?
teacher-nom student-nom library-loc who-dat saw QM said QM
 'Did the teacher say who the student saw in the library?'

¹ In Japanese, topic marked subject NP sounds more natural than nominative marked NP in the case like (5a), that is, the sequence *NP-top NP-nom WH-dat* is more natural. We tested this NP-top type of fragments as well in Experiment 1. The result is not significantly different from the result of NP-nom type in (5a). We, thus, do not discuss the result of NP-top type here.

b. **WH-nom NP-dat NP-nom**

Dare-ga [sensei-ni seito-ga toshyositu-de atta-to] iimasita-**KA**?

who-nom teacher-dat student-nom library-loc saw that said QM

'Who said that the student saw the teacher in the library?'

3.1.3. Procedure

The participants were required to complete a sentence with pen and paper. They were instructed not to return to the previous pages. We did not set up a time limit.

3.1.4. Prediction

The participants are expected to prefer to generate a sentence like (6a-i) in the scope-ambiguous condition (5a), if they use the 'short dependency' strategy. Comparing (6a-i) with (6a-ii), the QM in (6a-i) is closer to the wh-phrase than the QM in (6a-ii). A sentence does not have to contain two QMs, and (6a-iii) is less preferable.

3.1.5. Results and Discussion

We counted only bi-clausal sentences with at least 1 QM as the data to be analyzed. The native speakers showed a clear contrast between 2 conditions, replicating the results of Lieberman *et al.* (2006). The results for both L2 learner groups were similar to those of the native speakers.

Table 1. Counts and percentages of QM position, Japanese natives

Condition	Question Type					
	Embedded ²		Matrix		Both	
	N	%	N	%	N	%
<i>NP-nom NP-nom WH-dat</i>	33	100	0	0	0	0
<i>WH-nom NP-dat NP-nom</i>	1	2.8	34	97.1	0	0

Table 2. Counts and percentages of QM position, Korean learners

Condition	Question Type					
	Embedded		Matrix		Both	
	N	%	N	%	N	%
<i>NP-nom NP-nom WH-dat</i>	26	96.3	0	0	1	3.7
<i>WH-nom NP-dat NP-nom</i>	1	3.1	31	96.9	0	0

Table 3. Counts and percentages of QM position, Chinese learners

Condition	Question Type					
	Embedded		Matrix		Both	
	N	%	N	%	N	%
<i>NP-nom NP-nom WH-dat</i>	19	79.2	2	8.3	3	1.3
<i>WH-nom NP-dat NP-nom</i>	0	0	22	78.6	6	21.4

All groups prefer to place the QM in the right edge of the embedded clause under the ambiguous condition. Under the unambiguous condition, the learners correctly generated a sentence with the QM in the sentence final position. This result shows that the L2 learners resolved the scope ambiguity of Japanese questions in the manner similar to Japanese native speakers; they seem to use the 'short dependency' strategy.

² The labels, *Embedded*, *Matrix*, and *Both*, refer to the positions in which the QM is generated.

3.2. Experiment 2

The aim of Experiment 2 is to investigate whether the ‘short dependency’ strategy affects (off-line) sentence judgment. The participants were the same as in Experiment 1.

3.2.1. Materials

The materials consisted of 6 ambiguous questions such as (7) with 3 types of answers each. The sentence in (7) can be interpreted both as a Yes/No-question and as a *wh*-question as mentioned in Section 2. The answer (7b-ii) is adequate when the sentence is interpreted as a Yes/No-question. The answer (7c-ii), on the other hand, is adequate as the answer to a *wh*-question. The items were distributed over 3 lists so that each participant is presented with each sentence once.

(7) Taro-wa dare-ni Hanako-ga okotta-KA kikimasita-KA?
Taro-top who-dat Hanako-nom got angry QM asked QM
'Did Taro ask who Hanako got angry at?'

'Who did Taro ask whether Hanako got angry?'

a. **Type 1: Y/N-question & *WH**

- i. Taro-wa [**dare-ni** Hanako-ga okotta-**KA**] kikimasita-KA?
- ii. *Jiro-ni desu.
Jiro-dat copula

b. **Type 2: Y/N-question & Yes**

- i. Taro-wa [**dare-ni** Hanako-ga okotta-**KA**] kikimasita-KA?
- ii. Hai.
Yes

c. **Type 3: Wh-question & WH**

- i. Taro-wa **dare-ni** [Hanako-ga okotta-KA] kikimasita-**KA**?
- ii. Hanako-no hahaoya-ni desu.
Hanako's mother-dat copula

3.2.2. Procedure

The participants were instructed to read the context and judge whether the answer to the question is adequate for the context in 5 scales (from -2 *completely inadequate* to +2 *completely adequate*). The English translation of the sample question is shown in (8). All questions were presented in Japanese, with kana alongside kanji characters.

(8) **Sample question** (translated version):

Context: As Hanako is very irritable, she often gets angry at her younger brother Jiro. One day, Jiro spilled juice on Hanako's favorite skirt. Hanako got very angry at him. Then, their mother came, and appeased her anger. Later, Taro, Hanako's classmate, visited her house, and saw her in a bad mood. So, he asked Hanako's mother whether she got angry today, and if so, who she got angry at.

Question: Taro-wa dare-ni Hanako-ga okotta-KA kikimasita-KA?

Answer: Hanako-no hahaoya-ni desu.

3.2.3. Prediction

The participants should prefer to interpret the sentences as Yes/No-questions because the first QM is closer to the *wh*-phrase *dare*. The participants judged Yes/No-question and Yes type of answer pairs to be acceptable in the preliminary test³; therefore it is expected that items of Type 2 will be judged as highly acceptable,

³ The preliminary test was conducted before the main test to ascertain how the participants judge scope-unambiguous sentences as in (i).

(i) Question types:

- a. Taro-wa Hanako-ni [dare-ga neta-KA] kikimasita-KA? (Yes/No-question)
Taro-top Hanako-dat who-nom slept QM asked QM
- b. Taro-wa dare-ni [Jiro-ga neta-KA] kikimasita-KA? (WH-question)
Taro-top who-dat Jiro-nom slept QM asked QM

and even items in Type 3 are plausible.

3.2.4. Results and Discussion

Contrary to the prediction mentioned above, native speakers of Japanese and Korean learners judged only the Type 3 sentences as acceptable. Half of the Chinese learners preferred only the Type 2. The other half preferred only the cases in Type 3.

Table 5. Mean scores of acceptability judgment (5 scales; from -2 to +2):

Question & Answer Type	Native	Korean	Chinese
<i>Type 1: Y/N-question & *WH</i>	-1.14	-2	-1.64
<i>Type 2: Y/N-question & Y/N</i>	-1.29	-1.92	0.14
<i>Type 3: WH-question & WH</i>	1.29	1.5	0.07

The results do not seem to support the presence of the effects of the 'short dependency' strategy on sentence judgment. In the next section, we will consider the results (i) that Japanese native speakers and Korean learners accepted only Type 3, and (ii) that Chinese learners' judgment differed from that of others'.

4. General Discussion

The results of our experiment naturally lead us to the question whether the participants use the 'short dependency' strategy. For this question, Miyamoto (2002) gives a good account. Miyamoto (2002) suggests that a nominative marked NP can be a signal to mark the onset of a tensed clause in sentence processing in L1 Japanese. We call this strategy for clause boundary marking the 'case particle'

We prepared 4 types of question and answer pairs; 2 types of questions (Yes/No-question and WH-question) and 2 types of answers (Yes-type answer and WH-type answer). The procedure was the same as in the main test. All groups accepted only 2 of 4 types of pairs, (i) Yes/No-question and Yes-type answer and (ii) WH-question and WH-type answer.

strategy here for the sake of convenience. Japanese native speakers and Korean learners may use this ‘case particle’ strategy. For example, they take the steps in (9) when they process the sentences, such as

- (9) Taro-wa dare-ni Hanako-ga
 use the ‘case particle’ strategy
 Taro-wa dare-ni [Hanako-ga okotta-KA
 close the embedded clause
 Taro-wa dare-ni [Hanako-ga okotta-KA]
 Taro-wa dare-ni [Hanako-ga okotta-KA] kikimasita-KA?
 interpret as a *wh*-question

The ‘case particle’ strategy, which may be prior to the ‘short dependency’ strategy, determines the clause boundary of the embedded clause. Then the *wh*-phrase is interpreted as an item in the matrix clause, and is connected with the QM in the matrix clause. Suppose that this account is on the right track. The ‘case particle’ strategy and properties of each L1 can provide the answer to the question why Chinese learners judged the sentences differently in Experiment 2. As shown in (10), both Japanese and Korean have case particles, while Chinese has no case particles. Chinese learners, thus, may not be able to use the ‘case particle’ strategy because of the absence of case particles in their L1.

- (10) a. Taro-ga nani-o kaimasita-ka? (Japanese)
 Taro-nom what-acc bought QM
 ‘What did Taro buy?’
 b. Mary-ka mwues-ul sassa-no/ni? (Korean)
 Mary-nom what-acc bought QM
 ‘What did Mary buy?’
 c. Zhangsan mai-le shenme? (Chinese)
 Zhangsan bought what
 ‘What did Zhangsan buy?’

5. Conclusion

This paper showed that processing strategies influence the L2 judgment by considering two types of processing strategies, the 'short dependency' strategy and the 'case particle' strategy. Although there are issues that remain unresolved, this study has shed light not only on the possibility of the effects of processing strategies on L2 judgment, but also the role of the processing strategies in language acquisition.

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