THE TRANSFER OF OVERT PRONOUN CONSTRAINT IN L2 PROCESSING: AN ON-LINE EXPERIMENT WITH JAPANESE BILINGUAL SPEAKERS*

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This paper explores the effects of transfer of L1 syntactic constraints during L2 sentence processing. Specifically, it was investigated whether Japanese bilingual speakers apply their L1-specific binding constraints while they process English pronoun sentences. The experimental group contained Japanese subjects who spoke fluent English, and the control group contained monolingual English subjects. The experiment consisted of a simple reading task that required an acceptability judgment. Sentences were visually presented on a computer screen and the subjects' task was to decide whether or not each sentence was well-formed. Time taken to press a response key was recorded. The results showed a strong carry-over of the Japanese overt pronoun constraint (e.g., Montalbetti 1984; Hoji 1989, 1990) from L1 to L2.

INTRODUCTION

Much discussion on bilingual linguistic interference has centered around the study of second language (L2) production, not L2 comprehension. In addition, such studies have typically focused on phonological or semantic interference, rather than the study of syntactic interference. The work done on L2 coreference processing has been particularly scarce. Also, most of the research done in this area has dealt with overt anaphor (reflexive) resolution rather than overt pronoun resolution. Further, the methods used have been off-line; for example, multiple-choice comprehension questions on questionnaires and picture identification tasks. (Thomas 1989; Hirakawa 1990; Broselow and Finer 1991; Tomita 1992; Bennett 1994).

The present study focused on overt pronoun interpretation in L2 processing, and used an on-line task that appears more likely to tap automatic, unconscious processes. We used tasks that examined syntactic processing of English experimental sentences, and compared the results of monolingual English speakers with those of bilingual Japanese speakers.

The central aim of the present experiment was to explore whether or not Japanese subjects who speak fluent English apply a Japanese-specific overt pronoun constraint during the processing of English pronoun sentences.

The relevant Japanese-specific binding constraint is that the overt pronoun *kare* 'he' in Japanese, unlike English pronouns, cannot be construed as a bound variable, as is illustrated in the following examples.

(1) Daremo$_i$-ga [$_{NP}$[zibun$_i$-ga/*kare$_i$-ga/[e]$_i$ -ga tukutta] omotya]-o kowashita.
everyone NOM self-NOM/ he-NOM/e-NOM make-PAST toy-ACC break-PAST
'Everyone$_i$ broke the toy that he$_i$ had made.' (Hoji 1991)

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(2) *Dareka$_i$-ga [kare$_i$-ga katta to] omotta.
someone-NOM he-NOM win-PAST that thought
'Someone$_i$ thought that he$_i$ won.' (Katada 1991)

(3) *Daremo$_i$ kare$_i$-no ronbun-o shiagenakatta.
no one he-GEN paper-ACC finish-PAST
'No one$_i$ finished his$_i$ paper.'

In the sentence in (1), the reflexive pronoun *zibun*[1] and the phonetically null subject pronoun (empty category)[2] can be bound by QNP (Quantified Noun Phrase) *daremo* 'everyone,' but the overt pronoun *kare* cannot. In other words, when *kare* is put in the subject position in the relative clause in (1), there can be only one interpretation of the sentence: the so-called referential reading, where everyone broke the toy that a particular person (outside the sentence) had made. Notice that an English counterpart sentence has two readings — the bound variable reading and the referential reading. The same constraint holds in (2) and (3), where the QNP and *kare* cannot carry the same indices. Overt pronouns in Japanese cannot be bound by operators like QNPs. (See Nakai 1976; Montalbetti 1984; Saito 1985; Aoun and Hornstein 1986; Hoji 1989, 1990; etc.)[3]

The present study was based on the assumption that coreference processing is subject to structural constraints (Nicol 1988; Nicol and Swinney 1989). We were interested in whether or not such structural constraints can be carried over from L1 to L2 in the processing of L2. The task we used was a simple reading task, in which subjects read a sentence and made an acceptability judgment. Time taken to press a response key was recorded. Two examples of the types of sentences examined are given below (sentences (4) and (5)). In the prediction section, we will look at these sentences closely and explain them in detail (see (6) and (7)).

(4) Every king knows that he will retire. [gender match]
(5) Every king knows that she will retire. [gender mismatch]

After working through an analysis of the data, we will turn, in the final section of the paper, to a discussion of the implications of our results from the viewpoint of UG principle and second language learnability.

PREDICTION

Sentences such as (6) and (7) below were used in the experiment. These sentences contain a gender match and mismatch between the matrix subject and the embedded subject. The matrix subject of each sentence was a QNP.

(6) Gender match
a) masculine matrix subject/masculine embedded subject
Every king knows that he will retire.
b) feminine matrix subject/feminine embedded subject
Every queen knows that she will retire.

(7) Gender mismatch
a) masculine matrix subject/feminine embedded subject
Every king knows that she will retire.
b) feminine matrix subject/masculine embedded subject
Every queen knows that he will retire.

The pronoun *he* in (6a) can be construed as *every king* (bound variable reading), while *she* in (7a) cannot be construed as *every king* (forced referential reading). Likewise, the pronoun *she* in (6b) can be construed as *every queen* (bound variable reading), while *he* in (7b) cannot be construed as *every queen* (forced referential reading).

In contrast, as touched upon in the introduction, the Japanese pronouns for the third person singular, *kare/kanojo*, have a referential reading only, not a bound variable reading. In Japanese, the masculine pronoun *kare* (the Japanese counterpart of *he*) cannot take the masculine QNP matrix subject as its antecedent. (The same is true of the feminine pronoun *kanojo* and the feminine QNP.) The following example illustrates this.

(8) Subeteno oosama$_i$-ga kare*$_{i/j}$-ga taii suru koto-o shitteiru.
every king NOM he-NOM retire knows
'oosama-wa minna kare-ga taii suru koto-o shitteiru.'
'Every king$_i$ knows that he$_j$ will retire.'

Therefore, if grammatical constraints are transferred to L2, then this Japanese-particular overt pronoun constraint would carry over to the reading of the English pronoun sentences. If so, then Japanese speakers should look for antecedents outside the experimental sentences in both conditions (i.e., sentences (6) and (7)).

We assume that sentences containing an antecedent are less difficult to process than sentences that do not contain an antecedent (Badecker and Straub 1994). Given this assumption, we predicted that the monolingual English speakers' RTs (response times) would differ between conditions (6) and (7). That is, the monolingual subjects were expected to process gender mismatched sentences much more slowly than gender matched sentences. By contrast, we expected that if the Japanese-specific grammatical constraints were transferred to L2, the RTs of the Japanese bilinguals would not differ between these two sentences. Under this hypothesis, the Japanese subjects should look for the antecedents outside the test sentences in both conditions (i.e., sentences (6) and (7)). Thus, our prediction, stated simply, is given in the following schema on response time.

(9) Monolingual English speakers: (6) < (7)
Bilingual Japanese speakers: (6) = (7)

EXPERIMENT

Method

Subjects

A total of 20 graduate students at the University of Arizona served as subjects. Ten were monolingual speakers of American English and the other ten were Japanese speakers who speak fluent English. All Japanese subjects had studied English as undergraduates in Japan prior to coming to the United States, and had taken graduate courses in their respective fields at the University of Arizona for two to six years. Further, all had some experience teaching or assistant teaching at universities in the Unites States. The subjects were paid for their participation. Each subject participated in two sessions; sessions were 2 days apart, on average.

Materials and Design

The types of sentences used in the experiment were explained above in the prediction section. The examples used there are repeated here.

(6) Gender match
a) masculine matrix subject/masculine embedded subject
Every king knows that he will retire.
b) feminine matrix subject/feminine embedded subject
Every queen knows that she will retire.

(7) Gender mismatch
a) masculine matrix subject/feminine embedded subject
Every king knows that she will retire.
b) feminine matrix subject/masculine embedded subject
Every queen knows that he will retire.

Twenty sentence pairs were created. These were counterbalanced across two lists, so that each list contained 10 sentences with each condition. Each list contained 20 experimental sentences and 46 fillers. Filler sentences consisted of 23 ungrammatical sentences and 23 grammatical sentences. In the ungrammatical sentences, the words were out of sequence and did not form a proper sentence. Subjects were tested on both lists. Ten practice sentences preceded the experimental sentences.

Procedure

Sentences were presented visually on a computer screen one at a time. Each sentence was centered on the screen in its entirety and presented for 3 seconds. The experiment was run using the DMASTR software developed by Kenneth Forster and Jonathan Forster. IBM 386 computers with VGA color monitors were used. The subjects' task was to decide whether or not each sentence was a proper English sentence. Some of the sentences were valid and others were not. In the bad sentences the words were out of sequence. If the sentence were good, that is, well-formed as an English sentence, the subjects were supposed to press one button for a "yes" decision and to press another button for a "no" decision. They were instructed to respond as rapidly and accurately as possible.

RESULTS AND DISCUSSION

The results are summarized in Table 1.

	(6) gender match Every king... he...	(7) gender mismatch Every king... she...	Difference
Monolingual English speakers	1705 (3.0)	1876 (16.0)	171 (13.0)
Bilingual Japanese speakers	1908 (3.5)	1932 (6.0)	24 (3.0)

Table 1. Average RTs in ms, percentage errors shown in parentheses.

For each condition, two analyses of variance were conducted, one with subjects (F1), and one with items (F2) as the random factor. For RTs, there was a significant interaction of *subject group* and *sentence type* (F1 (1, 18) = 5.98, $p < .025$; F2 (1, 36) = 8.94, $p < .005$). The patterns of errors mimicked the RT pattern and the interaction of *subject group* and *sentence type* was significant by both subjects (F1 (1, 18) = 8.12, $p < .0107$), and items (F2 (1, 36) = 8.61, $p < .006$).

The results demonstrate a significant difference in RT patterns between monolingual English speakers and bilingual Japanese speakers. The monolingual subjects processed gender mismatched sentences much more slowly than gender matched sentences, while the bilingual Japanese subjects showed no statistically significant difference between the two. Note that the error rate for the Japanese subjects was low. This suggests that the Japanese subjects were proficient enough for the purpose of the experiment. Thus, the lack of a significant difference is unlikely to be due simply to a lack of proficiency.

The results of the monolingual speakers were consistent with previous findings (Badecker and Straub 1994) which indicated that sentences containing an antecedent (as in sentence (6)) are easier to process than sentences that do not contain an antecedent (as in sentence (7)). The results

of the bilinguals, in contrast, supported our hypothesis of syntactic transfer. That is, the subjects' responses to sentences (6) and (7) were virtually identical, despite the presence of an antecedent in sentence (6) and the absence of an antecedent in sentence (7).

GENERAL DISCUSSION

The results we obtained from the bilingual Japanese speakers did not show a statistically significant difference in RTs between conditions in (6) and (7). The results from the monolingual English speakers, however, showed a striking difference in RTs in both conditions. Our interpretation of this data is that the Japanese subjects applied a Japanese-specific overt pronoun constraint while processing the sentences.

We must note that there are other possible interpretations of the Japanese subjects' data. One alternate interpretation would be that Japanese speakers do not pay attention to gender. This possibility will be examined in a follow-up study. However, as we noted earlier, the error rate of the Japanese speakers was low. This suggests that the Japanese subjects were sufficiently proficient in English, and we consider it unlikely that they would have been able to ignore gender. Therefore, we assert that the experiment revealed strong Japanese interference of the overt pronoun constraint in L2 coreference processing. The Japanese bilingual speakers did not construe the pronouns in condition (6) to be bound variables. Instead, they applied the Japanese specific binding constraint during the processing of English pronoun sentences.

In other words, it appears that Japanese speakers choose *kare* as the counterpart of the English pronoun *he* over other logically possible Japanese pro-forms that can occur in the embedded tensed nominative position, and retain the structural constraint on *kare* when processing English sentences containing an embedded subject pronoun. Consider sentences (10) and (11).

(10) Every king$_i$ knows that *he*$_i$ will retire. (English *he* — tensed nominative)

(11) Subeteno oosama$_i$-ga [e]$_i$ / zibun$_i$-ga / kare$_i$-ga* / kare-zisin$_i$-ga? / zibun-zisin$_i$-ga taii suru koto-o shitteiru.
'Every king$_i$ knows that he$_i$ will retire.'

In the sentence in (11), all the pro-forms other than *kare* can be used in the tensed nominative position to obtain the meaning that is shown in the English translation. Only the overt pronominal *kare* cannot be read as a bound variable. *Kare* is a highly referential expression, and is rather similar to demonstratives. Hoji (1991) argues that *kare* is the counterpart of *that person* not *he*. Incorporating the ideas of Hoji (1991), Nakamura (1989), and others, we created the following table, which shows the English counterpart (with respect to coreference possibilities) of several Japanese pronouns.

Japanese	English
kare [overt pronoun]	that person
(e) [empty pronoun]	he? (unstressed)
zibun [simplex reflexive]	----
kare-zisin [phrasal reflexive]	"himself" or "he, himself"
zibun-zisin [phrasal reflexive]	----

Table 2. Japanese pronouns.

Regardless of what might be expected based on Table 2, Japanese subjects tend to choose *kare* as the counterpart of *he* over all of the other options (an empty pronoun or one of several reflexive forms). One of the possible reasons for this is that both *he* and *kare* are overt and morphologically simple[4]. It could be argued that this is because Japanese speakers, when first learning English, are first taught the deictic use of *he* æ since instruction typically involves pairing sentences with pictures æ and *kare* also happens to have a deictic use. Interestingly, however, *kare* has only a deictic use; it cannot be construed as a bound variable. Nonetheless, Japanese speakers retain this rigid, deictic use of *kare* when processing sentences like (6) (where *he* can be bound by QNP). This accounts for the data generated by the Japanese bilingual speakers in our experiment.

THE AUTHOR

Hisako Ikawa is a Ph.D. candidate in the Department of Linguistics at the University of Arizona. Her principal interests include theoretical linguistics (syntactic and semantic theory) and experimental linguistics (human sentence processing, first and second language acquisition, and lexical access).

NOTES

1. In Japanese, reflexives can occur in the tensed nominative position.
2. As is well known, Japanese is a pro-drop language.
3. Montalbetti observes several other languages, including Spanish, Italian, Catalan, Chinese, and Brazilian Portuguese, and generalizes the constraint as follows (Montalbetti 1984, p 89):
   The Overt Pronoun Constraint
   a. Overt pronouns cannot be bound
   b. (a) applies if the alternation overt/empty obtains
4. Strictly speaking, the question remains why the overt simplex reflexive, *zibun*, is not chosen instead of the overt pronominal *kare*. The reason may be related to the fact that the first sentences L2 learners study are simplex sentences that include overt pronouns used deictically. (See below in the text.)

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APPENDIX

Twenty sentence pairs were created for this experiment (each pair consisted of a gender-matched sentence and a gender-mismatched sentence). These pairs were counterbalanced across two lists, so that each list contained 10 sentences with each condition. Each list also contained 46 filler sentences. The filler sentences are not shown in this appendix.

List A

Every king knows that he will retire.
Every prince knows that he is admired.
Every man understands that he will be promoted.
Every salesman said that he did a nice job.
Every boy scout thinks he will succeed.
Every queen knows that she will be remembered.
Every princess thinks that she will be invited.
Every actress dreams that she will be nominated.
Every stewardess reported that she was overworked.
Every girl scout thinks she will do a good deed.

Every boy suspects that she is lying.
Every waiter imagined that she would leave.
Every priest said that she was surprised.
Every actor knows that she will be applauded.
Every duke imagined that she would win.
Every woman in the class thinks he will pass.
Every mother knew that he was brilliant.
Every girl hopes that he will be rich.
Every waitress said that he was upset.
Every nun knows that he will go.

List B

Every boy suspects that he is lying.
Every waiter imagined that he would leave.
Every priest said that he was surprised.
Every actor knows that he will be applauded.
Every duke imagined that he would win.
Every woman in the class thinks she will pass.
Every mother knew that she was brilliant.
Every girl hopes that she will be rich.
Every waitress said that she was upset.
Every nun knows that she will go.

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