

Anaphor reconstruction in Japanese relative clauses

An experimental study

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This study conducted two experiments to examine the derivation of the head noun phrase in Japanese relative clauses, with a focus on whether the anaphors *jibun* ‘self’ and *jibun-jishin* ‘self-self’ within the head noun phrase can be co-referential with the relative clause subject. It aims to settle a long-standing debate among the previous studies concerning the interpretation of the anaphors inside the head noun phrase: while several studies claimed that the co-reference between the anaphor *jibun* ‘self’ and the relative clause subject is prohibited, many other studies argued that such co-reference is possible. In addition, it has been claimed that while co-indexing the anaphor *jibun* with the relative clause subject might be marginally acceptable, it would become fully acceptable if we replace *jibun* with the morphologically complex anaphor *jibun-jishin* ‘self-self’, which implies that the morphological make-up of an anaphor may affect its ability to be co-indexed with the relative clause subject.

The results of two carefully controlled truth value judgment experiments show that neither the simplex anaphor *jibun* nor the complex anaphor *jibun-jishin* within the head noun phrase of relative clauses can take the relative clause subject as its antecedent, which suggests that the head noun phrase does not reconstruct and therefore lends support to the *pro*-binding analysis of Japanese relative clauses. Moreover, the findings also suggest that the morphological make-up of an anaphor does not affect its ability to take the relative clause subject as its antecedent, despite the claim that it is more acceptable to co-index the complex anaphor *jibun-jishin* with the relative clause subject than the simplex anaphor *jibun*.

Keywords: Japanese, relative clause, head noun phrase, anaphor

1. Introduction

The structure of Japanese Relative Clauses (RCs) has been investigated in many studies (e.g. Kuno 1973; Ishii 1991; Matsumoto 1997; Fukui & Takano 2000; Murasugi 2000). The existing proposals for Japanese RCs can be divided into two major approaches: the *pro*-binding analysis and the head-raising analysis. The *pro*-binding analysis claimed that the head Noun Phrase (NP) of Japanese RCs is base-generated external to the RC and binds a *pro* inside the RC (Perlmutter 1972; Kuno 1973; Fukui & Takano 2000; Murasugi 2000). In contrast, the head-raising analysis claimed that the head NP is raised out of the RC (e.g. Hoshi 2004; Kitao 2011; Morita 2013). The two approaches have different predictions for the interpretation of an anaphor within the head NP, as in (1):

- (1) *Mary_i-ga* [_{NP} [_{CP} *John_j-ga e_k arat-ta*] [*jibun_{i/?j}-no fuku*]_k]-o
 Mary-NOM John-NOM wash-PST self-GEN clothes-ACC
katazuke-ta.
 organize-PST
 ‘Mary_i organized self_{i/?j}’s clothes that John_j washed.’

On the one hand, under the *pro*-binding analysis, the head NP *jibun-no fuku* ‘self’s clothes’ in (1) is base-generated external to the RC. Thus, the anaphor *jibun* ‘self’ should be bound by the matrix subject *Mary* only, not the RC subject *John*. On the other hand, under the head-raising analysis, the head NP can reconstruct at its base position within the RC at LF, based on which we predict that the anaphor *jibun* can be bound by the RC subject. Meanwhile, since *jibun* can be bound by a long-distance subject (e.g. Aikawa 2002[1999]), the co-reference between *jibun* and the matrix subject should also be possible.

However, previous studies showed conflicting judgments upon whether the anaphor *jibun* inside the head NP can be co-referential with the RC subject. First, several studies claimed that such co-reference is prohibited (Hoji 1985; Hasegawa 1988; Fukui & Takano 2000; Murasugi 2000), supporting the *pro*-binding analysis. However, many other studies argued that the co-reference is possible (Gunji 2002; Hoshi 2004; Ishizuka 2010; Kitao 2011; Morita 2013), arguing for the head-raising analysis. In addition, Hoshi (2004) and Ishizuka (2010) claimed that while co-indexing the anaphor *jibun* with the RC subject might be marginally acceptable, it would become fully acceptable if we replace *jibun* with the anaphor *jibun-jishin* ‘self-self’, which is more morphologically complex. It implies that the morphological make-up of an anaphor may affect its ability to be co-referential with the RC subject.

This paper aims to address the above issues with two carefully controlled truth value judgment tasks (Crain & Thornton 1998), where participants were

asked to judge whether the interpretation of a given sentence matches a given picture. The results showed that neither the simplex anaphor *jibun* nor the complex anaphor *jibun-jishin* within the head NP of RCs can take the RC subject as its antecedent, which suggests that the head NP does not reconstruct and therefore lends support to the *pro*-binding analysis of Japanese RCs. Moreover, the finding suggests that the morphological make-up of an anaphor does not affect its ability to take the RC subject as its antecedent, despite the claim that it is more acceptable to co-index the complex anaphor *jibun-jishin* with the RC subject than the simplex anaphor *jibun*.

The rest of this paper is structured as follows. In § 2, I review what the *pro*-binding analysis and the head-raising analysis claimed about the derivation of the head NP in Japanese RCs. In § 3, I review the properties of the simplex anaphor *jibun* and the complex anaphors *jibun-jishin*, *kare-jishin* ‘himself’ and *kanojo-jishin* ‘herself’, as their morphological difference has been argued to affect their interpretation within the head NP of Japanese RCs. In § 4, two research questions are presented, followed by the details of Experiment 1 in § 5, with which the research questions were examined. § 6 presents Experiment 2, which was used to confirm the validity of the findings in Experiment 1. In § 7, the implications of the experimental results are discussed and § 8 concludes the paper.

2. Derivation of the head NP in Japanese RCs

Whether an anaphor within the head NP of an RC can take the RC subject as its antecedent has been considered as an important diagnostic to investigate the derivation of the head NP of RCs in different languages (e.g. Bhatt 2002; Aoun & Li 2003). Schachter (1973) pointed out that, in English sentences like (2), the anaphor *himself* within the head NP *the portrait of himself* can be co-referential with the RC subject *John*. Under the assumptions that (i) the head NP dominates the RC and (ii) an anaphor must be c-commanded by its antecedent, the binding relation between *John* and *himself* can be established in (2) if the head NP *the portrait of himself* moves back to its base position inside the RC at Logical Form (LF), i.e., if it “reconstructs” within the RC at LF.

- (2) [The portrait of himself]_i that John_j painted t_i is extremely flattering.

Since reconstruction occurs only when syntactic movement is involved (Chomsky 1993), the binding relation between *himself* and *John* in (2) suggests that the head NP was generated inside the RC and raised out of it afterwards.

The same diagnostic has also been applied to Japanese RCs. However, previous studies presented conflicting intuitive judgments upon whether an anaphor

within the head NP can take the RC subject as its antecedent. On the one hand, many studies claimed that the anaphor *jibun* within the head NP of Japanese RCs cannot refer to the RC subject (Hoji 1985; Hasegawa 1988; Ishii 1991; Fukui & Takano 2000; Murasugi 2000), as in (3), which supports the proposal that the head NP of Japanese RCs is base-generated external to the RC. On the other hand, there were also several studies arguing that the anaphor *jibun* can be co-referential with the RC subject (Gunji 2002; Hoshi 2004; Ishizuka 2010; Kitao 2011; Morita 2013), as in (4a) and (4b).

- (3) * [*John_i-ga e_j taipu-shita*] [*jibun_i-no ronbun*]_j
 John-NOM type-PST self-GEN paper
 'self_i's paper that John_i typed' (Hasegawa 1988: 59)

- (4) a. [[*Ken_i-ga kai-ta*] [*jibun_i-no denki*]]-ga *besutoseera-ni*
 Ken-NOM write-PST self-GEN biography-NOM best-seller-to
nat-ta.
 become-PST
 'The biography of himself_i that Ken_i wrote became a bestseller.'
 (Gunji 2002: 212)

- b. [*Mary_i-ga totta*] [*jibun_i-no shasin*]-ga *soko-ni aru*.
 Mary-NOM take-PST self-GEN photo-NOM there-at exist
 'The picture of herself_i that Mary_i took is there.' (Morita 2013: 649)

Moreover, Hoshi (2004) and Ishizuka (2010) stated that, in cases in which the simplex anaphor *jibun* cannot be co-referential with the RC subject, replacing *jibun* with the complex anaphor *jibun-jishin* would make the co-reference between the anaphor and the RC subject fully acceptable, as in (5).

- (5) [*John_i-ga e_j taipu-shita*] [*jibun-jishin_i-no ronbun*]_j
 John-NOM type-PST self-self-GEN paper
 'self_i's paper that John_i typed' (Hoshi 2004: 121)

Thus, the morphological complexity seems to affect the interpretation of the anaphor. Furthermore, Ishii (1991), Hoshi (2004) and Kitao (2009) argued that reconstruction can also occur with the other two complex anaphors *kare-jishin* and *kanojyo-jishin*, as in (6) and (7):

- (6) *Mary-wa* [[*John_i-ga e_j taipushita*] [*kare-jishin_i-no ronbun*]]-o *mottekita*.
 Mary-TOP John-NOM type-PST himself-GEN paper-ACC bring-PST
 'Mary bought the paper of himself_i that John_i typed.' (Hoshi 2004: 122)

- (7) *Katie-wa* [[*Paul_i-ga e_j egaita*] [*kare-jishin_i-no e_j*]-o *taiso*
 Katie-TOP Paul-NOM draw-PST himself-GEN picture-ACC very
hoshigatta.
 want-PST
 ‘Katie wanted the picture of himself_i that Paul_i drew very much.’

(Kitao 2009: 31)

It has been claimed that, in (6) and (7), the anaphor *kare-jishin* ‘himself’ can be co-referential with the RC subject.

Overall, previous studies had different judgments upon whether the anaphor within the head NP of Japanese RCs can be co-referential with the RC subject. There are two controversies that remain to be addressed: (i) whether the simplex anaphor *jibun* within the head NP can refer to the RC subject; (ii) whether the complex anaphor such as *jibun-jishin/kare-jishin* can refer to the RC subject.

To address the above issues, two truth value judgment experiments were conducted. Before delving into the details of the experiments, I would like to review the properties of the simplex anaphor *jibun* and the complex anaphors *jibun-jishin* and *kare-jishin/kanojo-jishin*, as their morphological difference was argued to affect their interpretation within the head NP of RCs. We will see *jibun* shares more properties with *jibun-jishin* than *kare-jishin/kanojo-jishin*. Because of this, *jibun-jishin*, rather than *kare-jishin/kanojo-jishin*, was selected along with the simplex anaphor *jibun* for an experimental investigation.

3. Simplex and complex anaphors in Japanese

The first difference between the simplex anaphor *jibun* and the complex anaphors *jibun-jishin* and *kare-jishin/kanojo-jishin* is that *jibun* can participate in long-distance binding while the complex anaphors cannot (Nakamura 1987; Katada 1988, 1991; Aikawa 2002[1999]). In other words, all types of complex anaphors must be locally bound but the simplex anaphor *jibun* may not, as in (8).

- (8) *Taroo_i-ga Jiroo_j-ga jibun_{i/j}/jibun-jishin_{*i/j}/kare-jishin_{*i/j}-o semeta to*
 Taroo-NOM Jiroo-NOM self/self-self/he-self-ACC blame-PST that
itta.
 say-PST
 ‘Taro_i said that Jiro_j blamed himself_{i/j}.’ (Aikawa 2002[1999]: 177)

In Japanese RCs, if a complex anaphor within the head NP can take the RC subject as its antecedent, it would indicate that the head NP reconstructs within the RC at LF, under the assumption that a complex anaphor must be locally bound

by its antecedent. In order to examine the validity of the claim that the complex anaphor is more likely to reconstruct than the simplex anaphor (Hoshi 2004; Ishizuka 2010), one should compare the availability of reconstruction with morphologically simplex and complex anaphors. The question is which ones to compare. There are four reasons that one should compare the simplex anaphor *jibun* with the complex anaphor *jibun-jishin* 'self-self' rather than *kare-jishin* 'himself'/'*kanojo-jishin* 'herself'.

First, the only morphological difference between *jibun* and *jibun-jishin* is the addition of *-jishin* in the complex anaphor. Thus, if reconstruction effects are found with *jibun-jishin*, but not *jibun*, it would be reasonable to conclude that it is the morpheme *-jishin* that makes the reconstruction happen. In contrast, *jibun* and *kare-jishin/kanojo-jishin* have nothing in common morphologically. Moreover, it is the suffix *-jishin* that makes the complex anaphor local (Katada 1988; 1991). Since the issue is whether the simplex anaphor *jibun* and the complex anaphors behave similarly in reconstruction, one should compare *jibun* and *jibun-jishin*, whose difference is only the extra morpheme *-jishin* in the latter.

Second, *jibun-jishin* is more similar to *jibun* because they do not have to agree with their antecedent in phi features, unlike *kare-jishin/kanojo-jishin* (Nakamura 1987; Aikawa 2002[1999]):

- (9) a. *Taroo_i/Hanako_j/[_{NP} Taroo_k-to Hanako]_k-ga jibun_{i/j/k}/jibun-jishin_{i/j/k}-o*
Taro/Hanako/ Taro-and Hanako-NOM self/self-self-ACC
semeta.
blame-PST
'Taro_i/Hanako_j/[Taroo_k and Hanako]_k blamed self_{i/j/k}/self-self_{i/j/k}.'
(Aikawa 2002[1999]: 178)
- b. *Taroo_i/Hanako_j/[_{NP} Taroo-to Hanako]_k-ga kare-jishin_{i/*j/*k}-o semeta.*
Taroo/Hanako/ Taro-and Hanako-NOM he-self-ACC blame-PST
*'Taro_i/Hanako_j/[Taroo and Hanako]_k blamed him-self_{i/*j/*k}.'*
(Aikawa 2002[1999]: 178)
- c. *Taroo_i/Hanako_j/[_{NP} Taroo-to Hanako]_k-ga kanojo-jishin_{*i/j/*k}-o*
Taroo/Hanako/ Taro-and Hanako-NOM she-self-ACC
semeta.
blame-PST
*'Taro_i/Hanako_j/[Taroo and Hanako]_k blamed her-self_{i/j/*k}.'*

In (9a), both *jibun* and *jibun-jishin* can take *Taroo*, *Hanako*, or *Taroo and Hanako* as their antecedent, which suggests that *jibun* and *jibun-jishin* do not need to agree with their antecedent in gender or number features. In contrast, in (9b), *kare-jishin* can only take *Taroo* as its antecedent and in (9c), *kanojo-jishin* can only take *Hanako* as its antecedent, which shows that they must agree with their

antecedent in gender and number features. Thus, *jibun* and *jibun-jishin* are more comparable and have fewer restrictions than *kare-jishin*/*kanojo-jishin*.

Third, both *jibun* and *jibun-jishin* can take the quantifier phrase *daremo* 'everyone' as their antecedent while *kare-jishin* and *kanojo-jishin* cannot (Aikawa 2002[1999]):

- (10) a. *Daremo_i-ga jibun_i/jibun-jishin_i-o hihanshita.*
 everyone-NOM self/self-self-ACC criticize-PST
 'Everyone_i criticized self_i/self-self_i.' (Aikawa 2002[1999]: 178)
- b. **Daremo_i-ga kare-jishin_i/kanojo-jishin_i-o hihanshita.*
 everyone-NOM he-self/her-self-ACC criticize-PST
 'Everyone_i criticized himself_i/herself_i.' (Aikawa 2002[1999]: 178)

Aikawa argued that the above difference between *jibun/jibun-jishin* and *kare-jishin/kanojo-jishin* can be attributed to the lexical properties of *jibun* and *kare/kanojo*: *jibun* can be interpreted as a bound variable but *kare/kanojo* cannot, as evidenced by (11a) and (11b):

- (11) a. *Taroo_i-ga jibun_i/*kare_i-o semeta.*
 Taroo-NOM self/him-ACC blame-PST
 'Taro_i blamed self_i/himself_i.'
- b. *Hanako_i-ga jibun_i/*kanojo_i-o semeta.*
 Hanako-NOM self/her-ACC blame-PST
 'Hanako_i blamed self_i/herself_i.'

Thus, *jibun-jishin* is more similar to *jibun*. The complex anaphors *kare-jishin* and *kanojo-jishin* have the property of *kare* and *kanojo* and therefore cannot be interpreted as bound variables.

Fourth, both *jibun* and *jibun-jishin* are subject-oriented while *kare-jishin* and *kanojo-jishin* are not (Aikawa 2002[1999]):

- (12) a. *Taroo_i-ga Jiroo_j-ni jibun_{i/*j}/jibun-jishin_{i/*j}-nitsuite hanashita.*
 Taroo-NOM JIROO-DAT self/self-self-about tell-PST
 'Taro_i told Jiro_j about himself_{i/*j}.' (Aikawa 2002[1999]: 178)
- b. *Taroo_i-ga Jiroo_j-ni kare-jishin_{i/j}-nitsuite hanashita.*
 Taroo-NOM JIROO-DAT him-self-about tell-PST
 'Taro_i told Jiro_j about himself_{i/j}.' (Aikawa 2002[1999]: 178)
- c. *Hanako_i-ga Mary_j-ni kanojo-jishin_{i/j}-nitsuite hanashita.*
 Hanako-NOM Mary-DAT her-self-about tell-PST
 'Hanako_i told Mary_j about herself_{i/j}.'

As shown in the above examples, *jibun* and *jibun-jishin* can only be bound by the subject while *kare-jishin* and *kanojo-jishin* can be bound by either the subject or

the indirect object. Thus, among the three complex anaphors, *jibun-jishin* is most similar to *jibun*.

To sum up, by taking into account the differences between *jibun-jishin* and *kare-jishin/kanojo-jishin*, we can see that the pair of *jibun-jishin* and *jibun* is more comparable than that of *kare-jishin/kanojo-jishin* and *jibun*. Thus, if one intends to compare the reconstruction effects of the simplex and complex anaphors inside the head NP of Japanese RCs, *jibun* and *jibun-jishin* should be examined.

4. Research questions

Two truth value judgment experiments were conducted to address the following two research questions:

- (13) Research Question 1: Can an anaphor inside the head NP of Japanese RCs take the subject of the RC as its antecedent?
 Research Question 2: Does the morphological complexity of an anaphor inside the head NP affect its availability to be interpreted within the RC?

The *pro*-binding analysis and the head-raising analysis predict different answers for the above questions. First, under the *pro*-binding analysis, the head NP is base-generated external to the RC so the head NP is not predicted to reconstruct into the RC at LF. Thus, the answer to both questions in (13) would be *no*, which means neither *jibun* nor *jibun-jishin* can take the RC subject as its antecedent. Second, under the head-raising analysis, the head NP is raised from within the RC and reconstruction of the head NP should be possible. Thus, we predict that the answer to both questions in (13) should be *yes*, which means both *jibun* and *jibun-jishin* can take the RC subject as their antecedent. Moreover, if the claim made by Hoshi (2004) and Ishizuka (2010) that complex anaphors are more likely to reconstruct than the simplex anaphor *jibun* is true, we predict that there would be a difference between *jibun* and *jibun-jishin* with respect to their ability to refer to the RC subject. The two truth value judgment experiments were named Experiment 1 and Experiment 2, respectively. Experiment 1 is introduced in the following section.

5. Experiment 1

Experiment 1, a picture-matching truth value judgment task, was conducted to investigate whether the simplex anaphor *jibun* and the complex anaphor *jibun-*

jishin within the head NP of Japanese RCs can be co-referential with the RC subject.

5.1 Participants

A total of 31 native speakers of Japanese participated in Experiment 1. They were undergraduate students from a university in Japan and their ages ranged from 18 to 24. Extra course credits were given to them after the experiment. After checking their language background, I removed one participant's data because he had lived in the United States from the age of 2 to 13.

5.2 Task

For each stimulus, the participants saw a picture with a sentence on a computer screen and were asked to decide whether the interpretation of the sentence matched the picture. Although there was no time limit for the task, all participants were able to finish it within 15 minutes. The experiment was created and run on an online survey website. Each participant did the experiment with a computer in a computer lab.

5.3 Materials and design of the experiment

Four Disney characters, *Mickey*, *Minnie*, *Donald*, and *Daisy*, were used in the task. They were briefly introduced at the beginning of the experiment, followed by four multiple-choice questions to confirm that the participants were familiar with these characters. The participants were then informed that all Disney characters always put their face photos on their belongings. For each experimental stimulus, participants saw a picture and a Japanese sentence at the same time on a computer screen. For example, in one stimulus, participants saw a picture, where there is a hat with a face photo of *Mickey*, indicating that the hat belongs to *Mickey*. A sentence was shown right below the picture, which is transcribed in (14):

- (14) *Daisy_j-ga* [*Mickey_k-ga e_i arat-ta*] [*jibun_{j/k}-no booshi*]_i-o *yogoshi-ta*.
 Daisy-NOM Mickey-NOM wash-PST self-GEN hat-ACC stain-PST
 'Daisy_j stained self_{j/k}'s hat that Mickey_k washed.'

The participants were then asked to judge whether the sentence and the picture matched by selecting one of two choices: *atteiru* 'match' or *atteinai* 'mismatch'. Importantly, in order for the sentence in (14) to match the given picture, *jibun-no booshi* 'self's hat' must be interpreted as *Mickey's* hat. In other words, the antecedent of the anaphor must be the RC subject.

The experiment had a 2×2 design with (i) *Anaphor Type* (*jibun* vs *jibun-jishin*) and (ii) *Antecedent Position* (whether the intended antecedent is the matrix subject or the RC subject). This results in the following 4 critical conditions:

Table 1. Four critical conditions in Experiment 1

	Matrix subject antecedent	RC subject antecedent
Simplex anaphor (<i>jibun</i>)	Simplex-Matrix	Simplex-RC
Complex anaphor (<i>jibun-jishin</i>)	Complex-Matrix	Complex-RC

All four conditions based on the sample stimulus in (14) are as follows:

- (15) a. a picture showing a hat with Daisy’s face photo
- b. a picture showing a hat with Mickey’s face photo

The pictures show that the hat belongs to *Daisy* in (15a) and to *Mickey* in (15b). The sentence in (16a) with a simplex anaphor *jibun* or the sentence in (16b) with a complex anaphor *jibun-jishin* appeared below the two pictures.

- (16) a. *Daisy_j-ga* [[*Mickey_k-ga* *e_i arat-ta*] [*jibun_{j/k}-no booshi*]_{*i*}]-o *yogoshi-ta*.
Daisy-NOM Mickey-NOM wash-PST self-GEN hat-ACC stain-PST
‘Daisy_{*j*} stained self_{*j/k*}’s hat that Mickey_{*k*} washed.’
- b. *Daisy_j-ga* [[*Mickey_k-ga* *e_i arat-ta*] [*jibun-jishin_{j/k}-no booshi*]_{*i*}]-o
Daisy-NOM Mickey-NOM wash-PST self-self-GEN hat-ACC
yogoshi-ta.
stain-PST
‘Daisy_{*j*} stained self_{*j/k*}’s hat that Mickey_{*k*} washed.’

The Simplex-Matrix condition in Table 1 involves the combination of (15a) and (16a). In order for (16a) to be judged as a true statement with (15a), the matrix subject *Daisy* must be interpreted as the antecedent of the simplex anaphor *jibun*. Moreover, the Complex-Matrix condition involves the combination of (15a) and (16b). In order for (16b) to be judged as a true statement with (15a), the matrix subject *Daisy* must be interpreted as the antecedent of the complex anaphor *jibun-jishin*. The more critical conditions for Experiment 1 are the other two conditions that involve RC subjects. The Simplex-RC condition involves the combination of (15b) and (16a) and the Complex-RC condition involves the combination of (15b) and (16b). In order for (16a) and (16b) to be judged as true statements with (15b), the RC subject *Mickey* must be interpreted as the antecedent of the simplex anaphor *jibun* and the complex anaphor *jibun-jishin*.

For each of the 2 conditions within *Anaphor Type*, 40 different lexicalizations were created so there were a total of 80 sentences. Each of the 80 sentences was then

combined with a picture that requires the matrix subject as the antecedent of the anaphor and another picture that requires the RC subject as the antecedent of the anaphor, resulting in 160 sentence-picture pairs.¹ These 160 pairs were distributed into four lists using a Latin Square procedure, so that there were 40 critical items in each list, which contained only one condition from the same lexicalization.

Moreover, the same 40 items were included in each list as baseline condition items, which were used to: (i) monitor whether the participants were careful enough in reading sentences and (ii) examine whether the participants had expected subject-orientation for the simplex and complex anaphors. There were two types of baseline condition items (Type 1 & Type 2), each of which had 20 items.

For the Type 1 items, an example of picture-sentence pair is given below:

- (17) a. a picture showing a notebook with Mickey's face photo
 b. a picture showing a notebook with Daisy's face photo

The Japanese sentence below the picture (17a)/(17b) is either (18a) with *jibun* or (18b) with *jibun-jishin*.

- (18) a. *Mickey_j-ga Daisy_k-ni jibun_{j/*k}-no hon-o watashita.*
 Mickey-NOM Daisy-DAT self-GEN book-ACC hand over-PST
 'Mickey_j handed over self_{j/*k}'s book to Daisy_k.'
 b. *Mickey_j-ga Daisy_k-ni jibun-jishin_{j/*k}-no hon-o watashita.*
 Mickey-NOM Daisy-DAT self-self-GEN book-ACC hand over-PST
 'Mickey_j handed over self_{j/*k}'s book to Daisy_k.'

Each Type 1 item has a ditransitive verb such as *watas* 'to handover' or *okur* 'to send.' Due to the constraint that the binding of *jibun* and *jibun-jishin* is subject-oriented, *jibun* and *jibun-jishin* in (18a) and (18b) can be co-indexed only with the subject *Mickey*, not the indirect object *Daisy*. Thus, when participants are shown (17a) with (18a) or (18b), they are expected to select "match." But when they are shown (17b) with (18a) or (18b), they are expected to select "mismatch." The intended antecedent is the subject in half of the items but is the object in another half.

As for the Type 2 items, an example of picture-sentence pair is given below:

- (19) a. a picture showing a pair of gloves with Minnie's face photo
 b. a picture showing a pair of gloves with Donald's face photo

1. In order to rule out the potential confounding factors of *gender* (i.e., male vs female) and *animal type* (i.e., mouse vs duck) of the characters, *Mickey* was always paired with *Daisy* and *Minnie* was always paired with *Donald* in the stimuli.

The Japanese sentence below the picture (19a)/(19b) is either (20a) with *jibun* or (20b) with *jibun-jishin*.

- (20) a. Minnie_j-ga Donald_k-ni jibun_{j/*k}-no tebukuro-o sute-ta to
 Minnie-NOM Donald-DAT self-GEN glove-ACC throw away-PST that
 it-ta.
 say-PST
 ‘Minnie_j said to Donald_k that she had thrown away self_{j/*k}’s gloves.’
- b. Minnie_j-ga Donald_k-ni jibun-jishin_{j/*k}-no tebukuro-o sute-ta
 Minnie-NOM Donald-DAT self-self-GEN glove-ACC throw away-PST
 to it-ta.
 that say-PST
 ‘Minnie_j said to Donald_k that she had thrown away self_{j/*k}’s gloves.’

Each Type 2 item has a bridge verb that is subcategorized for an indirect object and a clausal complement. All Type 2 items were constructed so that the complement clause always had a null subject. Due to the constraint that the binding of *jibun* and *jibun-jishin* is subject-oriented, both *jibun* and *jibun-jishin* can be co-indexed only with the subject, not the indirect object. Thus, when participants see (19a) with (20a) or (20b), they are expected to select “match.” However, when they see (19b) with (20a) or (20b), they are expected to select “mismatch.” The intended antecedent is the subject in half of the items but is the object in another half. All critical and baseline condition items were pseudo-randomized to balance the ordering effects.

5.4 Procedure

At the beginning of the experiment, the participants were asked to fill out a background information survey, which included: (i) name; (ii) age; (iii) native language; (iv) language(s) other than Japanese that they can speak fluently; (v) experience of studying/living abroad. Then two examples were presented to show how to do the experiment and the participants continued to practice four more trials before starting to read the actual experimental items. No feedback or explicit instruction was given when they were practicing the four trials.

The results of Experiment 1 were first analyzed with two-way repeated measures analysis of variance (ANOVA). When a factor was found to be a significant predictor in the initial analysis, planned pairwise comparisons were conducted to look at the result within the condition. The ANOVA and pairwise comparison tests were performed on both participant (F_1 and t_1) and item (F_2 and t_2). Since the participants gave binary judgments (“match” or “mismatch”), the binomial distribution of individual data was also examined.

5.5 Findings

Recall that Experiment 1 manipulated two factors: (i) *Anaphor Type* (*jibun* vs *jibun-jishin*); (ii) *Antecedent Position* (whether the intended antecedent is the matrix subject or the RC subject). Thus, there were four critical conditions: (i) when the simplex anaphor *jibun* is involved and the face photo presents the matrix subject (Simplex-Matrix); (ii) when the simplex anaphor *jibun* is involved and the face photo presents the RC subject (Simplex-RC); (iii) when the complex anaphor *jibun-jishin* is involved and the face photo presents the matrix subject (Complex-Matrix) and (iv) when the complex anaphor *jibun-jishin* is involved and the face photo presents the RC subject (Complex-RC).

Table 2 summarizes the participants' mean ratios of "match" answers, Standard Deviations (SDs), and Standard Errors (SEs) of the four critical conditions. Figure 1 graphically presents the mean ratios of "match" answers in these conditions.²

Table 2. Participants' mean ratios of "match" answers of the critical conditions in Experiment 1

	Mean (SD)	SE
Simplex-Matrix	0.96 (0.09)	0.02
Simplex-RC	0.05 (0.07)	0.01
Complex-Matrix	0.94 (0.11)	0.02
Complex-RC	0.08 (0.12)	0.02

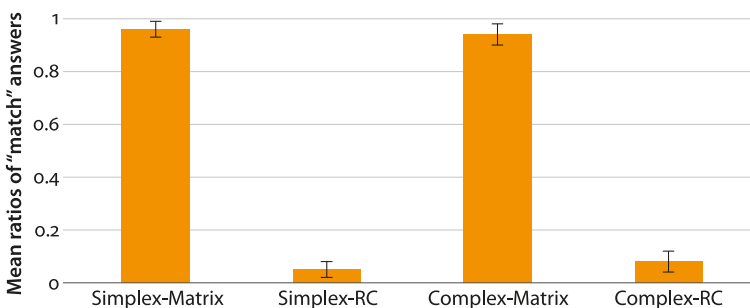


Figure 1. Participants' mean ratios of "match" answers of the critical conditions in Experiment 1

2. The error bars are 95% confidence intervals, each of which is a range of values where we can be 95% confident that the true mean is located.

Table 3 summarizes the items’ mean ratios of “match” answers, SDs and SEs of the four critical conditions. Figure 2 graphically presents the mean ratios of “match” answers in these conditions.

Table 3. Items’ mean ratios of “match” answers of the critical conditions in Experiment 1

	Mean (SD)	SE
Simplex-Matrix	0.96 (0.06)	0.01
Simplex-RC	0.05 (0.08)	0.01
Complex-Matrix	0.94 (0.08)	0.01
Complex-RC	0.07 (0.1)	0.02

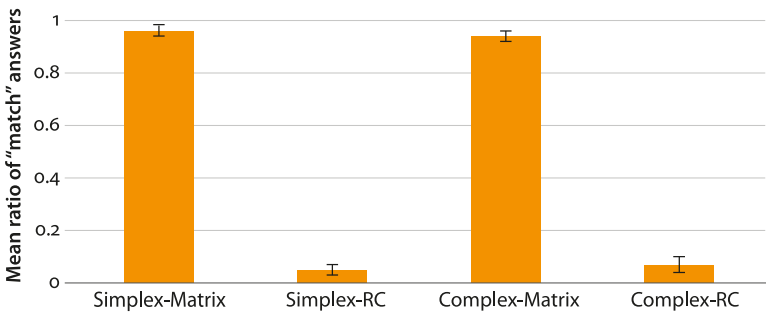


Figure 2. Items’ mean ratios of “match” answers of the critical conditions in Experiment 1

A visual inspection of the means in Figure 1 and 2 clearly shows that the matrix subject is strongly preferred to the RC subject as the antecedent for the anaphors, regardless of the anaphor type. Also, the very low mean ratios of the match answers with the RC subject conditions suggest that the co-reference between the anaphor and the RC subject is unavailable.

The results of two-way repeated measures ANOVA show that the anaphor type does not have significant effects on the participants’ selection of the “match” answer ($F_1(1,29)=0.02, p=.89; F_2(1,39)=0.02, p=.89$), although the antecedent position does ($F_1(1,29)=1347.32, p<.01; F_2(1,39)=2864.24, p<.01$). The interaction between these two factors is not significant ($F_1(1,29)=2.06, p=.16$) in the participant analysis but is significant in the item analysis ($F_2(1,39)=5.22, p=.03$). Pairwise comparisons further confirm that there is a significant mean difference between Simplex-Matrix and Simplex-RC ($t_1=1596.19, p<.01; t_2=55.1, p<.01$) and between Complex-Matrix and Complex-RC ($t_1=517.54, p<.01; t_2=39.91, p<.01$), while there is no significant mean difference between Simplex-RC and Complex-RC ($t_1=1.56, p=.22; t_2=1.43, p=.16$) or between Simplex-Matrix and Complex-Matrix ($t_1=1.48, p=.23; t_2=1.4, p=.17$).

Moreover, an analysis of the judgments within each individual participant shows that out of the 10 items in the Simplex-RC condition, 28 out of 30 participants (93.4%) rejected 9 or more items. Since participants' choice was binary ("match" or "mismatch"), based on the binomial distribution, we would be 95% confident that participants did not make random judgments if they accepted or rejected 8 or more out of 10 items in each condition. The above finding strongly implies that the participants consistently rejected the co-reference between the simplex anaphor *jibun* and the RC subject. The result with Complex-RC was similar: 27 out of 30 participants rejected more than 8 out of 10 items. In a clear contrast, in the Simplex-Matrix condition, 28 participants (93.3%) accepted 8 or more out of 10 items, and in the Complex-Matrix condition, 27 participants (90%) also accepted 8 or more out of 10 items, which suggests that the matrix subject interpretation was consistently available to the participants.

For both the Type 1 and the Type 2 baseline items, there were 4 conditions: (i) *jibun* is involved and the face photo presents the matrix subject; (ii) *jibun* is involved and the face photo presents the dative NP; (iii) *jibun-jishin* is involved and the face photo presents the matrix subject; (iv) *jibun-jishin* is involved and the face photo presents the dative NP. Since there were 5 items in each condition, based on the binomial distribution, we would be more than 95% confident that participants did not make random judgments in that condition if they accepted or rejected all 5 items.

The result shows that 22 participants (73.3%) accepted all items in (i) and (iii) and rejected all items in (ii) and (iv) of the Type 1 items and 27 (90%) accepted all items in (i) and (iii) and rejected all items in (ii) and (iv) of the Type 2 items. This finding suggests the expected subject-orientation constraint of *jibun* and *jibun-jishin* in the participants' native grammar. Due to this constraint, in order to further check whether the participants were paying attention to the experimental items, we expected each participant to accept at least 16 out of 20 items in (i) and (iii) and simultaneously reject at least 16 out of 20 items in (ii) and (iv) of both Type 1 and Type 2 items. The result shows that all participants did as expected.

6. Experiment 2

One remaining issue for the results of Experiment 1 is that the native Japanese participants might have consistently rejected the co-reference between the anaphor and the RC subject because they stuck to the following "matrix subject only" strategy: the matrix subject should always be the antecedent of the anaphor. For those participants, the matrix subject might be preferred over the RC subject to be the antecedent because it is generally considered as the most prominent argument in

a sequence of adjacent arguments (e.g. Klein et al. 2012). Due to the “matrix subject only” strategy, the co-reference between the anaphor and the RC subject might have been rejected even though it was acceptable. Thus, the participants should understand the following rule before the experiment: in a given sentence with ambiguous interpretations, as long as there is an interpretation that matches the picture, the item should be accepted. In order to address this issue, Experiment 2 was designed and conducted.

6.1 Participants

A group of 28 native speakers of Japanese participated in Experiment 2. Eighteen of them also participated in Experiment 1. They were all undergraduate students from a university in Japan and their age ranged from 18 to 23. Experiment 2 was conducted 2 months after Experiment 1 and extra course credits were given to the participants after the experiment was finished.

6.2 Task

The task in Experiment 2 was the same as that in Experiment 1, where participants judged whether the interpretation of a given sentence matched a given picture. All participants were able to finish the experiment within 15 minutes. Each participant did the experiment with a computer in a computer lab.

6.3 Materials and design of the experiment

The critical items in Experiment 2 were the same as those in Experiment 1, except that only *jibun* was included. Thus, the *Antecedent Position* (whether the intended antecedent is the matrix subject or the RC subject) was the only factor in Experiment 2. There were two critical conditions: (i) a picture is such that the anaphor *jibun* is intended to refer to the matrix subject (*Jibun-Matrix*) and (ii) a picture is such that the anaphor *jibun* is intended to refer to the RC subject (*Jibun-RC*).

A total of 24 sentences of different lexicalizations were created. Each of the 24 sentences was then combined with a picture that requires the matrix subject as the antecedent of the anaphor and another picture that requires the RC subject as the antecedent of the anaphor, resulting in 48 sentence-picture pairs. These 48 pairs were distributed into 2 lists so that there were 24 critical items in each list, each of which contained only one condition from the same lexicalization.

In addition to the critical items, there were 24 Type 1 baseline items, which were created in the same way as those in Experiment 1. There were two conditions: one matching condition where the picture is such that the anaphor is

intended to refer to the subject NP and one mismatching condition where the picture is such that the anaphor is intended to refer to the indirect object NP. Each condition had 12 fillers.

Furthermore, there were 12 Type 2 baseline items, which were different from those in Experiment 1. For each of the Type 2 item, the anaphor had two possible interpretations. One item with its two conditions is shown below:

- (21) a. a picture showing a bag with Daisy's face photo
 b. a picture showing a bag with Mickey's face photo

The Japanese sentence below (21a)/(21b) is transcribed in (22):

- (22) *Daisy_j-ga Mickey_k-ga jibun_{j/k}-no kaban-o huita-no-o mita.*
 Daisy-NOM Mickey-NOM self-GEN bag-ACC wipe-PST-COMP-ACC see-PST
 'Daisy_j saw Mickey_k wipe self_{j/k}'s bag.'

In (22), the anaphor *jibun* can be bound by either the matrix subject *Daisy* or the embedded subject *Mickey*. There were two conditions for the Type 2 items: (i) one condition where the picture is such that the anaphor is intended to refer to the matrix subject NP and (ii) one condition where the picture is such that the anaphor is intended to refer to the embedded subject NP. Since *jibun* can refer to either the matrix subject or the embedded subject, the participants were expected to consistently accept the items in the two conditions if they knew the following rule: in a given sentence with ambiguous interpretations, as long as there is an interpretation that matches the picture, the item should be accepted. Thus, the Type 2 items could be used to monitor whether the participants stuck to the "matrix subject only" strategy in making their judgments in Experiment 2. Since there were 6 items in each condition of the Type 2 items, if the participants managed to accept 5 or more items in both conditions, we would be sure that they did not stick to the "matrix subject only" strategy and had understood the important rule that whenever there is an interpretation that matches the picture, the item should be accepted.³

3. The reason why the complex anaphor *jibun-jishin* was not included in Experiment 2 is because there is no way to create a set of baseline items where *jibun-jishin* has two possible interpretations. One crucial difference between *jibun-jishin* and *jibun* is that the former must be locally bound. If *jibun-jishin* replaces *jibun* in (22), it has to refer to the embedded subject *Mickey*. Thus, if the participants have expected judgments for sentences like (22) with *jibun-jishin*, we would still be unable to rule out the possibility that they use the "matrix subject only" strategy in making judgments on the critical items that may have two possible interpretations.

6.4 Procedure

The procedure in Experiment 2 was the same as that in Experiment 1, except that a set of examples were added, which was intended to lead the participants to understand the rule that in a given sentence with ambiguous interpretations, as long as there is an interpretation that matches the picture, the item should be accepted. There were three examples, which involve three pictures described in (23), respectively, along with the sentence in (24), where the anaphor has two possible interpretations:⁴

- (23) a. a picture showing a toothpaste with Mickey's face photo
 b. a picture showing a toothpaste with Daisy's face photo
 c. a picture showing a toothpaste with Donald's face photo

The Japanese sentence below (23a)/(23b)/(23c) is transcribed in (24):

- (24) *Mickey_j-ga Daisy_k-ni Donald_i-ga jibun_{j/*k/i}-no hamigakiko-o tsukat-ta*
 Mickey-NOM Daisy-DAT Donald-NOM self-GEN toothpaste-ACC use-PST
to itta.
 that say-PST
 'Mickey_j said to Daisy_k that Donald_i used self_{j/*k/i}'s toothpaste.'

In (24), three characters, *Mickey*, *Daisy* and *Donald*, are involved. The anaphor *jibun* can be co-indexed with either *Mickey* or *Donald*, but not *Daisy*, due to its subject-oriented property. The participants saw the three pictures (23a), (23b) and (23c) consecutively, each of which was combined with (24). First, (23a) was presented and the participants were asked to click on "match" after understanding that *jibun-no hamigakiko* 'self's toothpaste' can be interpreted as *Mickey's toothpaste*. Next, (23b) was presented and the participants were asked to click on "mismatch" after understanding that *jibun-no hamigakiko* 'self's toothpaste' cannot be interpreted as *Daisy's toothpaste*. Last, (23c) was presented and the participants were asked to click on "match" after understanding that *jibun-no hamigakiko* 'self's toothpaste' can be interpreted as *Donald's toothpaste*. After seeing the examples, the participants continued to practice four trials of the experimental items before being presented with the actual ones. No feedback or explicit instruction was given with the practice trials.

4. This sentence is syntactically different from the Type 2 baseline items because it involves a complementizer *to*, a verb *iu* 'to say,' and an additional dative NP.

6.5 Findings

The participants' mean ratios of "match" answers in the two critical conditions of Experiment 2 were: *Jibun*-Matrix ($M=0.94$, $SD=0.09$, $SE=0.02$) and *Jibun*-RC ($M=0.1$, $SD=0.13$, $SE=0.02$). Meanwhile, the items' mean ratios of "match" answers in the two critical conditions of Experiment 2 were: *Jibun*-Matrix ($M=0.94$, $SD=0.09$, $SE=0.02$) and *Jibun*-RC ($M=0.1$, $SD=0.09$, $SE=0.02$). Pairwise comparison tests showed a significant difference between the mean frequencies of the match answers for the two conditions in the participant analysis ($t_1(27)=22.7$, $p<.01$) and the item analysis ($t_2(23)=26.67$, $p<.01$).

The individual participants' judgments were also examined. Since there were 12 items in each condition, based on the binomial distribution, we can be sure that participants made consistent judgments if they accepted or rejected nine items or more out of 12. The results reveal that within the *Jibun*-Matrix condition, 27 out of the 28 (96.4%) participants accepted nine items or more and the remaining one participant accepted eight items. On the other hand, within the *Jibun*-RC condition, 24 out of 28 (85.7%) participants rejected nine items or more and all participants rejected seven items or more. Overall, the results with the native Japanese participants were in accord with those of Experiment 1 and confirmed that the simplex anaphor *jibun* within the head NP of Japanese RCs cannot be co-indexed with the RC subject.

For the Type 1 baseline items, there were two conditions: the face photo featured either the subject NP or the indirect object NP. An examination of the individual participants' judgments of the two conditions shows that all participants accepted 10 items or more in the subject condition and rejected 11 items or more in the indirect object condition. The results suggest that all participants paid attention to the sentences they read, as they showed the expected subject-orientation constraint for the anaphor *jibun*.

For the Type 2 baseline items, there were two conditions: the face photo featured either the matrix subject NP (T2-Matrix) or the embedded subject NP (T2-Embed). Recall that in the Type 2 items, the anaphor *jibun* can refer to either the matrix subject or the embedded subject in the given sentences. The participants were expected to accept five or more out of six items in the two conditions, if they understood the rule that a given item must be accepted as long as there is one possible interpretation from the sentence that matches the picture. Thus, if the participants accepted five items or more in both conditions, we can be sure that they understood the rule and did not stick to the "matrix subject only" strategy to allow the co-reference between the matrix subject and the anaphor only. The individual participants' judgments of the two conditions are shown in Figure 3.⁵

5. "P1" to "P28" represent individual participants.

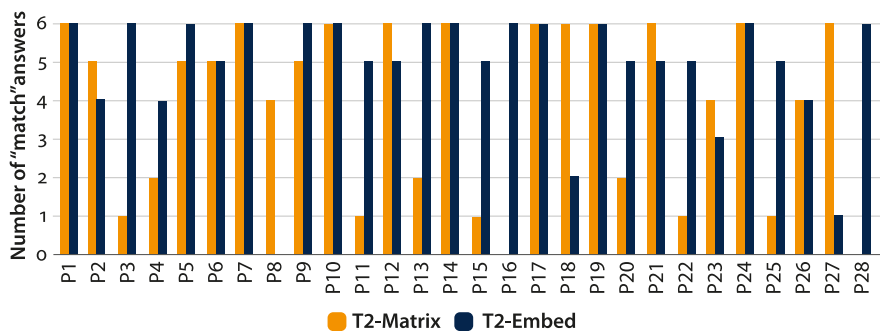


Figure 3. Individual participants’ judgments of the Type 2 items in Experiment 2

As shown in Figure 3, 12 participants accepted five or more out of six items in both conditions, based on which we can be sure that they understood the rule and did not use the “matrix subject only” strategy. Moreover, the 12 participants’ mean ratios of “match” answers in the two critical conditions were 0.96 and 0.11, respectively, which is in accordance with the group results in both Experiment 1 and 2. Furthermore, the 12 participants’ individual judgments on the two critical conditions showed that all of them accepted nine items or more in *Jibun-Matrix* and 10 of them rejected nine items or more in *Jibun-RC*. Therefore, the participants’ consistent rejection of the items where the anaphor *jibun* is intended to refer to the RC subject cannot be attributed to the reason that the participants used a strategy to only select the most prominent matrix subject as the antecedent. The only possible reason for the participants’ consistent rejection is that the anaphor *jibun* cannot take the RC subject as its antecedent.

7. Discussion

The results of Experiment 1 suggest that regardless of its morphological complexity, when a subject-oriented anaphor occurs inside the head NP of a Japanese RC, it cannot take the RC subject as its antecedent. As shown in § 5.5, the mean ratios of “match” answers with the RC subject conditions were very close to zero for the simplex anaphor *jibun* and the complex anaphor *jibun-jishin* in the participant and item analyses. Meanwhile, the mean ratios of “match” answers with the matrix subject condition were as high as 0.96 and 0.94 for *jibun* and *jibun-jishin* in both the participant and item analyses. These findings strongly imply that the head NP of Japanese RCs does not reconstruct into the RC, which in turn supports the *pro*-binding analysis for Japanese RCs, according to which the head NP of Japanese RCs is base-generated external to the RC.

In addition, the results of Experiment 1 also show that there were no statistically significant effects of the morphological complexity of the anaphors, despite the previous studies' claim that complex anaphors are more likely to be interpreted as having the RC subject as their antecedent (Hoshi 2004; Ishizuka 2010). Importantly, this finding can only be accounted for under the *pro*-binding analysis. As reviewed, *jibun* does not have to be bound locally. If it can be interpreted within the RC, as claimed in the head-raising analysis, we predict that in (25a), *jibun* can take either the RC subject *Mickey* or the matrix subject *Daisy* as its antecedent. However, the results show that only the matrix subject is possible. Additionally, *jibun-jishin* has to be bound locally. If the reconstruction is obligatory, it must be interpreted within the RC and should only be locally bound by the RC subject *Mickey* in (25b). However, this prediction is not born out: *jibun-jishin* can refer only to the matrix subject.

- (25) a. *Daisy_j-ga* [[*Mickey_k-ga* *e_i arat-ta*] [*jibun_{j/k}-no booshi*]_{*i*}]-o *yogoshi-ta*.
 Daisy-NOM Mickey-NOM wash-PST self-GEN hat-ACC stain-PST
 'Daisy_j stained self_{j/k}'s hat that Mickey_k washed.'
- b. *Daisy_j-ga* [[*Mickey_k-ga* *e_i arat-ta*] [*jibun-jishin_{j/k}-no booshi*]_{*i*}]-o
 Daisy-NOM Mickey-NOM wash-PST self-self-GEN hat-ACC
yogoshi-ta.
 stain-PST
 'Daisy_j stained self_{j/k}'s hat that Mickey_k washed.'

The experimental results are only predicted under the *pro*-binding analysis, according to which the head NP is base-generated external to the RC. The results of Experiment 2 were in accordance with those of Experiment 1: the mean ratios of "match" answers with the RC subject condition and the matrix subject condition were 0.1 and 0.94, respectively, in both the participant and item analyses. Moreover, the Type 2 items in Experiment 2 were used to rule out the possibility that the participants used a "matrix subject only" strategy to make judgments. For those participants who surely did not use the strategy, their mean ratios of "match" answers with the RC subject and matrix subject conditions were 0.11 and 0.96, respectively, which are compatible with the group results of Experiment 1 and 2. This finding strengthened the argument that the co-indexation between the anaphor and the RC subject is prohibited in Japanese RCs.

One remaining issue is why so many previous studies claimed that the co-reference between the anaphor *jibun* and the RC subject is allowed. As reviewed, many studies gave examples to argue that the co-reference between *jibun* and the RC subject is possible, as in (26a) and (26b):

- (26) a. [[*Ken_i-ga kai-ta*] [*jibun_i-no denki*]]-ga *besutoseera-ni*
Ken-NOM write-PST self-GEN biography-NOM best-seller-to
nat-ta.
become-PST
‘The biography of himself_i that Ken_i wrote became a bestseller.’
(Gunji 2002: 212)
- b. [*Mary_i-ga totta*] [*jibun_i-no shasin*]-ga *soko-ni aru*.
Mary-NOM take-PST self-GEN photo-NOM there-at exist
‘The picture of herself_i that Mary_i took is there.’ (Morita 2013: 649)

Then the question is why the anaphor *jibun* within the head NP in (26a) and (26b) can refer to the RC subject while the native Japanese participants in the current study rejected such co-reference in sentences like (27).

- (27) *Daisy_j-ga* [[*Mickey_k-ga e_i arat-ta*] [*jibun_{j/k}-no booshi*]_i]-o *yogoshi-ta*.
Daisy-NOM Mickey-NOM wash-PST self-GEN hat-ACC stain-PST
‘Daisy_j stained self_{j/k}’s hat that Mickey_k washed.’

First, the possible co-reference between the anaphor *jibun* and the RC subject in sentences like (26a) and (26b) may not necessarily suggest reconstruction of the head NP. Rather, it can be accounted for by the logophoric property of *jibun*.

In previous studies, *jibun* has been claimed to be able to function as a logophoric pronoun (Kuno 1978; Kameyama 1984, 1985), which is also known as an exempt anaphor (e.g. Pollard & Sag 1992; Kim & Yoon 2009). In fact, there are many well-known examples where the anaphor *jibun* does not have to be c-commanded by its antecedent:

- (28) a. *Jibun_i-ga gan kamoshirenai koto-ga Hiroshi_i-o nayamase-ta*.
self-NOM cancer may thing-NOM Hiroshi-ACC worry-PST
‘That he_i might have cancer worried Hiroshi_i.’ (McCawley 1976: 63)
- b. *Jibun_i-no jitsu-no musuko-ga Taroo_i-o kurushime-teiru*.
self-GEN real-GEN son-NOM Taroo-ACC annoy-ASP
‘His_i own son annoys Taroo_i.’ (Aikawa 2002[1999]: 175)

The notion of *logophoricity* was used to account for such *jibun*-binding in (28a) and (28b). According to Clements (1975), a logophoric individual is someone whose speech, thoughts, feelings, or general state of consciousness are reported in the linguistic context where a logophor occurs. In (28a) and (28b), since the matrix subject NP where *jibun* occurs indicates its antecedent’s feeling, *jibun* can be a logophor that does not have to be c-commanded. Likewise, the grammatical status of (26a) and (26b) can also be attributed to the logophoric property of *jibun*. It is possible that in (26a), *Ken* is aware of his action of writing his own

biography while in (26b), *Mary* is aware of her action of taking her own *pictures*. Thus, *jibun* may be interpreted as a logophor.⁶ Also, we should note that the above examples of the logophoric pronoun *jibun* do not have a c-commanding subject as its antecedent.

Moreover, recall that there were also many studies claiming that *jibun* within the head NP cannot be co-referential with the RC subject, as in (29):

- (29) * [_{NP} [_{CP} *John_i-ga e_j taipu-shita*] [_{NP} *jibun_i-no ronbun*]_j]
 John-NOM type-PST self-GEN paper
 ‘self_j’s paper that John_i typed’ (Hasegawa 1988: 59)

The question is why the co-reference between *jibun* and the RC subject is possible in (26a) and (26b) but impossible in (29). Comparing the three examples, we can see in (26a) and (26b), the RC is located in a matrix subject position while in (29), the RC stands alone and the structural position is left unspecified. In fact, if (29) occurs in a subject position, the co-reference between *jibun* and the RC subject is possible:

- (30) [_{NP} [_{CP} *John_i-ga e_j taipu-shita*] [_{NP} *jibun_i-no ronbun*]_j]-ga soko-ni aru.
 John-NOM type-PST self-GEN paper-NOM there-at exist
 ‘The paper of himself_i that John_i typed is there.’

In contrast, when (29) occurs in an object position, the co-reference between *jibun* and the RC subject *John* becomes impossible, as in (31):

- (31) *Daisy_j-ga [[John_k-ga e_i taipu-shita] [jibun_{j/*k}-no ronbun]_i]-o yon-da.*
 Daisy-NOM John-NOM type-PST self-GEN paper-ACC read-PST
 ‘Daisy_j read self_{j/*k}’s paper that John_k typed.’

6. One reviewer pointed out that the awareness requirement for logophors leads to the following prediction: if such awareness does not hold, *jibun* should not take an RC subject as its antecedent. Below is an example where the RC subject *Ken* is not aware of the fact that his biography has become a best seller:

- (i) *Ken_i-ga mi-ta koto-ga nai jibun_{2i}-no denki-ga shiranu ma-ni*
 Ken-NOM see-PST thing-NOM not self-NOM biography-NOM not knowing period-in
 besutoseraa-ni nat-ta.
 best seller-to become-PST
 ‘The biography of himself_{2i} that Ken_i has never seen became a bestseller without any of his notice.’

The reviewer mentioned that the co-indexation between *Ken* and *jibun* is somewhat degraded. But if that is the case, it supports the logophoric status of *jibun* in (26a) because only the awareness requirement can account for the degradation. I leave this question open.

Thus, the prohibited co-reference between the anaphor *jibun* and the RC subject *John* in (29) might be attributed to the reason that it is just a single complex NP. First, the logophoric property of *jibun* may not be easily accessible in a single complex NP because it requires a detailed extra-grammatical or pragmatic condition (e.g. Kuno 1973; Pollard & Sag 1992). Second, if a native speaker of Japanese interprets (29) in an object position like (31), the impossible co-reference between *jibun* and *John* is predicted.⁷

But why can *jibun* can be interpreted as a logophor in (30) but not (31)? Under the proposal that the head NP of Japanese RCs is base-generated, in (31), *jibun* is c-commanded by the matrix subject *Daisy* while in (30), there is no subject that c-commands *jibun*. Hence, *jibun* may not be interpreted as a logophor when being c-commanded by its antecedent. This can be accounted for by Abe's (1997) proposal that there are two types of *jibun*: one is a logophoric pronoun and the other is a pure anaphor. This proposal is in line with the claim that there are two types of anaphors: core anaphors and exempt anaphors (e.g. Pollard & Sag 1992; Huang & Liu 2001; Kim & Yoon 2009). The core anaphor is licensed with grammar-internal principles. That is, it has a superior co-argument or a subject/specifier within a Complete Functional Complex (CFC). Meanwhile, the exempt anaphor/logophor does not have a c-commanding subject and must be licensed by extra-grammatical conditions. According to Abe (1997), the pure/core anaphor *jibun* is always subject to Condition A of the binding theory. When it is contained in an argument NP and is c-commanded by a co-argument of that argument NP, it can only be a pure/core anaphor and should always be bound by its antecedent in the local domain. Thus, Abe's proposal explains why *jibun* in (31) can refer only to *Daisy*. First, since the head NP of the Japanese RC is base-generated externally, the matrix subject NP *Daisy* and the head NP that contains the anaphor *jibun* are co-arguments. Second, as *jibun* is c-commanded by *Daisy*, it must be a pure/core anaphor and can only be bound by *Daisy*. By contrast, *jibun* in (30) must be a logophor because it is not c-commanded by its antecedent *John*.

In addition, *jibun-jishin* can also be a logophor (Hara 2001; Kishida 2011), as in (32).

7. A further experiment might be needed to examine whether there is really a subject-object asymmetry with respect to the availability of the co-reference between the anaphor and the RC subject. This issue will be explored in future studies.

- (32) *Heishi-wa* [[*teki-no* *sentouki-ga* *jibun-jishin-o* *nerat-teiru*]
 soldier-TOP enemy-GEN battle plane-NOM self-self-ACC aim at-ASP
koto]-*ni* *kigatsuita*.
 thing-DAT notice-PST
 ‘The soldier noticed that an enemy’s battle plane was aiming at him.’
 (Kishida 2011: 53)

Thus, the possible co-reference between *jibun-jishin* and the RC subject in (5), repeated in (33), can be accounted for by the logophoric property of *jibun-jishin*.

- (33) [*John_i-ga* *e_j taipu-shita*] [*jibun-jishin_i-no ronbun*]_{*j*}
 John-NOM type-PST self-self-GEN paper
 ‘self_{*i*}’s paper that John_{*i*} typed’
 (Hoshi 2004: 121)

Recall that Hoshi (2004) and Ishizuka (2010) claimed that it is more acceptable for *jibun-jishin* to take the RC subject as its antecedent than *jibun* in complex NPs like (33). Since both *jibun* and *jibun-jishin* are logophors when they are not c-commanded by their antecedents, it might be easier for *jibun-jishin* to be co-indexed with the RC subject in a complex NP located in a matrix subject position. Nevertheless, when *jibun-jishin* is c-commanded by a subject, as in (34), the co-reference becomes impossible, as was supported by the findings of Experiment 1.

- (34) *Daisy_j-ga* [[*Mickey_k-ga* *e_i arat-ta*] [*jibun-jishin_{j/*k}-no booshi*]_{*i*}]-*o*
 Daisy-NOM Mickey-NOM wash-PST self-self-GEN hat-ACC
yogoshi-ta.
 stain-PST
 ‘Daisy_{*j*} stained self_{*j/*k*}’s hat that Mickey_{*k*} washed.’

Thus, it seems that *jibun-jishin* is subject to the same restriction as *jibun*, when occurring inside an argument NP and being c-commanded by a co-argument of that argument NP. That is, it must be a pure/core anaphor.

8. Conclusion

There are two main approaches to the syntactic structure of Japanese RCs: the *pro*-binding analysis and the head-raising analysis. This study conducted two truth value judgment experiments to examine the interpretation of the simplex anaphor *jibun* and the complex anaphor *jibun-jishin* within the head NP of Japanese RCs, in order to understand the derivation of the head NP. The experiments tested the predictions that the existing two approaches make about the availability of an interpretation in which the anaphor inside the head NP is bound by the RC subject.

Under the *pro*-binding analysis, such an interpretation is predicted to be unavailable, whereas under the head-raising analysis, such an interpretation is predicted to be available. Previous studies also claimed that the interpretation in question is more accessible with morphologically complex anaphors such as *jibun-jishin*. The results of Experiment 1 suggested that an anaphor inside the head NP of a Japanese RC cannot be interpreted as having the RC subject as its antecedent by native Japanese speakers, regardless of the morphological complexity of the anaphor. Additionally, the results of Experiment 2 suggested that the participants' consistent rejection of the co-reference between the anaphor and the RC subject in Experiment 1 should not be attributed to the reason that they used a "matrix subject only" strategy, with which they were expected to only allow the matrix subject to be the antecedent for anaphors. In brief, the findings of the two experiments supported the *pro*-binding analysis and simultaneously argued against the head-raising analysis for Japanese RCs. Moreover, the experimental results are incompatible with the claim that the morphological make-up of an anaphor affects its ability to take the RC subject as its antecedent in Japanese RCs.

Abbreviations

ACC	accusative	NOM	nominative
ANOVA	Analysis of Variance	NP	Noun Phrase
ASP	aspect marker	PST	past
CFC	Complete Functional Complex	RC	Relative Clause
DAT	dative	SD	Standard Deviation
GEN	genitive	SE	Standard Error
LF	Logical Form		

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