

AN EXPERIMENTAL INVESTIGATION OF THE RECONSTRUCTION OF ANAPHORS IN JAPANESE RELATIVE CLAUSES

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1 Introduction

Whether an anaphor within the head NP of a relative clause (RC) can have an NP inside the RC as its antecedent has been considered an important diagnostic to investigate the derivation of the head NP of RCs in different languages (e.g., Aoun & Li, 2003; Bhatt, 2002; Schatcher, 1973). Schatcher (1973) first pointed out that, in English sentences like (1), the anaphor *himself* within the head NP *the portrait of himself* can be co-indexed with the RC subject *John*. Under the assumptions that (i) the head NP dominates the RC and (ii) reflexives must be c-commanded by their antecedent, the binding relation between *John* and *himself* can be established in (1) if the head NP *the portrait of himself* moves back to its base position at LF, i.e., if it ‘reconstructs’ at LF.

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

Under the assumption that reconstruction occurs only when syntactic movement is involved (Chomsky, 1993), the binding relation between *himself* and *John* in (1) suggests that the head NP was originally inside the RC but has been raised out of it. The same diagnostic has also been applied to Japanese relative clauses (JRCs). However, previous studies present conflicting judgments upon whether an anaphor within the head NP can take the subject inside a JRC as its antecedent. This paper investigates this issue with a carefully controlled experiment using a Truth Value Judgment Task (Crain & Thornton, 1998). The results show that an anaphor inside the head NP of a JRC is not interpreted as having the RC subject as its antecedent. This suggests the head NP does not reconstruct; therefore, our finding provides support to an analysis of JRCs

in which the head NP is base-generated outside of the RC and binds an empty category inside the RC (e.g., Fukui & Takano, 2000; Kuno, 1973; Murasugi, 2000; Perlmutter, 1972)

2 Previous Studies on the Syntax of JRCs

There are three major approaches to the syntactic structure of JRCs: (i) the *pro*-binding analysis, (ii) the head raising analysis, and (iii) the operator movement analysis. First, under the *pro*-binding analysis, the head NP of JRCs is base-generated externally to the RC and binds a *pro* inside the RC (e.g. Fukui & Takano, 2000; Kuno, 1973; Murasugi, 2000; Perlmutter, 1972). Crucially, one of the arguments for this analysis comes from an observation that an anaphor inside the head NP does not reconstruct in a JRC. For example, in (2), the anaphor *jibun* cannot be co-referential with the RC subject *John* (e.g., Hoji, 1985; Murasugi, 2000).

- (2)* [_{NP} [_{CP} John_i-ga ec_j taipu-shita][_{NP} jibun_i-no ronbun]_j]
 John-NOM type-PST self-GEN paper
 ‘self_i’s paper that John_i typed’

However, other studies contend that an anaphor within the head NP can refer to the RC subject (e.g., Gunji, 2002; Hoshi, 2004; Ishizuka, 2010; Morita, 2013), claiming that in examples like (3), the anaphor *jibun* inside the head NP may take the RC subject *Mary* as its antecedent.

- (3) [Mary_i-ga ec_j totta] [jibun_i-no shasin]_j-ga soko-ni aru
 Mary-NOM take-PST self-GEN photo-NOM there-at is
 ‘Picture of herself_i that Mary_i took are there.’ (Morita, 2013, pg. 649)

The above observation suggests that the head NP reconstructs. This apparent reconstruction further suggests that the head NP of JRCs is raised out of the RC, motivating Kayne’s (1994) head raising proposal of RCs for JRCs (e.g., Hoshi, 2004; Morita, 2013).

Finally, Ishii (1991) argues for an operator movement analysis, which claims that there is a null operator generated inside the RC and raised to [Spec, CP] to be co-indexed with the base-generated head NP. Since the null operator is an RC-internal counterpart of the external head NP, the reconstruction of an anaphor inside the head NP is expected, which is in line with the matching analysis of RCs (Chomsky, 1965; Lees, 1960, 1961; Sauerland, 1998). However, Ishii further argues that the claimed operator movement reconstructs when it involves a complex anaphor such as *kare-jishin* ‘himself’ but it does not when it involves the simplex anaphor *jibun*. Similarly, Hoshi (2004) and Ishizuka (2010) state that if the simplex anaphor *jibun* is replaced with the complex anaphor *jibun-jishin*, the co-reference between the anaphor and the RC subject becomes fully acceptable:

- (4) [_{NP} [_{CP} John_i-ga e_j taipu-shita][_{NP} jibun-jishin_i-no ronbun]_j]
 John-NOM type-PST self-GEN paper
 ‘self_i’s paper that John_i typed’ (Hoshi, 2004, p.121)

To sum up, previous studies discussed conflicting judgments on whether the anaphor within the head NP of JRCs can reconstruct and be co-referential with the RC subject, and these

differences have different implications for the three major approaches to the syntactic structure of JRCs. In addition, the type of the anaphor, i.e., whether it is simplex or complex, has been claimed to play a role in whether reconstruction of the head NP is available.

3 Research Questions

Given the above background, this study pursues two research questions:

- (5) a. Research Question 1: Can an anaphor inside the head NP of a JRC take the subject of the RC as its antecedent?
b. Research Question 2: Does the morphological complexity of anaphors affect the availability of anaphors inside the head NP to be interpreted inside RCs?

Different proposals make different predictions with respect to the above questions. First, under the *pro*-binding analysis, the head NP is base-generated externally to RCs so the reconstruction of the head NP is not predicted. Therefore, the answer to both questions in (5) would be *no*, which means neither *jibun* nor *jibun-jishin* can be bound by the RC subject. However, under the head raising analysis, the head NP is raised from within the RC, so the reconstruction of the head NP should be possible. Thus, we would predict that the answers to both questions in (5) should be *yes*. Finally, under Ishii's (1991) proposal, only complex anaphors can be bound by the RC subject. In this case, the answer would be *no* to the first question but *yes* to the second question.

4 Experimental Investigation

A picture-matching Truth Value Judgment Task was used to investigate whether the simplex anaphor *jibun* and the complex anaphor *jibun-jishin* within the head NP of a JRC can refer to the RC subject. We chose to use the complex anaphor *jibun-jishin* 'self-self' rather than *kare-jishin/kanojo jishin* 'he/she-self' in our experiment because the only morphological difference between *jibun* and *jibun-jishin* is the addition of *jishin* in the complex anaphor. In contrast, *jibun* and *kare-jishin/kanojo-jishin* have nothing in common morphologically.

Four Disney characters were used in the materials: *Mickey*, *Minnie*, *Donald*, and *Daisy*. Before the experiment, participants were informed that all four Disney characters love to put a face photo on their belongings. With this context, for each experimental stimulus, participants see a picture like (6a) featuring an item with a face photo of one of the characters (e.g., a hat), indicating that the item belongs to the character, and a sentence like (6b) on the computer screen.



- b. 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.'

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 (6b) to match with (6a), *jibun-no booshi* ‘self’s hat’ must be interpreted as *Mickey’s* hat. In other word, the antecedent of the anaphor must be the RC subject.

The experiment had a 2x2 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 resulted in the following four conditions:

Table 1: Four conditions for the experiment

	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

For each of the two conditions within Anaphor Type, 40 different lexicalizations were created, a total of 80 sentences. Each of the 80 sentences was then combined with a picture that required the matrix subject as the antecedent of the anaphor and another picture that required the RC subject as the antecedent of the anaphor, resulting in 160 sentence-picture pairs. These 160 pairs were distributed into four lists using a Latin Square procedure, so that each list contained only one condition from the same lexicalization. The same 40 fillers were added to each list of 40 critical items. The order of the items in each list was pseudo-randomized.

Thirty undergraduate students in a university in Japan participated in the experiment for extra course credits. Participants were first shown the four Disney characters, followed by four simple multiple-choice questions to confirm that they were familiar with the four characters. Then, participants looked at two examples with detailed instructions, in order to understand how to do the task. Four practice items followed before the actual experimental items were presented.

The results were first analyzed with two-way repeated measures 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 binominal distribution of the individual data was also examined, since participants gave binary judgments (match or mismatch).

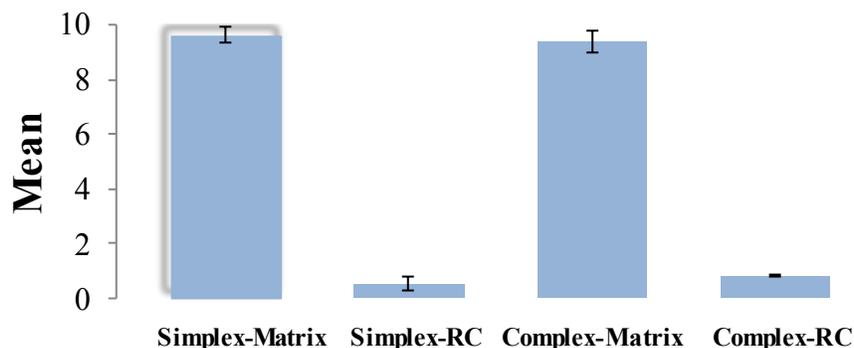
5 Findings

Table 2 summarizes the means, standard deviations, and standard errors for the four conditions. Figure 1 presents the mean frequencies of ‘match’ answers.

Table 2: Means, SDs and SEs for the four conditions

	Mean (SD)	SE
Simplex-Matrix	9.63(0.85)	0.16
Simplex-RC	0.5(0.73)	0.13
Complex-Matrix	9.37(1.07)	0.2
Complex-RC	0.8 (1.19)	0.22

Figure 1 Mean frequencies of ‘match’ answers.



The results of two-way repeated measures ANOVA show that the anaphor type does not show any significant difference ($F(1, 29) = 0.02, p = .889$), although the antecedent position does ($F(1,29)=1347.317, p<.001$). The interaction between these two factors is not significant ($F(1, 29) = 2.064, p = .162$). A visual inspection of the means clearly suggests that the matrix subject is significantly preferred to the RC subject as the antecedent, regardless of the anaphor type. In other words, the co-reference between the anaphor and the RC subject is quite disfavored.

The results of pair-wise comparison confirm this observation: there was a significant difference between the means of Simplex-Matrix and Simplex-RC ($F(1,29)=1596.191, p<.001$) and between the means of Complex-Matrix and Complex-RC ($F(1,29)=517.541, p<.001$). Also, there was no significant difference between the means of Simplex-RC and Complex-RC ($F(1,29)=1.557, p=.222$) and between the means of Simplex-Matrix and Complex-Matrix ($F(1,29)=1.478, p=.234$).

Moreover, the individual data show that out of the 10 items in the Simplex-RC condition, 28 participants out of 30 rejected more than 9 items (93.4%). Since the experiment is a TVJT and participants' choice was binary ('match' or 'mismatch,') based on binominal distribution, we would be 95% confident that participants did not make random judgements if they accepted/rejected 8 items or more out of 10 in each condition. Thus, the above finding strongly implicates that participants consistently disliked the co-reference between *jibun* and the RC subject. The result with Complex-RC was similar, with 90% (27 participants) rejecting more than 8 items out of 10. In a clear contrast, in the Simplex-Matrix condition, 28 participants (93.3%) accepted 8 items or more out of 10, and in the Complex-Matrix condition, 27 participants (90%) also accepted 8 items or more out of 10, showing that the matrix antecedent interpretation was consistently available to the participants.

6 Discussion

The results of our experiment suggest that regardless of whether the anaphor is simplex or complex, it *cannot* take the RC subject as its antecedent: the means of accepting the co-reference between the anaphor and the RC subject were as low as 0.5 out of 10 for the simplex anaphor *jibun* and 0.8 out of 10 for the complex anaphor *jibun-jishin*. Meanwhile, the means of accepting the co-reference between the anaphor and the matrix subject were as high as 9.63 out of 10 for *jibun* and 9.37 out of 10 for *jibun-jishin*. These findings suggest that the head NP in JRCs do not reconstruct, and they motivate the *pro*-binding analysis according to which the head NP in JRCs is base-generated external to the RC.

In addition, the experimental results also show that there were no significant main effects of the anaphor type, despite the claim in previous studies that only complex anaphors can be interpreted as having the RC subject as their antecedent.

One remaining issue is whether the availability of RC-antecedent interpretation with a complex anaphor depends on the type of complex anaphor. As mentioned earlier, Ishii (1991) agrees with Hoji (1985) that *jibun* cannot reconstruct, but he also states that *kare-jishin/kanojo-jishin* ‘he/she-self’ can, as in (7):

- (7) Mary-wa [John_i-ga e_j taipu-shita] [kare-jishin_i-no ronbun-o]_j mottekita.
 Mary-TOP John-NOM type-PST himself-GEN paper-ACC bring-PST
 ‘Mary brought himself_i’s paper that John_i typed.’ (Ishii, 1991, p.29)

Citing Katada (1988, 1989, 1991) and Nakamura (1989), Ishii (1991) claims that *kare-jishin* and *kanojo-jishin* are not subject-oriented, and different from the subject-oriented anaphors *jibun* and *jibun-jishin*. To account for the observation that *kare-jishin/kanojo-jishin* can reconstruct while *jibun* cannot, Ishii argues that the reconstruction of *jibun* is simply blocked at LF. If we want to reconcile our experimental results with Ishii’s proposal, we would have to claim that the reconstruction of *jibun-jishin* is blocked as well. But it is not immediately clear why *jibun* and *jibun-jishin* are blocked from undergoing reconstruction while *kare-jishin/kanojo-jishin* are not.

7 Conclusion

There are three main approaches to the syntactic structure of JRCs: (i) the *pro*-binding analysis; (ii) the head raising analysis; and (iii) the operator movement analysis. This study has examined the interpretation of anaphors inside the head NPs of Japanese relative clauses (JRCs) with a Truth Value Judgment Task experiment to test the predictions that these analyses 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, while the other two analyses predict that it should be available. Previous studies have also claimed that the interpretation in question is available with complex anaphors such as *jibun-jishin* ‘self-self’ but not with simplex anaphors like *jibun* ‘self.’ The results of this study implicate that an anaphor inside the head NP of a JRC is not interpreted as having the RC subject as its antecedent by native speakers, regardless of whether it is simple or complex. This finding provides support for the *pro*-binding analysis and fails to provide empirical support for the claim

that the morphological make-up of anaphors affects their ability to take RC subjects as their antecedent.

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