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## Interpretation of bound pronouns by learners of Japanese Sign Language

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This study deals with the interpretation of bound pronouns by hearing learners of Japanese Sign Language (JSL). It is the first attempt to investigate JSL second language (L2) acquisition from a theoretical perspective. The Overt Pronoun Constraint (OPC) states that an overt pronoun can be bound by a referential NP, but not by an operator (including quantifiers and *Wh*-elements). JSL, as well as Japanese, allows an overt pronoun to corefer with a referential NP. However, (at least in some cases) the overt pronoun can be bound by a *Wh*-operator in JSL, but never in Japanese. A Truth-Value Judgment Task (TVJT) study was conducted, with different levels of Japanese-speaking learners of JSL, to observe if the OPC applies to a L1-L2 pair in different modalities, with different OPC status. The results showed that there was an anti-OPC effect among beginners, which lessened somewhat for intermediate learners.

### 1. Introduction: Previous studies of L2 acquisition

The Overt Pronoun Constraint is given in (1) using the terms of Montalbetti (1984). It prohibits the binding of overt pronouns in languages which have both overt and null pronouns, since the phrase ‘iff the alternation overt/empty obtains’ picks out exactly those languages which permit such an alternation.

- (1) “overt pronouns cannot link to formal variables iff the alternation overt/  
empty obtains” (Montalbetti 1984: 94)

The operation of this constraint is illustrated using the Japanese examples in (2), from Pimental and Nakayama (2012) (note that Japanese is a *wh*-in-situ language). In (2a), the null subject of the embedded clause can be interpreted as the same individual as the subject of the main clause, so the person who used the word processor was also the person who said something about it. In this case, the null subject can be *bound*, or linked to a variable, in Montalbetti’s terms. On the other

hand, in (2b) the overt pronoun *kare* cannot be interpreted in this way. The sentence is grammatical, but it cannot be interpreted as a question about a person who said of himself that he would be late; rather, *kare* must pick out someone who is late while someone else is the one who reported it. In English, where the subject of a tensed embedded clause is always overt, the overt pronoun may have the interpretation blocked in Japanese, as illustrated in (3).

- (2) a. Dare-ga [sensyuu *pro* waapuro-o tukatta] to itteiru n  
 who-NOM last week word processor-ACC used that is saying  
 desu ka?  
 COP Q  
 ‘Who is saying that (he) used the word processor last week?’
- b. Dare-ga [kyoo *kare*-ga osoku naru] to itte-iru n desu ka?  
 who-NOM today he-NOM late become that is saying COP Q  
 ‘Who is saying that he would be late today?’
- (3) ‘Who<sub>i</sub> said that he<sub>i</sub> bought a car?’

This constraint has raised interest for studies of L2 acquisition because of the hypothesis that it is included in the principles of universal grammar (UG), for learnability reasons. The constraint rules out a possible interpretation of a grammatical sentence. Considering that this sentence type is grammatical, it might be in the input, but it is unlikely that learners are explicitly told that the grammatical sentence type fails to have what might be an expected interpretation. In such a context where negative evidence would otherwise be required, appeals to the logical problem of language acquisition and the poverty of stimulus argument as evidence for the existence of an innate language-acquisition device seem the strongest (see Crain 1991). If the OPC – or something that derives similar results – is part of UG, it is also an ideal test case for questions about whether or not UG is active in L2 acquisition. The learnability problem in this case is very similar for (adult) L2 learners as for (child) L1 learners, as it is highly unlikely that such a constraint would be explicitly taught. Furthermore, the subtlety of the example leads us to think that if a learner were to make such an error, it would be unlikely to be caught and corrected. Then, if learners whose L1 is like English and therefore does not show the operation of the OPC are exposed to an L2 like Japanese where the OPC applies, the application of this UG principle in L2 acquisition can be studied. If L2 learners show that they adhere to the OPC this would be a good argument in favor of the operation of UG, including principles not applicable in the first language. On the other hand, if L2 learners do not show adherence to the OPC, a number of possible reasons can be posited (see White 2003 for discussion). We will return to this in our discussion section.

To address these theoretical issues, Kanno (1997) tested L1-English learners of L2-Japanese on sentences like those in (2) written in Japanese kanji/kana. Her method used a written questionnaire in which test items were preceded by brief statements. Participants were asked to choose an answer to the question; the options included the coreferential name, someone else, (the subjects had an option to choose both a and b, as well). An example of the test items is given in (4).

- (4) (setting up the context)  
 Dare-ga [kyoo kare-ga osoku naru] to itte-iru n desu ka?  
 who-NOM today he-NOM late become that is saying COP Q  
 ‘Who is saying that he would be late today?’  
 (test sentence)  
 Q: Dare-ga kyoo osoku naru n desyoo ka?  
 who-NOM today late become probably Q  
 ‘Who do you suppose will be late today?’  
 (a) same as dare  
 (b) another person

The participants indicated their interpretation of the embedded subject *kare* in the question sentence. According to the OPC, the bound reading (in which *dare* and *kare* co-refer) is not a possible grammatical option. Hence, if the learners obey the OPC, they should choose (b).

That was exactly what Kanno observed. Her participants included 20 native speakers of Japanese, and 28 L1-English learners of L2-Japanese. The learners were in their second year (fourth semester) of university-level Japanese language courses in the US. Overall, the learners showed the same pattern of results as the native speakers: overwhelming rejection of the bound reading for overt pronouns with quantified antecedents (98% rejection for the native speakers; 87% rejection for the learners).

Kanno also included test items with an overt pronoun (5a) and items with a null pronoun (5b), with a referential NP as an antecedent, such as the following (note that these test sentences also appeared with an introductory context, not given here).

- (5) a. Tanaka-san-wa [kare-ga kaisya-de itiban da to] itte-iru.  
 Tanaka-Mr TOP he-NOM company in best is that saying-is  
 ‘Tanaka says that he is the best in the company.’  
 b. Tanaka-san-wa [∅ kaisya-de itiban da to] itte-iru.  
 Tanaka-Mr TOP company in best is that saying-is  
 ‘Tanaka says that he is the best in the company.’

The bound interpretation was accepted for overt pronouns with referential antecedents (roughly half the time for both groups), and strongly preferred for null pronouns. Kanno's conclusion is that L2 learners are constrained by the OPC, and that this provides evidence for the larger theoretical view which includes access to UG in adult language learning.

However, Kanno's findings have been challenged in a series of studies with conflicting results. A methodological issue has been brought up as a potential source of the discrepancies in results. For example, Masumoto (2008) argued that it would be preferable to provide participants with a context in which to evaluate possible binding relations, rather than an explicit meta-linguistic comparison of alternative interpretations. She therefore applied the Truth Value Judgment Task (TVJT) methodology to study this issue. Extending and refining her approach with TVJT, Pimentel and Nakayama (2012) found that L1-English learners of L2-Japanese accepted the bound reading for overt pronouns with quantified antecedents about half the time. In their study, participants read a narrative in English, setting the stage for the test sentences, given in Japanese. The participants' task was to judge the sentence as True or False given the context. A sample test sentence is given in (6). This sentence has an overt pronoun, which should not be able to be bound by the quantified antecedent. In the context for this example, each cousin does call his own sister, but there is no interpretation that corresponds to the grammatical, non-bound reading. Therefore the expected (target) response is False.

- (6) *Dono itoko-mo kare-no imooto-o yon-da.*  
 which cousin also he-GEN younger sister-ACC call-PAST  
 'Every cousin called his younger sister.'

Although the native speakers rejected examples such as (6) 76% of the time, the average correct rejection for the L2 learners was only 47%. The most advanced learners in their subject groups were the only ones who scored above 50% (they scored 83% correct). Pimentel and Nakayama conclude that it takes time for learners to determine the full nature of the relevant elements in Japanese. As for the acceptance of bound variable pronouns, Pimentel and Nakayama suggest that the learners are employing L1 transfer, since the participants' L1 (English) does allow overt pronouns to be bound.

Kahraman and Nakayama (2015) replicated the study by Pimentel and Nakayama using a different group of participants: L1-Turkish learners of L2-Japanese. Turkish, like Japanese, is a null argument language. Thus, the authors reasoned that if L1 transfer were the explanation for their earlier findings, the Turkish learners would not accept the bound variable interpretation in Japanese, as it is not allowed in their L1 either. However, the L1-Turkish participants indeed over-accepted the bound variable interpretation of overt pronouns, just like

the L1-English learners had. In fact, they found that their highest-level participants (rated Superior) correctly rejected the bound variable interpretation, but the lowest-level participants (rated Intermediate) accepted such interpretations about half the time.

An alternative to the L1 transfer strategy explanation for learners' responses is needed to account for the results reported above. Kahraman and Nakayama agree with Pimentel and Nakayama that there are language-particular aspects of Japanese that must be learned in order for participants to correctly reject the bound interpretation. Furthermore, they suggest that L2 learners employ a default (anti-OPC) strategy permitting pronouns to have the bound interpretation until they have learned the relevant properties of Japanese.

Studies of learners of other languages with OPC effects also provide mixed results. Rothman (2009) used performance on an OPC task to identify groups of learners of Spanish who had correctly determined that Spanish is a null-subject language, versus those who were judged not to have acquired the syntax of null subjects in Spanish (the intermediate learners). The native speakers and advanced learners correctly rejected the bound variable reading of overt pronouns over 90% of the time, but the intermediate learners accepted about 25%. This lends support to the conclusion that in fact learners require some time for language-specific information to be learned before they show evidence of adhering to the OPC. It should be noted, however, that Rothman's participants were L1-English learners, so the non-target responses could be due to an L1-transfer strategy.

## 2. JSL and OPC

Since there have been so few studies of the OPC effect with those for whom both L1 and L2 are null-subject languages, we determined that further studies in this area are in order. Accordingly, we undertook a study in which L1-Japanese speakers are acquiring an L2 which is also a null-subject language. However, this study is different from the preceding studies, because the L2 these learners are exposed to is Japanese Sign Language (JSL, *nihon shuwa*), a language in a second (visual-spatial) modality.

There are not many linguistic studies of L2 acquisition in sign languages (more properly considered M2 acquisition, to emphasize that the new language is also in a new modality; see Chen Pichler & Koulidobrova 2016). Thus, there are doubtlessly many factors at work that we hope are orthogonal to the syntactic issue at hand. Nevertheless, we attempted this first study of L1-Japanese learners of L2-JSL to see whether the previously-observed 'reverse OPC' effect would be found in a new pair of languages.

Japanese Sign Language refers to the language acquired and used by native signers who were exposed to the language since birth (Ichida 2010; Kimura 2011; Oka & Akahori 2011; Matsuoka 2015). It follows a basic SOV word order, allowing information-structure motivated alterations in word order (e.g., topics). Although many areas of the syntax of JSL have not been studied in detail, it seems clear that it is a null argument language. As shown in the following examples, the subject or the object can be null, if the appropriate context is provided. In the examples below, the null arguments are indicated by  $\emptyset$ .<sup>1,2</sup> (7) is an example of a sentence with a null subject, while (8) demonstrates an example of a null object.

- (7) (answering a question about the time the speaker's mother woke up)  
 $\emptyset$  SIX-O'CLOCK WAKE-UP<sup>3</sup> 'She woke up at six.'
- (8) (speaking about who is buying the gift)  
 YESTERDAY YAMADA  $\emptyset$  BUY 'Yamada bought (it) yesterday.'

As in many other sign languages (cf. Meier & Lillo-Martin 2013), the overt pronoun in JSL appears as pointing (glossed here PT; in other works the gloss IX for 'index' is used).<sup>4</sup> In the examples henceforth, the referent of the pointing as 1st/2nd/3rd person is indicated by subscripts on the gloss PT, as in (9).

1. Without an extensive study of the phenomenon, we do not know what type of null argument is found in JSL. For example, earlier studies of Japanese (starting with Kuroda 1965) followed the idea that null arguments in that language are phonologically null pronouns, but more recent works (including Saito 2007) posit other syntactic analyses, including argument ellipsis. A similar history can be seen for American Sign Language (ASL), which has been analyzed as having null pronouns, topic-bound variables, and argument ellipsis, under different proposals (see Koulidobrova 2012 for recent discussion).

2. We follow the sign linguistics custom of writing signs by using upper-case glosses with as similar an interpretation to the sign language (SL) signs as possible. It should be understood that the signs may well have a different syntax and/or semantics from the Japanese words used to gloss them.

3. As reported for many other sign languages in the world, JSL does not have overt tense markers.

4. The pointing (overt pronoun in sign languages) seems to establish a direct referent in the space, which could be used as a surrogate person/item. However, that is not an accurate interpretation of the pointing, as indicated by the fact it can be bound by a *wh*-item. In addition, it has been observed that the overt pronoun in ASL allows sloppy reading (Lillo-Martin & Klima 1990). Koulidobrova (2013) argues that pointing in ASL does not indicate definiteness as in spoken English, contrary to MacLaughlin (1997). Based on those facts, we assume that the syntactic property of JSL overt pronouns relevant for the current study (not establishing any definite referent) is comparable to that of pronouns in spoken languages.

- (9) PT<sub>3</sub> SLEEP  
 ‘S/he/they sleep.’

According to Montalbetti’s version of the OPC, JSL would be expected to pattern like Japanese in prohibiting overt pronouns from being bound, since it is a language that has both overt and null pronouns. However, at least in some contexts JSL does permit binding of overt pronouns, as in example (10), below. For this example, it is possible for the underlined overt pronoun and the *wh*-expression WHO to refer to the same person. That is, overt pronouns in JSL demonstrate a different characteristic from their equivalents in spoken Japanese. In other words, OPC does not seem to apply, at least in such cases, to JSL (we will come back to this issue in the Results section).

- (10) [PT<sub>3</sub> HOME STAY] THINK WHO PT<sub>3</sub>  
 ‘Who thinks he (will) stay home?’

In example (10) and the experimental stimuli to be presented in the next section, questions end with a sentence-final PT, which is strongly preferred by native signers. This may be an instance of what has been called ‘subject-pronoun copy’ in ASL and other sign languages (Padden 1988).<sup>5</sup> Though the Subject (or Topic) Copy is optional, as indicated in (11), it is strongly preferred by native signers in JSL *wh*-questions (cf. Uchibori & Matsuoka 2013). L2 JSL learners taught in the direct (JSL-only) method have abundant opportunities to be exposed to this structure. In fact, the participants of the current study were familiar with the Subject/Topic copy, as indicated by their responses to the warm-up stories.

- (11) YAMADA SLEEP (PT<sub>3</sub>)  
 ‘Yamada sleeps/slept.’

If the OPC is operative from the first stages of L2 development (with exceptions such as JSL to be learned from positive evidence), JSL L2-learners should reject the bound reading of an overt embedded subject in examples such as the *wh*-question in (10). The same result would be observed if learners rely on L1 transfer from Japanese. On the other hand, if the anti-OPC favors bound readings even for learners whose first language is a null argument language, these readings should be expected. Note that JSL is a *wh*-final language, in which *wh* phrases appear in the clause-final position (Uchibori & Matsuoka 2013).

Our research questions are as follows: Do learners exhibit the OPC effect or the anti-OPC effect in their interpretation of overt pronouns in JSL? Are there any differences between beginner and intermediate learners with respect to such effects?

5. But see Crasborn et al. (2009) for an alternative analysis of a similar phenomenon in the Sign Language of the Netherlands (NGT).



### 3. Method

#### 3.1 Participants

Forty-four hearing JSL learners (12 males, 32 females) participated in this study. The average age of participants is 28 (range: 19–52). All participants have studied JSL for at least four months (approximately 64 hours). The average length of studying JSL is 1.7 years (19.86 months). The majority (86%) of the participants are enrolled in full-time (4–5 days a week) JSL programs taught in the direct (JSL-only) method by deaf instructors, or taking weekly JSL lessons to raise deaf children. The participants all confirmed on a background questionnaire that their native language is Japanese. In addition, the same study was administered to 7 native signers (4 males, 3 females) who were exposed to JSL from birth in deaf families.<sup>6</sup> The average age of the native signers is 32 (range: 25–42). All participants were informed about the purpose of the study and the protection of their privacy, following the procedures approved by Research Ethics Committee of Keio University Research Coordination and Administration.

Since there was no standardised test designed specifically for measuring proficiency of JSL, the participants were divided into two groups, based on the evaluation by their native-signing JSL instructor of their JSL comprehension skill. The instructor's evaluation was based on a scale of 1–5, in which 5 is the highest 'native-like' level. Learners who received the evaluation between 1–3 were classified into the beginner group ( $N = 24$ ), while those who received the score of 3.5 or above comprise the intermediate group ( $N = 20$ ).

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6. The number of native signers of JSL (who were exposed to JSL since birth in deaf families) is far smaller than non-native signers (born to hearing parents). There is no established statistics of the native JSL signers. According to Ichida et al. (2001) and Kanda et al. (2008), the number is estimated to be 35,000–57,000, which is nearly 10% of the hearing-impaired. The status of JSL is overshadowed by the political supremacy of signed Japanese, which has been promoted for a long time by the organizations which are overwhelmingly headed by hard-of-hearing officers. Nevertheless, groups of native and native-like signers began to form groups to study and promote JSL, in a few urban areas. The native signers who participated in the study are associated with Meisei Gakuen School for the Deaf. Meisei Gakuen is the only BiBi (bilingual-bicultural) school for the deaf in the country, where JSL is used as the main mean of communication for pupils, teachers, and parents. Our deaf participants all confirmed that they were born and raised in deaf families and their native language is JSL.

### 3.2 Procedure

- Step 1: Instruction and background questionnaire: In most sessions, the participants gathered in a classroom at the school they attend, where they received the instructions, and filled in the background questionnaire. In the questionnaire, the participants provided information including their native language, length of study of JSL, and the number of hours they use JSL a week. The deaf instructors' evaluation of each participant was separately collected, and was used as the basis for dividing the learners into two groups for analysis.
- Step 2: Vocabulary quiz: To confirm that the participants were familiar with the JSL expressions used in the stories given as contexts for the test questions, a multiple-choice vocabulary quiz was given to the hearing participants. They watched the recordings of 37 JSL words, signed twice each, and selected the closest Japanese translation out of three possible answers printed on a response sheet. Most of the participants were correct on the quiz: the average score was 36 (97%) for both the beginner and intermediate groups.
- Step 3: Experiment: After the participants completed the quiz, they proceeded to the story segment and watched JSL movies, projected on a large screen, as well as PowerPoint slides of the stories (described below). There were four warm-ups, followed by eleven experimental stories.

### 3.3 Material

In order to provide sufficient context, we followed the studies by Pimental and Nakayama (2012) and Kahraman and Nakayama (2015) and employed the Truth-Value Judgment Task (Crain & McKee 1985; Crain & Thornton 1998) in this study. There were three practice items and eleven test stories in the session. All stories were signed by a native signer. The signed stories were presented one to two signed sentences at a time, with photos and illustrations to help the participants to remember the plot. Figure 1 shows one of the slides used in the session.

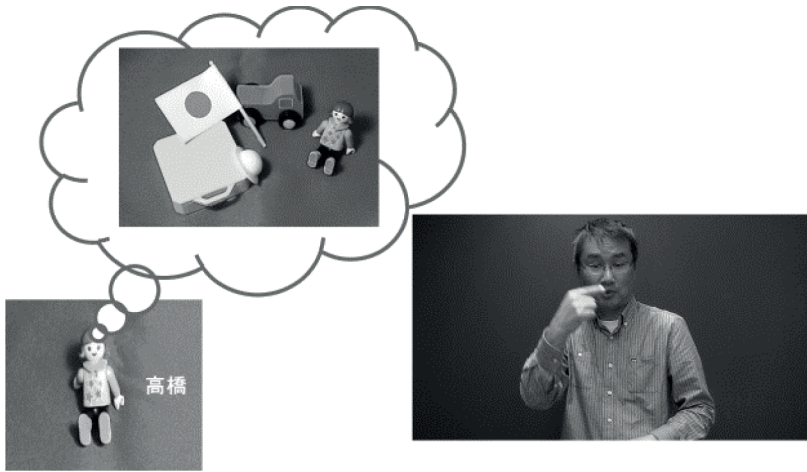


Figure 1. Sample slide

At the end of each story, a black screen appeared with the word ‘Question’ in Japanese, followed by the target question signed by the same signer who presented the story. In the last slide, another native signer (woman) answered the question by fingerspelling the name of the character. The participants were asked to determine if her answer was correct or wrong, given the context provided by the first signer.<sup>7</sup> To help the participants to make the judgments, the photos of toy persons (the two main characters) always appeared with their names throughout the story and the Q&A slides. To accommodate the possibility that the participants detect that there can be more than one acceptable interpretation (both indicated in the story), particularly with null subjects, they were instructed to choose ‘correct’ if the signer is ‘not wrong’.

The following is a sample story with an overt pronoun in the embedded clause.

(12) Sample story

A typhoon is approaching the area. Tanaka and Sato are friends from college. Tanaka thinks that the university will be closed tomorrow and he (Tanaka) will stay home. Sato thinks otherwise. He is planning to go to school. But he thinks Tanaka will not show up in class tomorrow.

Q: [PT<sub>3</sub> HOME STAY] THINK WHO PT<sub>3</sub>

‘Who thinks he (will) stay home?’

A: SATO

‘Sato.’

7. See Crain (1991) for a similar approach to testing interpretation of bound pronouns using a question/answer pair, in his case examining children’s responses to sentences displaying cross-over.

If the participant chose the bound reading of the overt pronoun subject in the embedded clause (i.e., the first occurrence of the PT<sub>3</sub>), contrary to the OPC, the response would be False, since Sato thinks he (himself) will go to the university, and on the bound reading, the question and answer pair has the interpretation that Sato thinks Sato would stay home.<sup>8, 9</sup> On the other hand, if the participant rejected the bound reading of the overt pronoun, the answer would be True, since Sato thinks Tanaka will stay home. In this way, it is possible to see whether participants accepted the bound reading or not.<sup>10</sup> It is important that both characters in the stories were involved with the activity described by the matrix verb. For example, in the sample story above, both Tanaka and Sato thought about (and made decisions about) staying home. Hence, it is not possible to provide the correct answer if one considered simply who did the thinking or who stayed home.<sup>11</sup>

There are a total of eleven test stories: four stories with overt subjects, four stories with null subjects, and three stories with overt NP subjects (used as fillers). For both the overt and null subject conditions, two of the four stories would be answered True on the bound reading, and two would be answered False on the

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8. As seen in many other sign languages, the JSL lexicon contains a group of verbs classified as Agreeing verbs. They are called 'Agreeing', since the verb moves between spatial locations established for the 1st/2nd/3rd persons to indicate the grammatical subject and object. Agreeing verbs are observed in JSL as well (Fischer 1996; Ichida 2010). There has been an ongoing discussion in sign language linguistics about the grammatical nature of those unsigned subject and object associated with the agreeing verbs. Hence, the target sentences did not include any agreeing verbs in the main clause (e.g., the JSL agreeing verb 'TELL' was replaced by the non-agreeing "TELL-AROUND").

9. It should be noted that the overt pronoun cases by necessity include two instances of PT<sub>3</sub>, which are pointing in the same general direction. This may have increased the number of bound readings, an issue we leave for future research.

10. Notice that in the design, there is a clear question under discussion (QUD), namely, who thinks someone will stay home (the test question). The scenario provided two possible answers to the QUD, since both Tanaka and Sato think someone will stay home. Furthermore, Sato's opinion regarding both Tanaka's action and his own are given in the scenario. Thus, participants have sufficient information to judge the question as true or false. In order to keep the test scenarios from becoming too complex, we did not include other manipulations such as having Sato consider staying home then changing his mind, to make it explicit that he did not plan to stay home. Such considerations could be manipulated in further testing.

11. An anonymous reviewer pointed out there is a possibility of role shift being used in the context described here. Actually, the role shift in JSL is marked with a distinctive face (Y. Ichida, p.c.). The native storyteller who signed the story has experience with analyzing role shift and embedded sentences for a separate research project, so he was fully aware of the differences between the two constructions. He signed the stories without any markers associated with role-shift in JSL.

bound reading. Samples of the three question types are as follows. The full list of actual stories used is included in the appendix.

- (13) Questions with overt pronouns (4 tokens):  
 [PT<sub>3</sub> HOME STAY] THINK WHO PT<sub>3</sub>  
 ‘Who thinks he (will) stay home?’
- (14) Questions with null pronouns (4 tokens):  
 [Ø PASTA MAKE] TELL-AROUND WHO PT<sub>3</sub>  
 ‘Who told everyone that (pro) (will) make pasta?’
- (15) Questions with overt NPs (3 tokens):  
 [KEN MATCH WIN-CHAMPIONSHIP] BELIEVE WHO PT<sub>3</sub>  
 ‘Who believes Ken (will) win the tournament?’

The stories were semi-randomized in order to prevent more than one story of the same type of question from being presented consecutively.

#### 4. Results

The participants overall answered correctly on the NP-antecedent (Questions with overt NPs, example (15) above) control cases (92.4% for all L2 participants; 90.3% correct for beginners, 95% for intermediates, 100% for native signers). This is a good indication of the success of the methodology and the learners’ ability to respond to the test.

Our primary analysis of interest concerns whether or not the learners adopted the bound interpretation, and whether this differs for overt versus null arguments. The proportion the learners chose the bound interpretation is presented in Figure 2.<sup>12</sup>

The difference between the beginner and intermediate groups is significant for the overt test items ( $t(27.61) = 2.2, p < .05$ ), but not for the null items ( $t(33.85) = 1.64, ns$ ).<sup>13</sup> The difference between the overt and null items is not

12. It should be borne in mind that the research question concerns whether or not the learners accepted the bound reading, and whether there was any difference in their acceptance of the bound reading for null versus overt subjects. Acceptance of the bound reading was indicated by a ‘True’ response on half of the items and a ‘False’ response on the other half of the items in each condition (null, overt).

13. Although the t-test analysis was calculated assuming unequal sample variances, the use of a parametric analysis might be questioned due to the limited number of possible responses. We therefore also conducted a Mann-Whitney test, which revealed marginal effects for both overt items ( $U = 170.5, p = .05$ ), and null items ( $U = 182, p = .09$ ).

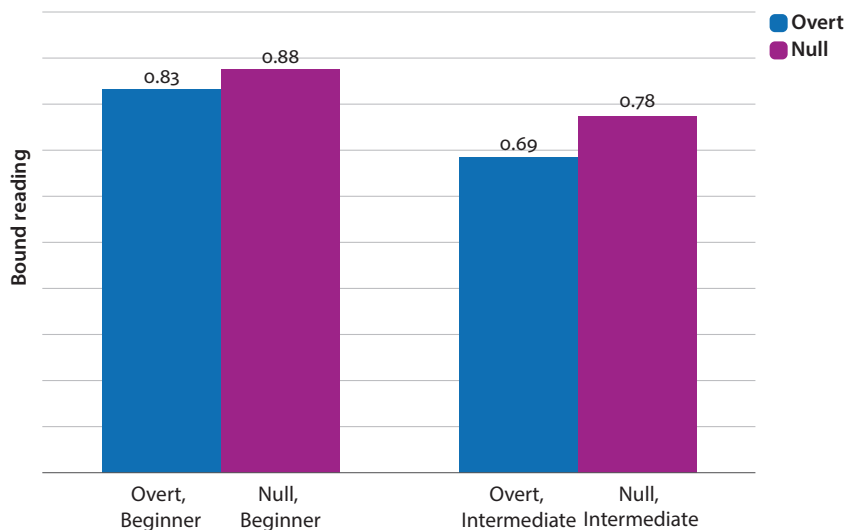


Figure 2. Bound reading interpretation of the overt/null pronouns (L2 learners)

significant for either group (for the beginners,  $t(44.94) = -0.94$ , ns), for the intermediate group ( $t(37.07) = -1.11$ , ns). Most subjects (in either group) selected the bound reading in at least three items. There were more participants who allowed the bound reading only for one or two items in the intermediate group. There was no observable effect of the ‘Yes-bias’; namely, no distinctive difference between the participants’ responses with match and mismatch conditions.

The native signers also showed a high rate of acceptance of the bound reading for null pronouns (82%). Unexpectedly, they accepted the bound reading for overt pronoun items 57% of the time. This figure represents a split in judgments which indicates that (i) OPC does not universally apply to languages that allow overt and null pronouns, or (ii) sign language pronouns can engage in different syntactic relationships than their spoken language counterparts (see Sandler & Lillo-Martin 2006; Schlenker 2013; Koulidobrova & Lillo-Martin 2016). We leave for future research a detailed analysis of such phenomena in JSL. Considering that the main purpose of the current study is to examine if OPC is operative as an L2 strategy of (novice) learners, we point out it is important that an anti-OPC (i.e., bound reading) effect was observed among L2 learners of JSL, which cannot be due to L1-transfer. We will discuss the bound reading among novice learners in the following section.

## 5. Discussion

There is a high rate of acceptance of the bound reading for null pronouns, for all participants. Such a preference has also been observed for spoken Japanese, as noted by Kanno (1997), cf. Grimshaw and Rosen (1990: 200–201). Note that acceptance of the non-bound reading should also be possible, and this reading is associated with the ‘Yes’ response on half of the items. Then, the preference for the bound reading is particularly strong, since it overrides any possible preference for ‘Yes’ responses.

For overt items, the beginners show a very strong anti-OPC effect, accepting the bound reading 83% of the time. The rate of the anti-OPC effect is lower for the intermediate participants, at 69%, but this is similar to the rate of acceptance of the bound reading observed for intermediate-level learners in the studies by Pimentel and Nakayama (2012) and Kahraman and Nakayama (2015). Note that the bound reading in the equivalent construction is not allowed in the learners’ L1, Japanese (see (2b) in section 1). We therefore conclude with Kahraman and Nakayama (2015) that high rates of acceptance of bound readings is a result of something other than L1 transfer. It seems that regardless of the status of the L1 with respect to the OPC, learners who have a limited amount of exposure to their L2 rely on the bound reading of the overt pronoun in the embedded structure. Our study supports the possibility that this bound reading strategy (the anti-OPC effect, or the employment of intrasentential co-reference strategy) is a tendency that L2 learners employ before they learn language-specific properties of overt and null pronouns in the target language. What those properties are in JSL remains to be studied further. Pimentel and Nakayama (2012) and Kahraman and Nakayama (2015) suggest that for L2 learners of Japanese, a candidate for the language-specific property is the analysis of overt pronouns as demonstratives rather than personal pronouns (Hoji 1991). Interestingly, Koulidobrova and Lillo-Martin (2016) have proposed that a similar analysis holds for the indexical pronouns in ASL.

We want to point out that not finding an OPC effect in L2 learners does not necessarily invalidate Kanno’s conclusion that UG plays a role for second language as well as for first language acquisition. As pointed out by Pimentel and Nakayama (2012) and Kahraman and Nakayama (2015), alternative analyses of the ‘OPC effect’ in Japanese may be needed, if the analysis of *kare* as a demonstrative is to be pursued, since – as currently formulated – the OPC should not even apply to demonstratives. Further study of this, and particularly of the nature of both overt and null pronouns in JSL, will contribute to the resolution of this issue.

Finally, it is also important to note the differences in methodology. Kanno’s method clearly gives an opportunity for learners to overtly consider both bound and non-bound interpretations of pronouns. The subjects were expected to

compare and choose from the options of the bound and free interpretation of the pronoun (see (4) in section 1). This could have assisted the participants to overcome a preference for intrasentential coreference. The TVJT was originally developed as a means for testing (child) participants' interpretation of sentences with pronouns (Crain & McKee 1985). It permits the experimenter to present contexts appropriate to one or another reading to see whether participants accept a particular form-meaning pair. In the studies presented here (ours and those by Nakayama and colleagues), participants showed acceptance of bound readings and in some cases, a strong preference for this reading. There may be a strategy that is used in contexts compatible with both readings, such that a strong context in favor of the non-bound interpretation is needed for learners to show they can access it as well. In any case their acceptance of the bound reading supports the view that early learners are not restricted to non-bound interpretations by the OPC.<sup>14</sup>

## 6. Conclusion

Our study revealed that novice L2 hearing learners of JSL show response patterns in their interpretation of the referents of overt pronouns in the embedded subject position of test sentences, similar to those reported in previous studies such as Kahraman and Nakayama (2015). It is interesting to note that the response pattern in these studies cannot be attributed to L1 transfer, and furthermore, this response was observed regardless of the modality of the language pairs studied (auditory or visual-spatial). The 'anti-OPC' or the intrasentential coreference preference was observed strongly in novice-level L2 learners, as well as more moderately in intermediate-level learners. Understanding the nature of the preference for intrasentential coreference, and its relation to learner's proficiency, would require further research.

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14. An anonymous reviewer raised a question regarding how the anti-OPC strategy compares with the notion of a default parameter setting. We assume that the anti-OPC (i.e., the employment of intrasentential co-reference strategy, see the Discussion section) is a learning strategy adopted in the process of L2 acquisition, and hence fundamentally unrelated to the nature of Universal Grammar that leads children's acquisition of their native language.



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## Appendix. Stories used in the test session

The stories were semi-randomized in order to prevent more than one story in the same question category from being presented consecutively. The answers indicated here (True/False) are based on the bound reading of the pronominal subject in the embedded clause (when applicable).

### *Warm-ups*

1-1: Yamada and Takahashi are colleagues at a part-time job. They are both planning to travel when they get paid. Yamada wants to visit the US. Takahashi would rather travel inside Japan.

Q: [PT<sub>3</sub> AMERICA GO] HOPE WHO PT<sub>3</sub>  
A: TAKAHASHI (False)

1-2: Takuya and Kei are friends at college. Their common friend Mami is having a debut as a singer and will appear on TV. Takuya was so happy that he told many people about her TV appearance. Kei did not tell anyone about Mami.

Q: [FRIEND TV APPEAR] TELL-AROUND WHO PT<sub>3</sub>  
A: TAKUYA (True)

1-3: Ellie and Maria are American. They are friends. They are having dinner at a Japanese restaurant. Ellie thinks she wants Sushi. Maria thinks she wants ramen noodles.

Q: [Ø SUSHI EAT] THINK WHO PT<sub>3</sub>  
A: MARIA (False)

### *Overt pronoun stories*

2-1: Daisuke and Yuta are colleagues at a company. They each decided to quit. Daisuke told many people that he (Daisuke) quit. Yuta did not tell anyone about his own decision. But Yuta told many people that Daisuke quit.

Q: [PT<sub>3</sub> JOB QUIT] TELL-AROUND WHO PT<sub>3</sub>  
A: YUTA (False)

2-2: Masato and Kazuki are brothers. They each borrowed money from someone. Masato wrote on the IOU that he (Masato) will pay back the money when he gets paid. Kazuki does not have a job. Kazuki wrote that his brother will pay the money back on his IOU.

Q: [PT<sub>3</sub> MONEY RETURN] WRITE WHO PT<sub>3</sub>  
A: MASATO (True)

2-3: A typhoon is approaching the area. Tanaka and Sato are friends from college. Tanaka thinks that the university will be closed tomorrow and he (Tanaka) will stay home. Sato thinks otherwise. He is planning to go to school. But he thinks Tanaka will not show up in class tomorrow.

Q: [PT<sub>3</sub> HOME STAY] THINK WHO PT<sub>3</sub>  
A: SATO (False)

2-4: Momo and Risa are friends at a kindergarten. They drew pictures of animals at school. Momo wants to get a panda bear as a pet. Risa wants a cat, because she thinks the panda bear is too large and tough to keep as a pet. But Risa thinks Momo loves panda bears, so she would be happy to have one as a pet.

Q: [PT<sub>3</sub> PANDA KEEP-AS-PET] HOPE WHO PT<sub>3</sub>

A: MOMO (True)

### *Null pronoun stories*

3-1: Yuka and Mayumi are friends. Yuka is determined to find a person to marry within a year. Mayumi is not so confident. Mayumi thinks she (Mayumi) would not be able to find anyone anytime soon. But Mayumi thinks Yuka has a chance, since Yuka is such a nice person.

Q: [∅ SOMEONE-TO-MARRY FIND] BELIEVE WHO PT<sub>3</sub>

A: YUKA (True)

3-2: Narumi and Rena are friends. Each of them is going to make their favorite dishes. Narumi told many people she (Narumi) will make a pasta dish. Rena did not tell anyone that she (Rena) is going to make a pasta dish, too. Instead, Rena told many people that Narumi will make a pasta dish.

Q: [∅ PASTA MAKE] TELL-AROUND WHO PT<sub>3</sub>

A: RENA (False)

3-3: Reiji and Tatsuya are high school students. They did some volunteer work in Tohoku before. Reiji wants to move to Tohoku sometime in the future. Tatsuya wants to find a job and stay in Tokyo. But Tatsuya thinks it would be nice if Reiji moves to Tohoku, so he can visit him.

Q: [∅ TOHOKU MOVE] HOPE WHO PT<sub>3</sub>

A: TATSUYA (False)

3-4: Hitomi and Ai are sisters. Hitomi plans to graduate and work for a company. Ai does not enjoy studying, and thinks about leaving school and opening a café. But Ai knows Hitomi is a good student. Ai thinks Hitomi will graduate.

Q: [∅ UNIVERSITY GRADUATE] THINK WHO PT<sub>3</sub>

A: HITOMI (True)

### *Overt NP stories (filler)*

4-1: Reika and Aya are friends. Their common friend Yumiko is learning JSL. Yumiko is quiet about her learning JSL, though she is good at it. Reika told many people that Yumiko is learning JSL. Aya did not tell anything about Yumiko.

Q: [YUMIKO SIGN-LANGUAGE STUDY] TELL-AROUND WHO PT<sub>3</sub>

A: AYA (False)

4-2: Hiroki and Kazuya are college students. They are not good at English. Their common friend Kota has been studying English diligently. Hiroki and Kazuya found an interesting book at their lab. It is written in English. Hiroki thinks Kota can read it, while Kazuya thinks Kota is not that good at reading English.

Q: [ KOTA BOOK-ENGLISH READ] THINK WHO PT<sub>3</sub>

A: KAZUYA (False)

4-3: Mana and Rieko are friends at high school. Their common friend Ken is playing tennis at a tournament. Mana believes that Ken will win the final. Rieko thinks Ken is not good enough to win the championship.

Q: [ KEN MATCH WIN-CHAMPIONSHIP] BELIEVE WHO PT<sub>3</sub>

A: MANA (True)