

The Influence of Proficiency Levels on Resolving Ambiguous Relative-Clause Attachments in German as a Second Language

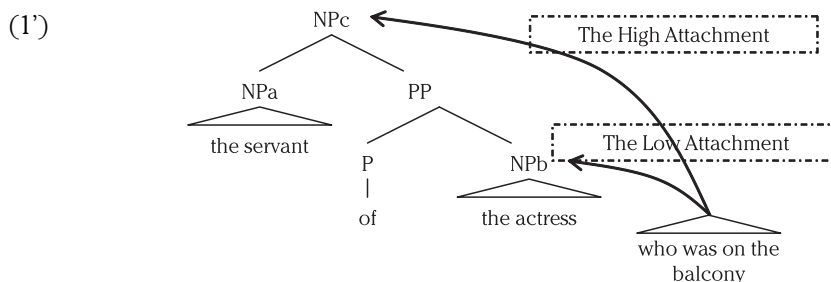
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I. Introduction

It has been argued that when language learners process sentences in a second language (L2), even if they are highly advanced learners, they do not process the L2 sentences in the same way as native speakers of that language do (Clahsen & Felser, 2006a, 2006b, and 2006c). Previous studies have mainly focused only on highly advanced language learners. How do language learners at different developmental stages process sentences? The present study investigated whether L2 learners at different proficiency levels show different preferences when resolving ambiguous relative-clause attachments.

When auditorily presented sentences are processed, the sentences are merely a string of sounds with no division. The string is divided into small units (e.g., morphemes, or words), and the units are combined to form larger units such as phrases and clauses, which function as a subject NP, object NPs, modifiers, and a predicate. This process of combination is repeated to form larger units, and ultimately to construct a sentence structure (Martinét, 1960; Senghas, Kita, & Özyürek, 2004, among others). It has been reported that several strategies are applied when constituents are associated and attached together. One of the strategies is Late Closure: “When possible, attach incoming lexical items to the clause or phrase currently being processed (i.e., the lowest possible non-terminal node dominating the last item analyzed)” (Frazier & Rayner, 1982, p. 180). Cuetos and Mitchell (1988) investigated which noun phrase a relative clause will be attached to in a sentence like (1) below. (1') represents the phrase structure of the italicized complex NPc. The relative clause *who was on the balcony* can be attached either to the NPb *the actress* or to the NPc *the servant of the actress*.

(1) Someone shot *the servant of the actress who was on the balcony*.



They found that the NPb *the actress* was preferred to the NPc *the servant of the actress*. They argued that the preference is due to the application of Late Closure. This means that when the incoming new item is the relative pronoun *who* the phrase currently being processed is the NPb *the actress*, not the NPc *the servant of the actress*; hence, the relative pronoun *who* was attached to *the actress*. The rest of the relative clause will be attached to the relative pronoun *who* in the same way.

The NPb *the actress* is lower than the NPc *the servant of the actress* in the phrase structure (1'). Therefore, when the relative clause is attached to the lower NP, the clause is referred to as a **Low Attachment**; however, when the relative clause is attached to the higher NP, the clause is referred to as a **High Attachment**. The results for Cuetos and Mitchell's experiments indicate that native speakers of English preferred low attachment.

Cuetos and Mitchell applied the same experimental paradigms to native speakers of Spanish and found a preference for high attachment. Since then, the preference in ambiguous relative-clause attachments has been investigated in a variety of languages (e.g., languages that are reported to prefer high attachment—French (Mitchell, Cuetos, & Zagar, 1990), Spanish (Cuetos & Mitchell, 1988), German (Hemforth, Koneiczny, & Scheepers, 2000; Hemforth, Koneiczny, Scheepers, & Strube, 1998), Afrikaans (Mitchell, Brysbaert, Grondelaers, & Swanepoel, 2000), Greek (Papadopoulou & Clahsen, 2003), Japanese (Kamide & Mitchell, 1997)—and languages that are reported to prefer low attachment: English (Cuetos & Mitchell, 1988), Chinese (Shen & Mitchell, 2003), Arabic (Abdelghany & Fodor, 1999), Norway, Swedish, and Rumanian (Ehrlich, Fernandez, Fodor, Steshoel & Vinereanu, 1999)).

(2) Dareka-ga *barukoni-ni tatteiru joyu-no meshitsukai-o* utta.

Somebody-nom balcony-on standing actress-gen servant-acc shot

(Somebody shot the servant of the actress who was on the balcony.)

(2) is the Japanese equivalent of the English sentence (1). The noun phrase *joyuu* (the actress) is lower than the noun phrase *joyuu no meshitsukai* (the servant of the actress) in (2). Kamide and Mitchell (1997) investigated the Japanese preference for ambiguous relative-clause attachment by using offline and online tasks. The researchers argued that the relative clause was initially attached low, and then at a certain point of processing a reanalysis occurred and the relative clause was attached to the higher potential antecedent.

(3) Jemand erschö die Dienerin von der Schauspielerin, die auf dem Balkon war.

(Someone shot the maid of the actress, who was on the balcony.)

In terms of German, Hemforth et al. (1998, 2000) reported a preference for high attachment. The relative clause *die auf dem Balkon war* tends to be attached to the NP *die Dienerin von der Schauspielerin*, rather than *der Schauspielerin* in (3).

Researchers have also investigated the factors responsible for different attachment preferences across languages. The factors can be classified into three types: crosslinguistic features, factors relevant to the materials used in the experiments, and factors relevant to the participants in the experiments.

II . Crosslinguistic Features

A considerable number of hypotheses have been proposed. Here we deal with only the two major principles: one is based on the syntactic differences between languages, and the other is based on the pragmatic difference between languages.

1. The Principles of Recency and Predicate Proximity

Gibson, Pearlmutter, Canseco-Gonzalez, and Hickok (1996) argued that either the principle of recency (“preferentially attach structures for incoming lexical items to structures built more recently”) (Gibson et al., 1996, p. 26) or the principle of predicate proximity (“attach as close as possible to the head of a predicate phrase”) (Gibson et al., 1996, p. 41) is adapted in a language, resulting in the crosslinguistic difference in attachment preferences.

(4) Someone shot *the servant of the actress who was on the balcony*.

Suppose that you read the phrase *the actress* in example (4) and the next incoming item is *who*. The structure built most recently is not *the servant of the actress* but *the actress*. If the principle of recency is applied in processing example (4), *who* is attached to the lower potential head, resulting in low attachment.

(5) Dareka-ga *barukoni-ni tatteiru joyu-no meshitsukai-o utta*.

Somebody-nom balcony-on standing actress-gen servant-acc shot

(Somebody shot the servant of the actress who was on the balcony.)

In contrast, if the principle of predicate proximity is applied to the Japanese example (5), the potential antecedent that is closer to the predicate *utta* is *meshitsukai* rather than *joyu*; hence, the relative clause *barukoni-ni tatteiru* is attached to *meshitsukai*, resulting in high attachment. Gibson et al. (1996) argued that the principle of recency is the default but that if word-ordering in a language is relatively free, as in Japanese, the predicate will be activated more in order to attract its arguments, whereby the principle of predicate proximity will be applied. In other words, which of the two principles is adapted in a language depends on the degree of freedom in word-ordering. For instance, if word-ordering is rigid, as in English, the principle of recency is applied to the language, whereas if word-ordering is relatively free, as in Japanese, the principle of predicate proximity is

applied.

2. Frazier and Clifton (1996)

Frazier and Clifton (1996) divided the relationships between the constituents of a sentence into primary relations and nonprimary relations. Primary relations are those between arguments and the head, and nonprimary relations are those between adjuncts and the head. The principles that are syntactically oriented, such as the principles of recency and predicate proximity, are applied to primary relations. As for nonprimary relations, not only the syntactically oriented principles but also the principles that are pragmatically oriented are applied. Relative clauses are a kind of adjunct; hence, their relationship with the antecedent can be categorized as a nonprimary relation. For instance, a pragmatic axiom, the Grician maxim of manner or clarity (*Be clear and unambiguous*, Grice, 1975), is applied to process ambiguous relative-clause attachments. The English expression *the servant of the actress* can be rephrased as *the actress's servant*. Reading the phrase *the actress's servant who was on the balcony*, native speakers of English interpret that the person who was on the balcony is the servant, not the actress; hence, the phrase is not ambiguous with respect to its interpretation. Given the Grician maxim of manner or clarity, when we would like to mean that the person who was on the balcony is the servant, we must use the unambiguous expression *the actress's servant who was on the balcony*. The phrase *the servant of the actress who was on the balcony* is used only when we would like to mean that the person who was on the balcony is the actress. Some languages can rephrase the NP of the NP phrase into an unambiguous phrase (e.g., English), while other languages do not have such an alternative expression (e.g., Spanish). Compared to the latter type of languages, low-attachment interpretations proportionally become higher than high-attachment interpretations in the former type of languages.

We cannot claim that only the above-mentioned factors determine the cross-linguistically different preferences of ambiguous relative-clause attachments, since some counter-examples have been proposed to each of the above-mentioned factors (e.g., Hemforth et al., 2000, against Gibson et al., 1996), and some other factors have been proposed, as mentioned below.

III. Factors Relevant to the Materials

1. Connectors

When the two NPs that can be antecedents of a relative clause are connected either with a syntactic suffix, word or phrase that indicates the genitive case (e.g., the English *of*, the Japanese *no*, the German *der*), the preferences for the ambiguous relative-clause attachment vary according to the languages; however, when the NPs are connected with a preposition, a postposition, and an equivalent phrase (e.g., the English *with*, the Japanese *tonari no* “next to,” the German *mit* “with”), ambiguous relative clauses tend to be attached

low (Gilboy, Sopena, Clifton, & Frazier, 1995).

Frazier and Clifton (1996) proposed that constituents in nonprimary relations are associated “into the current processing thematic domains— the extended maximal projection of the last thematic role assigner” (*the Construal Principle*, Frazier and Clifton, 1996, p.54). Since relative clauses are nonprimary constituents, they associate to the extended maximal projection of the last thematic role assigner. If the NPb is the argument of the NPa in [_{NPc}NPa of NPb], e.g., *the maid (NPa) of the actress (NPb)*, the NPc, i.e., the entire noun phrase will be the current processing thematic domain and will be associated with the relative clause, thus, either the NPc or the NPb can be antecedents for the relative clauses. The prepositions, such as *with* in English and *mit* in German are thematic-assigning prepositions, the current processing domain of the noun phrase *the woman (NPa) with the boy (NPb)* in *the woman with the boy who was on the balcony is the boy (NPb)*. Therefore, only the NPb can host the relative clause.

2. Other Factors

It has been pointed out that a number of factors relevant to the materials used in the previous experiments influence relative-clause attachment preferences. For instance, Mendelsohn and Pearlmutter (1999) argued that the plausibility of a combination of relative clauses and potential antecedents influences attachment preferences. Mak et al. (2002) reported that when the inanimate noun phrase was the potential antecedent of a relative clause, the complex NPs became more difficult to process than when the animate noun phrase was the antecedent. Uetsuki (2004) reported that unsaturated noun phrases are preferred to the saturated noun phrase as the antecedent of a relative clause. Fodor et al. (1998, 2002) argued that the balance of the prosodic lengths between a relative clause and the head noun phrase affects attachment preference. A relative clause tends to be attached to a noun phrase with a similar length.

IV. Factors Relevant to Participants

It has been reported that working memory (WM) plays an important role in processing sentences (Baddeley & Hitch, 1974, Just & Carpenter, 1992; King & Just, 1991, among others). Individual humans have different WM capacities, which influence the comprehension of sentences and texts (Just & Carpenter, 1992; Osaka & Osaka, 1992). Felser et al. (2003) compared the relative-clause attachment preference of adults and children. The researchers measured children’s working memory capacity by using the listening-span test and reported that the high-span group of children tended to prefer high attachment regardless of the GEN or the PP conditions, while children in the low-span group showed a general low-attachment tendency. Nakano and Nishiuchi (2007) investigated whether individual differences in working memory capacity measured by the reading-span test influence the relative-clause attachment preferences of adult native

speakers of Japanese: the high-span participants preferred high attachment in the GEN condition whereas the low-span participants showed no particular preference. Both the high-span and the low-span participants indicated a low-attachment preference in the PP condition. The researchers argued that the different working memory capacity of the participants influenced their attachment preference.

V. Ambiguity Resolution in L2 Relative-Clause Attachment

Papadopoulou and Clahsen (2003) investigated relative-clause attachment in Greek with native speakers of Greek and adult Spanish learners of Greek at a highly advanced level of proficiency as participants by using the offline acceptability judgement task and the self-paced reading span task. The experimental sentences had a complex NP, in which the antecedent of a relative clause was unambiguous. Namely, a relative clause modified either the low NP (the low-biasing condition) or the high NP (the high-biasing condition). Participants were required to judge the acceptability of each experimental sentence. If the participants preferred high attachment and were presented with a low-biasing sentence, they needed to reanalyze their initial high-attachment preference compared to low attachment, which was less acceptable to the participants. In contrast, if the participants preferred low attachment and received a low-biasing sentence, the acceptability of the sentence was better than in the previous example. The results indicated that in the GEN condition native speakers of Greek preferred high attachment while the Spanish learners of Greek showed no particular preference. In the PP condition, both the native speakers of Greek and the Spanish learners of Greek preferred low attachment. The results for the self-paced reading task were compatible with the results for the acceptability judgment task. Felser et al. (2003) investigated the relative-clause attachment preference of native speakers of English and highly advanced Greek learners of English by using the same paradigms as Papadopoulou and Clahsen (2003) and found the compatible results.

Nakano, Nishiuchi, Hayano, and Imoto (2007) investigated the preferences for ambiguous relative-clause attachments in L1 and L2 Japanese with native speakers of Japanese and advanced Chinese learners of Japanese as participants. Considering the possible influence of individuals' different working memory capacity on sentence processing indicated by previous studies, Nakano et al. measured the participants' reading spans. The researchers asked the participants to read experimental sentences, which contained a complex NP with a relative clause and its two potential antecedents, e.g., *barukonii-ni iru joyuu no meshitukai* "the servant of the actress who was on the balcony", and asked the participants to answer the question, *dare-ga barukonii-ni iru no desuka*, "Who was on the balcony?" The participants had to choose either *meshitukai* "the servant" or *joyuu* "the actress". The results indicated that both the high-span native speakers of Japanese and the high-span Chinese learners of Japanese preferred high attachment in the GEN condition, whereas the low-span participants did not show a particular preference,

regardless of their native languages. Nakano et al. (2007) argued that, in contrast to previous studies, advanced learners resolve ambiguous relative-clause attachments in the same way native speakers do, depending on the advanced learners' working memory capacity. It is conceivable that the L2 learners in the previous studies did not show an attachment preference in the GEN condition because the participants behaved differently according to their WM capacity but their data were statistically analyzed together.

In previous studies, the participants were all advanced learners of the target language. As far as we know, not many studies have been conducted to investigate whether different levels of proficiency in target languages affect relative-clause attachment preferences. We, therefore, investigated the influence of proficiency levels on the resolution for ambiguous relative-clause attachments with native speakers of German and Japanese learners of German at different proficiency levels.

VI. Method

1. Participants

Twenty-four Japanese native speakers learning German (F: 20, M: 4, Mean Age: 22.3) who were studying German at Kochi University, at Sophia University, or at the University of Tokyo Foreign Studies and nineteen native speakers of German (F: 7, M: 12, Mean Age: 31.4) participated in the experiment. One thousand yen was paid to each of the participants.

2. Materials

One hundred thirty-six sets of sentences, in which two NPs of singular form with the same gender (masculine, feminine, or neuter) were conjoined either with a genitive definite article (e.g., *der* in the NP *die Tochter der Frau*, "the daughter of the woman," **the GEN condition**) or prepositions (e.g., *mit* in the NP *die Frau mit der Tochter*, "the woman with the daughter," **the PP condition**), and twenty sets of sentences, in which two NPs of plural form were conjoined with a genitive definite article or with prepositions, were constructed. The two NPs were followed by a relative clause, which was ambiguous with respect to which NP the relative clause was attached. The main verbs of the relative clauses were intransitive verbs in half of the sentences and transitive verbs in the other half of the sentences. Fifty-two filler sentences were constructed. All the sentences used in the experiment were constructed by a native speaker of German, who has taught German to Japanese learners at several Japanese universities for more than fifteen years. Since several students had studied German for a few years and knew the vocabulary that had previously appeared in their German textbooks, the test sentences were carefully constructed by using very basic vocabulary that even elementary-level learners should know. One hundred twenty-eight sentences were used as the experimental sentences based on the results for the normality judgment test. The experimental sentences were divided into four lists and

mixed with the fifty-two filler sentences. The lists were counterbalanced with respect to the four conditions (three gender types in singular forms and a plural form), the types of verbs (transitive and intransitive verbs), and the two types of antecedents, i.e., NPs connected either by the genitive case article (the GEN condition) or with a thematic preposition (the PP condition), and mixed with the filler sentences. Each of the experimental sentences was followed by a multiple-choice question and two answer choices that indicated the attachment preference of a relative clause, as shown in examples (6) and (7). Each of the filler sentences was also followed by a question and two choices for the answer.

(6) The GEN condition

Karl liebt die Tochter der Frau, die in Berlin lebt.

(Karl loves the daughter of the woman who lives in Berlin.)

Wer lebt in Berlin?

A: die Tochter B: die Frau

(7) The PP Condition

Karl liebt die Frau mit der Tochter, die in Berlin lebt.

(Karl loves the woman with the daughter who lives in Berlin.)

Wer lebt in Berlin?

A: die Tochter B: die Frau

Twenty-two additional sentences were constructed. The sentences contained a complex NP, in which two NPs were conjoined either with the genitive definite article or a preposition and were followed by a relative clause, and one of the two NPs was either a syntactically plausible antecedent of the relative clause, as in (8), or a semantically plausible antecedent, as in (9). We will refer to the sentences as marker sentences.

(8) Tom und Marcus treffen die Eltern des Schülers, die das ganze Wochenende bleiben wollen.

(Tom and Markus meet the parents (Pl) of the pupil (Sg) who want to stay for the weekend.)

Wer will das ganze Wochenende bleiben?

A: die Eltern B: der Schüler

Answer: A

(9) Der Präsident küsste das Baby neben dem Mädchen, das ihn gewählt hat.

(The president kissed the baby (NEUT, Akk) next to the girl (NEUT, Dat) who voted for him.)

Wer hat den Präsidenten gewählt?

A: das Baby B: das Mädchen

Answer: B

The additional sentences were constructed in order to check whether the participants had acquired the grammar rule relating to the relative clause and could understand the meanings of the complex NPs followed by the relative clause.

A grammar test was constructed. Twenty question items were taken from the past three versions of the German section of the National Center Test created by the National Center for the University Entrance Examination.

3. Procedure

The grammar test and the experimental sentences were printed on A4-size sheets of paper. The instructions were written in Japanese for the Japanese participants and in German for the German participants. The experiments were conducted with all the Japanese participants together in a room at each of the three universities. The same experiments were given to the German participants individually. The experimenter, who could speak both Japanese and German, explained the procedure.

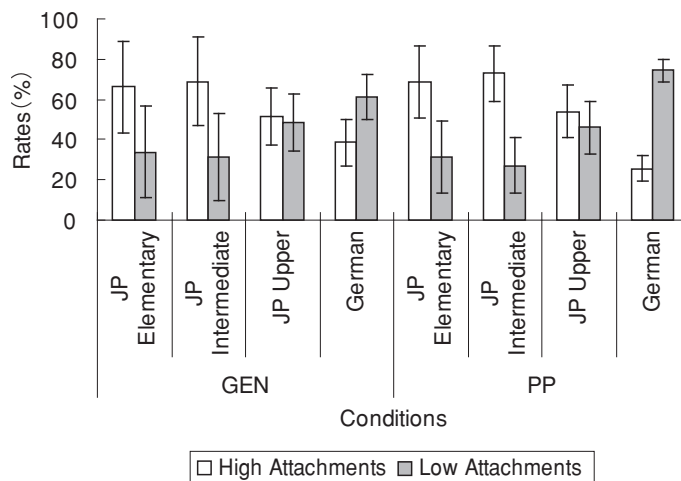
VI. Results

The correctness rates were calculated from the average scores for the number of correct answers on the grammar test and that for the marker sentences. The lowest correctness rate was 63.1 percent and the highest correctness rate was 97.7 percent in the group of the Japanese learners of German. The Japanese learners of German were divided into three groups according to the correctness rates: the upper-level group (95 percent to 100 percent, $N=7$), the intermediate group (85 percent to 94 percent, $n=6$), and the elementary group (84 percent or below, $n=11$).¹⁾ Data from a native speaker of German whose correctness rate was below 75 percent were removed from further analyses. As for the other native speakers of German, the individual participants' correctness rates were 95 percent or above. Figure 1 shows the attachment preferences of the three groups of Japanese learners of German and the group of German native speakers.

We conducted loglinear analyses with the groups (the Elementary group, the Intermediate group, the Upper group, and the Native Speaker group) and the NP types (the GEN condition and the PP condition) as the independent factors and the Attachment Preferences (High and Low Attachments) as the dependent factor. Table 1 below shows the goodness of fit in the possible models.²⁾

1) Many commercialized language proficiency examinations use absolute assessment criteria to differentiate proficiency levels, such as the elementary, intermediate, and advanced levels, and indicate particular developmental stages. The scores for the tests used in the present study indicate that the participants were at different levels of proficiency but not more than that; hence, the names of the groups do not indicate particular developmental stages.

2) Although analyses of variance and *t*-tests have been conventionally used in some of the previous studies



JP: Japanese learners of German, German: native speakers of German
 Elementary: the Elementary group, Intermediate: the Intermediate group, Upper: the Upper group
 Figure 1: Attachment Preferences for L1 and L2 German

Table 1: Goodness of Fit

Models	Goodness of Fit		
	G^2	df	P
H_1 [Attachment Preferences x NP Types] [Groups x NP-Types] [Attachment Preferences x Groups]	9.45	3	.024
H_2 [Attachment Preferences x NP Types] [Groups x NP-Types]	145.36	6	<0.001
H_3 [Attachment Preferences x NP Types] [Attachment Preferences x Groups]	9.72	6	0.134
H_4 [Groups x NP Types] [Attachment Preferences x Groups]	11.60	4	0.021
H_5 [Attachment Preferences] [Groups x NP Types]	147.24	7	<0.001
H_6 [Groups] [Attachment Preferences x NP Types]	145.36	6	<0.001
H_7 [NP-Types] [Attachment Preferences x Groups]	11.60	7	0.114
H_8 [Attachment Preferences] [NP Types] [Groups]	147.24	10	<0.001

The saturated model included all the main factors and the possible 2-way interactions and the 3-way interaction. The model for the hypothesis H_1 contains all the main factors and the possible 2-way interactions but not the 3-way interaction. Using H_1 as a baseline, we removed one of the three 2-way interactions from H_1 ($H_2 \sim H_4$), and removed two of the three 2-way interactions from H_1 ($H_5 \sim H_7$) and kept only the main factors (H_8), in order to find the degree of improvement and deterioration of goodness of fit in each model, compared to the other models. For instance, if the interaction of the Attachment Preferences and the Groups is removed from H_1 , i.e., H_2 , the goodness of fit became worse than H_1 . In contrast, if the interaction of the Group and the NP-types is removed from H_1 , i.e., H_3 , the goodness of fit improves. Since the value of probability was not significant, the model for H_3 is acceptable.

The hypotheses H_3 and H_7 indicated non-significant probabilities, while the rest of the

(e.g., Cuertos & Mitchell, 1988; Kamide & Mitchell, 1997), here we conducted a loglinear analysis because our data were nominal, for which loglinear analyses and chi-square analyses were more adaptable.

hypotheses indicated significant probabilities. After the models for H_3 and H_7 were compared with the models for the rest of the hypotheses, the interaction of the Attachment Preferences and the Groups was found to contribute to a better goodness of fit. This means that the interaction of the Proficiency Levels and the NP Types influences Attachment Preferences. In other words, the interaction of the Proficiency Levels and the NP Types plays an important role in resolving ambiguous relative-clause attachments.

Chi-square tests were performed in order to examine the attachment preferences in each of the participants' groups. The elementary group of learners preferred high attachment both in the GEN condition ($X^2(1)=11.57$, $p=0.001$) and in the PP condition ($X^2(1)=15.75$, $p<0.001$). The intermediate group of learners also preferred high attachment both in the GEN condition ($X^2(1)=13.5$, $p<0.001$) and the PP condition ($X^2(1)=20.17$, $p<0.001$). The upper group of learners did not have a particular preference in either of the conditions (the GEN condition: $X^2(1)=0.21$, $p=0.65$, the PP condition: $X^2(1)=1.11$, $p=0.29$). The group of German native speakers had low-attachment preferences both in the GEN condition ($X^2(1)=14.53$, $p<0.001$) and the PP condition ($X^2(1)=66.06$, $p<0.001$).

Another set of chi-square tests was performed to compare the attachment preferences of each of the Japanese groups and the group of native speakers of German by using the expectancy values calculated in accordance with the rates for the L1 German group (38.7 percent for high attachment and 61.3 percent for low attachment in the GEN condition and 25.7 percent for high attachment and 74.3 percent for low attachment in the PP condition). The calculated expectancy value of each of the Japanese groups for high attachment was 6.16 and that for low attachment was 9.84 in the GEN condition, and that for high attachment was 4.08 and that for low attachment was 11.92 in the PP condition. In the GEN condition, the difference between the elementary group and the German group ($X^2(1)=3.25$, $p=0.072$) and that between the intermediate group and the German group ($X^2(1)=8.5$, $p=0.004$) were significant. The significant difference, in contrast, dissipated between the upper learners group and the German group ($X^2(1)=1.75$, $p=0.19$). In the PP condition, the difference between the elementary group and the German group ($X^2(1)=6.92$, $p=0.009$), the difference between the intermediate group and the German group ($X^2(1)=28.23$, $p<0.001$), and the difference between the upper learners group and the German group ($X^2(1)=8.62$, $p=0.003$) were all significant. Notice, however, that the values of the probability decreased as the levels of proficiency rose in the PP condition. From these results, it is conceivable that as learners become proficient they tend to process the target language in a way that is more similar to that of a native speaker of the target language.

VIII. Discussion

1. The Influence of Proficiency Levels on Relative-Clause Attachments

The present study investigated the influence of proficiency levels on the resolution of

ambiguous relative-clause attachments in L1 and L2 German. The results indicated that as learners' proficiency levels improve, the attachment preference will become closer to that of native speakers. Therefore, it can be said that the different levels of proficiency influence resolving ambiguous relative-clause attachments. There are, however, a few points to consider.

First, many language learners translate the target language into their first language when they start learning new languages and may gradually interpret sentences written in the target languages without translating the sentences into their first language. Previous studies reported that native speakers of Japanese tend to attach high in the GEN condition (Kamide & Mitchell, 1997; Miyamoto & Nakamura, 2003; Nakano & Nishiuchi, 2007; Uetsuki, 2004). The high attachment preferences in the GEN conditions in the elementary and the intermediate groups can be due to the involvement of translation, applying the strategies used in Japanese.

Second, the tests used in the present study was not fully developed to explore all the grammatical aspects relevant to what constitutes language proficiency; hence, there is a possibility that the correctness rates used in the present study reflect particular aspects of learners' proficiency. Comprehensive proficiency tests should be provided in further studies, and the results will be fully confirmed.

Finally, since sentences are processed dynamically, offline tasks cannot sufficiently catch dynamic sentence-processing strategies. Assuming that sentences are processed incrementally (Kamide, Altmann, & Haywood, 2003), the decision on which noun phrase a relative clause should be attached to is conducted well before the participants choose the answers in the offline task. Therefore, further investigation needs to be carried by using online paradigms.

2. The Results for Native Speakers of German

Although previous studies (Hemforth et al., 1998 2000) have reported that native speakers of German prefer high attachment in the GEN condition and low attachment in the PP condition, the participants in the present study preferred low attachment both in the GEN and the PP conditions. One possible cause for the deviation in the GEN condition is that half of the native speakers of German have been teaching German to Japanese learners in Japan for a number of years and most of them are over 35, while the other half have never been to Japan and are not language teachers but high school and university students and their ages range from 16 to 19. The long exposure to the Japanese environment of the former participants may have influenced their attachment preferences. Teenagers are still at the developmental stage; it is, therefore, conceivable that they have not yet acquired adult-like processing strategies (Felsler et al., 2003).

IX. Conclusion

The present study examined the influence of different proficiency levels on second language on the resolution of ambiguous relative-clause attachments. The results indicated that language learners at different proficiency levels resolve ambiguous relative-clause attachments differently, but as the learners' proficiency in the target language improves, their attachment preference becomes more similar to that of native speakers.

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The Influence of Proficiency Levels on Resolving Ambiguous Relative-Clause Attachments in German as a Second Language

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本研究は、第二言語における習熟度が関係節付加曖昧構文の処理に影響を与えるかどうかについて調査を行った。被験者は、24名の日本人ドイツ語学習者と19名のドイツ語母語話者で、ドイツ語の試験と本実験に参加した。本実験では *Karl liebt die Tochter der Frau, die in Berlin lebt.* (カールはベルリンに住んでいる娘の教師を愛している) や *Karl liebt die Tochter mit der Frau, die in Berlin lebt.* (カールはベルリンに住んでいる娘と一緒にいる教師を愛している) のような関係節付加曖昧構文を読み、*Wer lebt in Berlin?* (誰がベルリンに住んでいるのですか) というような質問の答えとして *die Tochter* (教師) または *die Frau* (娘) を選ぶよう指示を受けた。このような質問を通して2つの名詞句のうち、どちらが関係節の先行詞として解釈されたのかを調べた。実験材料には統語的あるいは意味的に2つの名詞句のうち片方しか先行詞として解釈できないような刺激文(マーカー文)も含めた。ドイツ語の試験とマーカー文に対する質問の正答率の平均によって、日本人のドイツ語学習者を習熟度別に3つのグループに分けドイツ語母語話者と比較した。学習者は習熟度が上がるに従って、母語話者に似た解釈を示したところから、学習者は習熟度が上がるに従って母語話者に近い文処理の方略を用いて、関係節付加曖昧構文を解釈するようになる可能性が示唆された。