Influence of Information Structure on

Word Order Change and Topic Marker *WA* in Japanese

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Abstract

The purpose of this study is to investigate the influence of given-new ordering on word order change and topic marker *WA*, using a self-paced reading task. The results demonstrated that $O_{ACC}S_{NOM}V$ is sensitive to given-new information, but $S_{NOM}O_{ACC}V$, $S_{TOP}O_{ACC}V$, and $O_{TOP}S_{NOM}V$ are not. This fact can be explained by the Markedness Principle for Discourse Rule Violation (Kuno, 1987: 212): both $S_{NOM}O_{ACC}V$ and $S_{TOP}O_{ACC}V$ are not penalized even when they violate given-new ordering because they are unmarked options, $O_{ACC}S_{NOM}V$ is penalized when it violates given-new ordering because it is a marked option, and $O_{TOP}S_{NOM}V$ is penalized even when given-new ordering is preserved because it requires more contrastive contexts (McGloin, 1990:113). Another point is that topic marker *WA* is not responsive to the given-new distinction. This suggests that the usage of *WA* does not rely on anaphoricity in general. Note that there are two usages of *WA*: thematic topic needs to be previously mentioned while contrastive topic does not require anaphoricity. Taken together, we can conclude that the essence of *WA* is not thematic topic but contrastive topic.

1. Introduction

In Japanese, a relatively free word order language, various word orders share the basic meaning of a sentence. Hence, OSV can convey the same meaning as SOV does. Moreover, Japanese is equipped with topic marker *WA*, which can be attached to both subject and object. Therefore, there are choices between topic marker and case marker: S_{NOM} vs S_{TOP} and O_{ACC} vs. O_{TOP}. As a result, when they use transitive sentences, Japanese need to select an option regarding word order and marker: SOV or OSV, and case marker or topic marker. What factor, then, determines the choice among them? One factor is givenness. Since Prague School, it has been shown that word order changes follow given-new ordering i.e. given information comes first and new information comes later. In addition, research on Japanese has demonstrated that nominative case marker *GA* usually marks new information and topic marker *WA* prefers given information. Therefore, based on a self-paced reading task, we will study the relationship among word order, topic and case marker, and given-new ordering.

In section 2, we will overview previous studies about scrambling, *GA/WA* distinction, and topicalization. Section 3 provides our experiment and discusses the results of the sentence

comprehension task. Section 4 is devoted to the conclusion.

2. Previous Studies

2.1. Scrambling

Theoretically, it has been assumed in general that $O_{ACC}S_{NOM}V$ is derived by moving the direct object to the sentence initial position in Japanese (Miyagawa, 2001, 2003, 2010; Saito, 1985, 2009; Saito and Hoji 1983). Thus, this operation is called 'scrambling'. What we should emphasize here is that scrambling does not change grammatical relations between constituents. For example, both (1a) and (1b) convey the same proposition *John pushed Ken*.

(1) a. John-ga   Ken-o   oshi-ta.
       John-NOM   Ken-ACC   push-PAST
       'John pushed Ken.'
    b. Ken-o   John-ga   oshi-ta.
       Ken-ACC   John-NOM   push-PAST
       'John pushed Ken'

In processing, numerous studies have reported that scrambling incurs a larger processing cost compared to canonical word order. Rösler et al. (1998) and Weyerts et al. (2002) provide examples from German, Frazier and Flores d' Arcais (1989) from Dutch, and Sekerina (2003) from Russian. In sentence comprehension, in Japanese, it has been reported that the reaction times for scrambled sentences were longer than those for canonically ordered ones (Chujo, 1983; Koizumi and Tamaoka, 2010; Miyamoto and Takahashi, 2002; Tamaoka et al. 2005). All these studies support the claim that scrambling is more difficult to process than canonical sentences.

However, there are cases where native speakers select scrambled word orders. When do they prefer non-canonical word orders to canonical word order? One factor is given-new ordering, which means given information is mentioned early and new information later. In order to meet this requirement, OSV may be chosen. To put it more

concretely, Kuno (1978:54) argues that native Japanese speakers use OSV when the direct object is given information (Kuno 1978: 54). In Finnish, Kaiser and Trueswell (2004) conducted a self-paced reading task and reported that OgivenVSnew is read faster than OnewVSgiven. This fact supports the proposal that scrambling is chosen in order to preserve given-new ordering.

In sum, given-new ordering seems to be a crucial factor for the usage of scrambling.

2.2. *GA/ WA* distinction

Traditionally, it has long been noted that nominative case *GA* correlates with new information and topic marker *WA* is related to given information in general (see e.g. Kuno, 1972, 1973; Mikami, 1963; Ono, 1973). In particular, Kuno (1972: 277) illustrates the usage of *GA* and *WA* by citing (2). He points out that only the *WA*-marked subject *sono-gōtō* "the robber" is acceptable in (2b) because it has already been mentioned in (2a). If it were attached with *GA*, it would be unacceptable because *GA* marks new information although *sono-gōtō* "the robber" is given information.

(2) a. gōtō-ga   boku-no-ie-ni
       robber-NOM   I-GEN-house-into
       hait-ta
       enter-PAST
       'A robber broke into my house.'
    b. sono-gōtō   *ga/wa
       the-robber   NOM/TOP
       boku-ni-pisutoru-o   tsukitsukete
       I-to-gun-ACC   point
       kane-o   da-se-to   it-ta.
       money-ACC   give-IMP-QT   say-PAST
       'The robber, pointing a pistol at me,
       said, "give me money". '

Yet, Kuno (1972:270) points out that *WA* is not necessarily anaphoric (i.e. previously mentioned) when it has a contrastive meaning. In other words, contrastive *WA* can be both given information and new information. In fact, Miyagawa (1987: 186)

observed that thematic *WA* cannot follow a *wh*-phrase as in (3a) but contrastive *WA* can be attached to a *wh*-phrase as in (3b). Note that *wh*-phrases generally require new information and are not anaphoric because they have no specific referents. Thus, *wh*-phrases cannot be accompanied with thematic *WA*, which usually requires an anaphoric antecedent. However, there is no such constraint for contrastive *WA*.

(3) a. *dare-wa   ki-ta-no?
         who-TOP   come-PAST-Q
         '* Speaking of whom, did he/she/they
            come?'
     b. dare-wa   ki-te,   dare-wa
         who-TOP   come-GER   who-TOP
         ko-nakat-tano?
         come-do not-PAST-Q
         'Who came, and who didin't?'

Summing up, generally speaking, nominative case marker *GA* is used for new information and topic marker *WA* is appropriate for given information. However, contrastive *WA* is an exception to this observation.

2.3. Topicalization

In Japanese, topicalized constituents are accompanied with topic marker *WA*. Kuno (1973: 357) points out that when *WA* follows a non-subject noun phrase, it tends to be interpreted as contrastive. Moreover, McGloin (1990) maintains that topicalized objects are apt to have only a contrastive meaning unless they have not been mentioned in the preceding discourse. For instance, (4b) needs more specific contexts than (4a) does. In other words, native Japanese speakers feel that the topicalized object, *sono-ringo* "the apple", in (4b) should be interpreted as contrastive while there is no such constraint for the accusative object in (4a).

(4) a. John-wa   sono-ringo-o   tabeta
         John-TOP   the-apple-ACC   ate

         'John ate the apple.'
     b. Sono-ringo-wa   John-ga   tabeta
         the-apple-TOP   John-NOM   ate
         'The apple, John ate.'

To summarize, $O_{TOP}SV$ in Japanese is likely to have a contrastive meaning.

3. Experiment

3.1. Prediction

This experiment is intended to examine the interaction between information structure and syntactic structure. It has been shown that preposed objects and topic marker *WA* prefer given information. Therefore, given-new ordering is expected to mitigate the processing cost of $S_{TOP}OV$, $O_{ACC}SV$, and $O_{TOP}SV$. On the other hand, it is predicted to have a negative influence on the processing of $S_{NOM}OV$ because nominative subject *GA* is incompatible with given information.

3.2. Method

3.2.1. Participants

Sixty-four Japanese graduate and undergraduate students (28 males and 36 females) at Tohoku University participated in the experiment. Their average age was 21.5 years.

3.2.2. Materials

Ninety-six sets of four two-sentence passages such as (5) were used for the sentence correctness decision task (see the appendix for two-sentence passages used for S_{NOM}/given O_{ACC}/new V condition). Each passage consisted of a context sentence and a target sentence. The former were all existential sentences, and the latter were all transitive sentences. Subjects in the context sentences (e.g., *Sato* in (5a)) were reused in the immediately following target sentences. The phrases were given information in the target

sentences, with the result that either the subject or the object in the target sentences was given information. On the other hand, NPs that were not used in context sentences (e.g., *Suzuki* in (5b)) were new information in the target sentences.

(5) a. Kōen-ni   Sato-ga   iru.
         park-LOC   Sato-NOM   be.PRS
         'There is Sato at the park.'
     b. Sato-ga   Suzuki-o   ot-ta.
         Sato-NOM   Suzuki-ACC   chase-PAST
         'Sato chased Suzuki.'

This experiment was a 2×2×2 factorial design, with the informational factor (given-new/new-given), syntactic factor (SOV/OSV), and morphological factor (case marker/topic marker). Hence, there were eight experimental conditions, as shown in (6).

(6) Experimental Conditions:
     a. S_{NOM}/given O_{ACC}/new V
     b. S_{NOM}/new O_{ACC}/given V
     c. S_{TOP}/given O_{ACC}/new V
     d. S_{TOP}/new O_{ACC}/given V
     e. O_{ACC}/given S_{NOM}/new V
     f. O_{ACC}/new S_{NOM}/given V
     g. O_{TOP}/given S_{NOM}/new V
     h. O_{TOP}/new S_{NOM}/given V

The sets of two-sentence passages such as (5) were shuffled in Latin Square Design and divided into eight lists of 120 two-sentence passages, which included 48 correct, 48 incorrect, and 24 filler two-sentence passages. An example of a correct two-sentence passage is shown in (5). (7a) illustrates an incorrect two-sentence passage and (7c) demonstrates a filler one. Note that (7a) is semantically unacceptable because *noboru* 'climb' is incompatible with *Mizuno*. This is why it is an incorrect two-sentence passage. On the other hand, the filler example shown in (7b) is acceptable. However, filler examples differ from correct examples in their sentence structure. For example, (7b) includes a copula sentence and a negative sentence.

(7) a. Incorrect Two-Sentence Passage
         Umibe-ni   Mizuno-ga   iru.
        beach-LOC   Mizuno-NOM   be.PRS
         Mizuno-wa   Takano-ga   nobot-ta.
         Mizuno-TOP Takano-NOM climb-PAST
         'There is Mizuno at the beach. * Takano
         climbed Mizuno.'
     b. Filler Two-Sentence Passage
          pro Hokkaido-ni   shucchō-da.
     (I)   Hokkaido-LOC business.trip-COP
          pro   samui-basho-niwa   iki-taku-nai
          (I)   cold-place-to   go-want-NEG
          'I will go on a business trip to Hokkaido. I
          would not like to go to a cold place.'

Participants were asked to complete two lists. Only the reaction times and error rates for correct sentences were analyzed. The lexical material of the sentences was controlled for length and frequency. In addition, no lexical words were used in more than one two-sentence passage in order to prevent interference from familiarity.

3.2.3. Procedure

This experiment was conducted by using E-Prime (Psychology Software Tools, Inc.) with an external mouse for participants' use in responding. Stimuli were presented to the participants in random order in the center of the computer screen. After a fixation mark (+) appeared in the center of the screen for 2000ms, an existential sentence appeared on the screen as context until participants pushed the left button. Next, a transitive sentence was presented as a target sentence and participants were asked to indicate whether it was semantically acceptable or unacceptable by pressing the left mouse button for "yes" or the right mouse button for "no. Participants were instructed to respond as quickly and accurately as possible. The reaction times were registered from the point of transitive sentence presentation on the screen to the point when participants clicked the mouse to answer. Error rates for target sentences were also registered.

Seven two-sentence practice passages were given to participants prior to the commencement of the actual trial.

3.2.4. Data Analysis

Analyses of variances (ANOVAs) were conducted on reaction times and error rates for target sentences (48 correct sentences), using subject ($F1$) and item ($F2$) variables. There were three factors for our analysis: an informational factor (given-new /new-given), a syntactic factor (SOV/OSV), and a morphological factor (case marker O or GA/topic marker WA). Only correctly judged target sentences were used in the analyses of reaction times. First, extremes among sentence correctness decision times (less than 500 ms and longer than 5000 ms) were recorded as missing values. Second, reaction times outside of 2.5 standard deviations at both the high and low ranges were replaced by boundaries indicated by 2.5 standard deviations from the individual means of participants in each category.

3.3. Results

3.3.1. Question Accuracy

The error rates for correctness decision of target sentences are shown in table 1.

Table 1 Error rates (%) for target sentences

Sentence type	M	SD
S_{NOM}/given O_{ACC}/new	5.86%	10.25%
S_{NOM}/new O_{ACC}/given	5.99%	12.01%
S_{TOP}/given O_{ACC}/new	5.60%	11.70%
S_{TOP}/new O_{ACC}/given	6.64%	13.04%
O_{ACC}/given S_{NOM}/new	8.85%	13.68%
O_{ACC}/new S_{NOM}/given	13.67%	18.63%
O_{TOP}/given S_{NOM}/new	23.57%	28.19%
O_{TOP}/new S_{NOM}/given	25.39%	27.11%

There was a significant main effect of both the syntactic factor (F_1(1, 63) = 54.79, $p < .001$; F_2(1,

11) = 100.22, $p < .001$) and the morphological factor (F_1(1, 63) = 33.27 $p < .001$; F_2(1, 11) = 54.40, $p < .001$). The informational factor was marginally significant (F_1(1, 63) = 7.62, $p < .01$; F_2(1, 11) = 3.64, $p = .08$). In addition, there was a significant interaction between the syntactic factor and the morphological factor (F_1(1, 63) = 38.42, $p < .001$; F_2(1, 22) = 50.48, $p < .001$). Planned comparison showed that the effect of the morphological factor to be significant in OSV (F_1(1, 126) = 71.13, $p < .001$; F_2(1, 22) = 104.81, $p < .001$) but not in SOV (F_1(1, 126) = 0.01, $n.s.$; F_2(1, 22) = 0.02, $n.s.$). The main effect of syntactic factor was significant both in case marked condition (F_1(1, 126) = 7.76, $p < .01$; F_2(1, 22) = 12.57, $p < .005$) and topic marked condition (F_1(1, 126) = 91.96, $p < .001$; F_2(1, 22) = 150.40, $p < .001$).

3.3.2. Reaction Times

The reaction times for correctness decisions are demonstrated in table 2.

Table 2 Reaction times for target sentences

Sentence Type	M	SD
S_{NOM}/given O_{ACC}/new	1688	515
S_{NOM}/new O_{ACC}/given	1822	565
S_{TOP}/given O_{ACC}/new	1705	515
S_{TOP}/new O_{ACC}/given	1748	558
O_{ACC}/given S_{NOM}/new	1899	633
O_{ACC}/new S_{NOM}/given	2141	865
O_{TOP}/given S_{NOM}/new	2155	917
O_{TOP}/new S_{NOM}/given	2193	807

The results showed a significant effect for the syntactic factor (F_1(1, 63) = 80.59, $p < .001$; F_2(1, 11) = 153.04, $p < .001$). This indicates that OSV was processed slower than SOV. The main effects of the informational factor (F_1(1, 63) = 22.11, $p < .001$; F_2(1, 11) = 2.52, $n.s.$) and the morphological factor (F_1(1, 63) = 4.69, $p < .05$; F_2 = 1.96, $n.s.$) were observed for participant analysis but not for item analysis. There was a significant interaction between the informational factor and

the morphological factor ($F_1(1, 63) = 9.72$, $p < .01$; $F_2(1, 11) = 14.34$, $p < .01$). This interaction was marginally significant in SOV ($F_1(1, 63) = 3.94$, $p = .051$; $F_2(1, 11) = 3.28$, $p = .09$) and was significant in OSV ($F_1(1, 63) = 4.39$, $p < .05$; $F_2(1, 11) = 10.90$, $p < .01$). Furthermore, the main effect of the informational factor was significant in $O_{ACC}S_{NOM}V$ ($F_1(1, 126) = 16.34$, $p < .001$; $F_2(1, 22) = 6.68$, $p < .05$) though it was not in $O_{TOP}S_{NOM}V$ ($F_1(1, 126) = 0.40$, $n.s.$; $F_2(1, 22) = 0.45$, $n.s.$). Moreover, the syntactic factor and the morphological factor were found to interact ($F_1(1, 63)) = 11.71$, $p < .005$; $F_2(1, 11) = 23.81$, $p < .001$). Planned comparison revealed the effect of the morphological factor to be significant in OSV ($F_1(1, 126) = 12.29$, $p < .001$; $F_2(1, 22) = 11.58$, $p < .005$) but not in SOV ($F_1(1, 126) = 0.47$, $n.s.$; $F_2(1, 22) = 0.78$, $n.s.$). The effect of the syntactic factor was significant both in the case marked condition ($F_1(1, 126) = 30.63$, $p < .001$; $F_2(1, 22) = 58.50$, $p < .001$) and in the topic marked condition ($F_1(1, 126) = 87.57$, $p < .001$; $F_2(1, 22) = 169.42$, $p < .001$).

3.4. Discussion

3.4.1. SOV and OSV

The results of reaction times showed the interaction between three factors: informational, syntactic, and morphological. First, there was an interaction between the informational factor and the morphological factor. This was caused by the fact that given-new ordering facilitated the processing cost of O_{ACC} S_{NOM} V, but not the cost of S_{NOM} O_{ACC} V, S_{TOP} O_{ACC} V, and O_{TOP} S_{NOM} V. In other words, only scrambled sentences were affected by give-new ordering. This is compatible with Kaiser and Trueswell (2004) in that scrambled sentences were processed easier in an appropriate context (given-new condition) than in an inappropriate context (new-given condition). Moreover, this supports previous studies stating that $O_{ACC}S_{NOM}V$ is selected when the direct object is older than the subject (Kuno, 1978). However, even in given-new condition, the processing cost of

the scrambled word order was higher than that of the canonical counterpart. Namely, information structure could not override the cost related to scrambling. This indicates that some parts of the processing cost derive from syntactic complexity and they are robust enough for pragmatic factors to be unable to erase.

Second, an interaction between the syntactic factor and the morphological factor was observed. The cause of this interaction was due to a significant difference between $O_{ACC}S_{NOM}V$ and $O_{TOP}S_{NOM}V$ but not between $S_{NOM}O_{ACC}V$ and $S_{TOP}O_{ACC}V$. To put it more concretely, $O_{TOP}S_{NOM}V$ was processed slower than $O_{ACC}S_{NOM}V$. However, in the new-given condition, there was no difference in reaction time between $O_{ACC}S_{NOM}V$ and $O_{TOP}S_{NOM}V$, although, in the given-new condition, there was. This means that information structure mitigated the processing cost of scrambling while it was useless for processing topicalization. This data indicates that given-new ordering is not an important factor for the usage of topicalization in Japanese. Then, what are the appropriate contexts for topicalization? It has been said that topicalized objects tend to have a contrastive meaning (Kuno, 1973; McGloin, 1990). Taking this fact into consideration, a discourse context to make topicalized object contrastive is needed.

To summarize the results, focusing on the information structure, the given-new distinction has influence on $O_{ACC}S_{NOM}V$, but not on SOV and $O_{TOP}S_{NOM}V$. Why did such differences occur? One explanation is the markedness principle for discourse-rule violations (Kuno, 1987:212), which is formally defined in (8).

(8) Markedness Principle for Discourse-Rule Violations: Sentences that involve marked (or intentional) violations of discourse principles are unacceptable. On the other hand, sentences that involve unmarked (or unintentional) violations of discourse principles go unpenalized and are acceptable.

This coincides with previous studies that claim the marked pattern to occur only in the licensing

context, whereas the unmarked pattern is contextually unrestricted (Aissen, 1992; Birner and Ward 2009; Kuno, 1995). Specifically, Birner and Ward (2009) point out that canonical word order can be used in a wide range of contexts while non-canonical word orders can be permitted only in a specific context. Applying this rule to Japanese, canonical word order SOV is an unmarked option and thus can violate discourse principles. On the other hand, OSV is a marked option and hence cannot violate discourse principles.

Let us explain the results of our experiment based on (8). First, $S_{NOM}O_{ACC}V$ and $S_{TOP}O_{ACC}V$ are not sensitive to one of the discourse principles, given-new ordering. Even when they violate given-new ordering, they are not penalized because both options are unmarked. In the new-given condition, the reaction times were not slowed down and the error rates did not become higher than in the given-new condition. In other words, SOV was not penalized even in an inappropriate context. Although given-new ordering is preferred for SOV, it is not required and violating it is not penalized. Second, $O_{ACC}S_{NOM}V$ is sensitive to given-new ordering. Scrambling is a marked option and it is penalized when it violates given-new ordering. Indeed, $O_{ACC}A_{NOM}V$ was processed slower in the new-given condition than in the given-new condition. In other words, $O_{ACC}S_{NOM}V$ was penalized in the new-given condition and this is why it was processed slower than in the given-new condition. Third, $O_{TOP}S_{NOM}V$ is not responsive to given-new ordering. Neither in reaction times nor in error rates was there any difference between the given-new condition and the new-given condition. Apparently, this seems to be in contradiction with (8) because $O_{TOP}S_{NOM}V$ does not seem to be penalized in the new-given condition although it is a marked option. However, note that the reaction time for $O_{TOP}S_{NOM}V$ was very slow even in the given-new condition. In fact, in reaction times, given-new ordered $O_{TOP}S_{NOM}V$ was as slow as new-given ordered $O_{ACC}S_{NOM}V$. This means that $O_{TOP}S_{NOM}V$ was penalized even in the given-new condition. The $O_{TOP}S_{NOM}V$ construction needs a contrastive context. In fact, the error rates for $O_{TOP}S_{NOM}V$ are higher than for the other constructions. This indicates that discourse contexts provided in our experiment were not supportive for interpreting $O_{TOP}S_{NOM}V$. Therefore, we can conclude that $O_{TOP}S_{NOM}V$ was penalized even when a give-new context was provided because it demands a more specific context.

In sum, the markedness principle for discourse-rule violations and contrastiveness is the key to explaining the results of our experiment.

3.4.2. Topic Marker *WA*

Information structure had no influence on *WA*-marked conditions: $S_{TOP}O_{ACC}V$ and $O_{TOP}S_{NOM}V$. This result is surprising because numerous studies have insisted that topic marker *WA* prefers given information (Mikami, 1963; Kuno, 1972, 1973; Ono, 1973). Why was no preference for given information with topic marker *WA* observed? One explanation is to suppose that the essence of *WA* is not thematic topic but contrastive topic. Kuno (1972:270) observed that thematic topic must have an anaphoric antecedent while there is no such constraint for contrastive topic. What we should emphasize here is that contrastive topic is not sensitive to given information. Whether *WA*-marked constituents are given or new is not crucial for contrastive topic *WA*. Therefore, in our experiment, participants seem to have considered topic marker *WA* to have a contrastive meaning in $S_{TOP}O_{ACC}V$ and $O_{TOP}S_{NOM}V$ and thus there was no difference in reaction time between the given-new condition and the new-given condition in $S_{TOP}O_{ACC}V$ and $O_{TOP}S_{NOM}V$. Our assumption agrees with Clancy and Downing (1987) who state that it is the contrastive usage of *WA* which is basic. According to their study, 75% of *WA*s are used in contrastive context. In recent study, Shimojo (2005:179) observed that the contrastive usage accounts for 82% of *WA* in spoken Japanese. Furthermore, Makino (1982) and Yoshimoto (1982) claim that thematic topic *WA* is merely a special case of the contrastive use of *WA*. According to Yoshimoto, picking out one prominent entity is the primary function of *WA*. He contends that there is no need to distinguish thematic topic *WA* from contrastive topic *WA*.

Yet, there is a possibility that participants interpreted *WA*-marked NPs as contrastive topic in our experiment because of our design. Miyagawa (1987:205) points out that a contrastive interpretation can arise from dividing the set into two or more parts. This kind of contrastive interpretation is called set-contrastive. His definition of set-contrast is formally defined in (8).

(8) Set-contrastive:
Partitioning of a set into two or more subsets, the member(s) of one subset being associated with a property that can be contrasted with the property explicitly or implicitly associated with the member(s) of the other subset(s).

Our design may have met the condition for set-contrastive. Note that proper nouns are employed in transitive sentences in our experiment. This means that the subject and object form a superset of human beings. To put it the other way round, subjects and objects seem to divide the super-set of human beings into sub-sets of proper nouns. In such a situation, it is easy to find a contrastive relationship between subject and object (p.c. Dr. Stephen Wright Horn). Because of this reason, participants might have considered *WA*-marked NPs to have a contrastive meaning. If this is on the right track, participants will regard *WA*-marked NPs as thematic topics when they are given a context appropriate for thematic topics. However, this conclusion may be refuted by the data of topicalization ($O_{TOP}S_{NOM}V$). Remember that topicalization seems to require contrastive context and that appropriate contexts facilitate processing of marked constructions like scrambling. Hence, if a contrastive relationship arose because of the superset, the processing cost of topicalization would be mitigated. However, topicalization showed the slowest reaction time and the highest error rate of all conditions. If topicalization was processed easier because of the superset, the reaction time would be as fast as scrambling in the given-new condition, but there was no such tendency. Moreover, the highest error rates mean that the superset relation for our experiment was not enough to allow topicalization. Thus, it is unlikely that participants regarded *WA*-marked NPs as thematic topics because of our design. We conclude that participants were insensitive to the given-new distinction when they processed *WA*-marked NPs because the basic function of *WA* is not thematic topic but contrastive topic.

4. Conclusion

We conducted a sentence comprehension experiment to see if there is an influence of given-new ordering on scrambling, topicalization, and topic marker *WA*. The results have revealed that the processing cost of scrambling was mitigated in given-new condition. However, the processing of topicalization and topic marker *WA* was not facilitated by given-new ordering. Our explanation based on (8) is shown in (9).

(9) Hypothesis based on Markedness Principle for Discourse-Rule Violations: $S_{NOM}O_{ACC}V$ and $S_{TOP}O_{ACC}V$ are not penalized when they violate given-new ordering because they are unmarked options. $O_{ACC}S_{NOM}V$ is penalized when it violates given-new ordering because it is a marked option. $O_{TOP}S_{NOM}V$ is penalized even when it conforms to given-new ordering because it is a marked option and hence needs more contrastive context.

Moreover, it has been demonstrated that topic marker *WA* is not sensitive to given-new ordering. This indicates that anaphoricity is not necessary for noun phrases to be marked by *WA*. Note that thematic topic is not allowed in a non-anaphoric context while contrastive topic can be used both in anaphoric contexts and in non-anaphoric contexts. This fact means that the basic usage of *WA* is based on contrastive topic.

Acknowledgments

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Appendix: List of the Sentence Pairs

1. 公園に佐藤がいる。　　　佐藤が鈴木を褒めた。
2. 学校に伊藤がいる。　　　伊藤を田中が許した。
3. 窓際に加藤がいる。　　　加藤は吉田を押した。
4. 会社に木村がいる。　　　木村は山田が叱った。
5. 校庭に清水がいる。　　　清水が池田を蹴った。
6. 会議室に小川がいる。　　小川を前田が責めた。
7. 居酒屋に藤田がいる。　　藤田は岡田を称えた。
8. 大学に石井がいる。　　　石井は後藤が呼んだ。
9. 食堂に青木がいる。　　　青木が藤井を騙した。
10. 研究室に太田がいる。　　太田を福田が認めた。
11. 台所に三浦がいる。　　　三浦は松田を守った。
12. 病院に原田がいる。　　　原田は中野が支えた。
13. 美術館に田村がいる。　　田村が金子を探した。
14. 海辺に上田がいる。　　　上田を石田が助けた。
15. 喫茶店に森田がいる。　　森田は柴田を待った。
16. 教室に工藤がいる。　　　工藤は酒井が叩いた。
17. 八百屋に内田がいる。　　内田が高木を追った。
18. 薬局に高木がいる。　　　高木を大野が襲った。
19. 銀行に今井がいる。　　　今井は河野を脅した。
20. 郵便局に武田がいる。　　武田は須藤が救った。
21. 博物館に村田がいる。　　村田が上野を雇った。
22. コンビニに小山がいる。　小山を増田が睨んだ。
23. 駐車場に平野がいる。　　平野は松井を殺した。
24. 空港に松尾がいる。　　　松尾は野口が殴った。
25. 消防署に吉田がいる。　　加藤を吉田が褒めた。
26. 交番に山田がいる。　　　木村は山田を許した。
27. 入口に池田がいる。　　　清水は池田が押した。
28. 図書館に前田がいる。　　小川が前田を叱った。
29. 体育館に岡田がいる。　　藤田を岡田が蹴った。
30. 本屋に後藤がいる。　　　石井は後藤を責めた。
31. 地下室に藤井がいる。　　青木は藤井が称えた。
32. 玄関に福田がいる。　　　太田が福田を呼んだ。
33. 広場に松田がいる。　　　三浦を松田が騙した。
34. 野球場に中野がいる。　　原田は中野を認めた。
35. 三階に金子がいる。　　　田村は金子が守った。
36. 屋上に石田がいる。　　　上田が石田を支えた。
37. 木陰に柴田がいる。　　　森田を柴田が探した。
38. 救急車に酒井がいる。　　工藤は酒井を助けた。
39. 改札に高木がいる。　　　内田は高木が待った。
40. 正門に大野がいる。　　　高田が大野を叩いた。
41. バス停に河野がいる。　　今井を河野が追った。
42. デパートに須藤がいる。　武田は須藤を襲った。
43. 階段に上野がいる。　　　村田は上野が脅した。
44. トイレに増田がいる。　　小山が増田を救った。
45. 事務所に松井がいる。　　平野を松井が雇った。
46. ベンチに野口がいる。　　松尾は野口を睨んだ。
47. 日なたに鈴木がいる。　　佐藤は鈴木が殺した。
48. 駐輪場に田中がいる。　　伊藤が田中を殴った。