

- (4) *pro* LGB-o yon-da.
 LGB-Acc read-Past
 “*pro* read LGB.”
- (5) a. It rained yesterday
- b. **pro* rained yesterday.

The existence of overt expletives suggests that the EPP feature is obviously active in a given language, and in the Probe-Goal Framework, it attracts an NP or NPs to the specifier of the TP (Chomsky 2000, 2001, among others). Given these characteristics of Japanese, one intriguing question arises here: How do Japanese-speaking children notice the string-vacuous movement of the theme argument of an unaccusative verb despite the lack of decisive cues for the EPP feature or the NP-movement in child-directed speech? According to Han et al. (2007), which we will briefly discuss below, string-vacuous V-raising in Korean results in a lack of convergence of one grammar among Korean speakers: one population with V-raising and the other without V-raising. Thus, if we extend their thought to our issue, Japanese-speaking children may also result in two types of populations: one with NP movement and the other without NP movement. In other words, within one population, they systematically apply NP movement, whereas in the other population, they do not. In addition, we would like to point out the possibility that given the lack of relevant crucial input data from adults, Japanese-speaking children may randomly place the theme argument of an unaccusative verb in the object and subject positions. In the latter case, movement is optional, and each child may apply the movement on each occasion. In this study, we demonstrate that Japanese-speaking children systematically place the theme argument in the subject position, and we speculate that this finding suggests that the EPP feature is innately and universally active (Ura 2011).¹

2. Previous Studies

2.1. Acquisition of Japanese Unaccusatives

Here, we briefly review previous studies on the acquisition of Japanese unaccusatives. According to Shimada & Sano (2007), young Japanese-speaking children can successfully distinguish unaccusative verbs from unergative verbs at an early developmental stage. See (6a) and (6b):

¹ Ura (2011) argues that Japanese has a phonologically null expletive and that the EPP feature is universally active.

- (6) a. Butasan-ga ima hasit-te-iru yo.
 pig-Nom now run-TEIRU-Present Prt
 “The pig is running now.”
- b. Kaerusan-ga ima umat-te-iru yo.
 frog-Nom now bury-TEIRU-Present Prt
 “The frog is (has been) buried now.”

(Shimada & Sano 2007, p.390)

In (6), *teiru* is an aspect marker and yields “progressive reading” and/or “resultative reading.” The *teiru* construction can be used to diagnose unaccusativity. In (6a), the unergative verb, “*hasi-teiru*,” allows “progressive reading” only. In contrast, the unaccusative verb, “*umat-teiru*,” allows both progressive and resultative readings. According to Shimada & Sano (2007), even 3-year-old children clearly showed the distinction between unaccusative and unergative verbs in terms of the progressive reading/resultative reading. Shimada & Sano (2007) assumed that, following Takezawa (1991), a resultative reading is available only when the NP movement of the theme argument of an unaccusative verb occurs. However, it still seems inconclusive whether the theme argument remains in the object position, since their claim depends on the validity of Takezawa’s generalization.

Next, let us examine Shimada (2016), who examined children’s interpretation of Japanese anaphor *zibun* with unaccusatives, such as (7), to investigate whether the theme argument has subjecthood.

- (7) Zousan_i-ga butasan_i-ni zibun_{i/*j}-no niwa-de tsukamat-ta
 Elephant-Nom pig-by zibun-Gen garden-in catch-Unacc-Past
 “The elephant was caught by the pig in zibun’s garden.”

(Shimada 2016, p.315)

As is well known, *zibun* is subject-oriented, and thus, it can refer to the subject *zousan* but not to *butasan* accompanying *ni* (*by* in English) (Kuroda 1965). In the experiment, Japanese-speaking children at 5 years of age showed adult-like performance; they allowed *zibun* to refer to the subject but disallowed it to refer to the *-ni* phrase. Assuming that subjecthood is assigned to vP or TP, Shimada (2016) suggested that the theme argument of an unaccusative verb does not remain in the object position; it moves to a higher position, that is, the specifier of vP and/or TP and receives subjecthood (Saito 2009; Takano 2011; Ura 2011).

However, we would like to note here that it is still inconclusive whether Japanese-speaking children consistently place the theme argument in the subject position; there is a possibility that children may allow the theme argument to be placed both in the subject and object positions in child Japanese. In the experiment in Shimada (2016), since subject-oriented anaphora *zibun* was used, the

participants had to choose to place the theme argument in the subject position to derive the stimulus sentence to converge; if the theme argument is placed in the object position in (7), (7) becomes ungrammatical because it then fails to satisfy the requirement that the antecedent of *zibun* should be the subject. Given this reasoning, there seems to be a possibility that Japanese-speaking children could, in principle, place the theme argument of unaccusatives in the object position. Hence, strictly speaking, Shimada's (2016) experiment could be inconclusive in showing that Japanese-speaking children consistently place the theme argument in the subject position.

In short, although Shimada & Sano (2007) and Shimada (2016) showed children's adult-like performance with unaccusatives, it remains inconclusive whether the theme argument consistently occupies the subject position (i.e., the specifier of TP). To address this issue, we examined Japanese-speaking children's interpretations of Japanese disjunction in unaccusatives, as discussed below.

2.2. String-vacuous Movement in Korean and Two Types of Grammar

As mentioned in Han et al. (2007), placement of an adverb (i.e., pre-verbal or post-verbal) indicates whether V-raising to T occurs in an SVO language. Let us consider the following examples in French and English.

- (8) a. *Jean souvent embrasse Marie.
 Jean often kisses Marie.
 b. Jean embrasse souvent Marie.
 Jean kisses often Marie.
- (9) a. John often kisses Mary.
 b. *John kisses often Mary.

(Han et al.2007, p.3)

The contrast between (8a) and (8b) indicates that overt V-raising to T occurs in French. However, the contrast between (9a) and (9b) shows that this does not occur in English. Therefore, in head-initial languages, such as English and French, it is easy to detect the existence of V-raising to T.

However, this is not the case in head-final languages, such as Korean and Japanese. Let us consider the example in (10) and its schematic representation in (11):²

² Han et al. (2007) assume that the object moves to the specifier of FP for Case reasons.

- (10) Yuri-ka cacwu Toli-lul ttayli-n-ta.
 Yuri-Nom often Toli-Acc hit-Pres-Decl
 “Yuri often hits Toli.”

(Han et al.2007, p.4)

- (11) [TP Subj [VP Adverb O V] T]


As shown in (11), even when the V-raising to T occurs, this movement is string-vacuous. Han et al. (2007) discussed a large variety of sentences and argued that all of them were compatible with analyses with or without V-raising to T. They then examined adults' and children's interpretations of sentences containing quantified NP and negation. One of the crucial items is given in (12).

- (12) Khwukhi Monste-ka motun khwukhi-lul an mek-ess-ta.
 Cookie Monster-Nom every cookie-Acc neg eat-Past-Decl
 “Cookie Monster didn't eat every cookie.”

(Han et al.2007, p.28)

In short, if the V-raising to T occurs, it accompanies negation, yielding “not > every” reading. In contrast, if V-raising does not occur, the quantified NP takes scope over the negation (i.e., “ever > not” reading). According to Han et al. (2007), due to the lack of decisive cues for the V-raising in Korean, there are two types of Korean speakers in both adults and children. In one population, string-vacuous V-raising occurs, whereas it does not occur in the other population. In other words, learners of Korean are exposed to input data that are compatible with both grammars (i.e., with V-raising /without V-raising), and thus, they randomly choose one grammar. According to Han et al., roughly speaking, the number of the two types of Korean speakers, including children, is even.

Given this finding discussed by Han et al. (2007), an intriguing question arises here. As discussed above, Japanese also lacks decisive cues for the NP-movement of the theme argument of an unaccusative verb; there are no overt expletives and the NP movement is string-vacuous, just like V-raising in Korean. In other words, Japanese children may be exposed to input data that is compatible with the two types of grammar (with/without NP movement of the theme argument). Thus, there is a possibility that Japanese-speaking children also result in a lack of convergence on one grammar; there are two types of populations in Japanese-speaking children and the distribution would be bimodal, as in the case of V-raising in Korean, as observed in Han et al. (2007). In addition, we would like to note that there is another possibility: they randomly place the theme argument in the subject and object positions on each occasion within a Japanese-speaking child.

3. Experiment

3.1. Method: Disjunction

Our research question is summarized in (13).

- (13) As for the NP movement of the theme argument of an unaccusative verb, do Japanese children also show a lack of convergence in one grammar and the distribution is bimodal? Alternatively, do Japanese children randomly put the theme argument of an unaccusative verb in the subject and object positions?

How should this issue be addressed? To address this issue, we adopted the scope interaction between negation and Japanese disjunction *ka* as a diagnosis. One reason is that Japanese-speaking children alter their interpretation of the disjunction based on its syntactic position in negative sentences, higher than negation or lower than negation. Japanese children incorrectly assign conjunctive interpretation (“not > or” reading) to the disjunction when it appears in the object position in negative sentences, such as (14) (Caley-Komine 2018; Goro 2007; Goro & Akiba 2004; Komine 2012; Shimada & Goro 2021).

- (14) Risusan-wa piiman ka ninjin-o tabe-re-nakat-ta. (or > not, *not > or)
squirrel-Top pepper or carrot-Acc eat-can-neg-Past

Lit. “The squirrel couldn’t eat the pepper or the carrot.”

(Shimada & Goro 2021, p.114)

In (14), disjunction *ka* appears in the object position. Unlike in English, Japanese disjunction is not interpreted within the scope of negation. Thus, in adult Japanese, the sentence given in (14) means “The squirrel couldn’t eat the pepper OR couldn’t eat the carrot.” However, Japanese children often interpret it conjunctively; they interpret the sentence as “The squirrel couldn’t eat the pepper AND couldn’t eat the carrot.” In contrast, according to Shimada (2014) and Shimada & Goro (2021) Japanese-speaking children correctly assign the disjunctive interpretation (“or > not” reading) to the disjunction when it appears in the subject position, such as (15).

- (15) Zousan ka butasan-ga piiman-o tabe-re-nakat-ta. (or > not, *not > or)
elephant or pig-Nom pepper-Acc eat-can-neg-Past

“The elephant or the pig couldn’t eat the pepper.”

(Shimada & Goro 2021, p.119)

This subject-object asymmetry and its (non-)adult-like behavior can be accounted for by the parametric scope account (Goro 2007; Shimada & Goro 2021). According to Goro (2007), disjunction has a lexical parameter [\pm PPI], and the default value is [-PPI]. For example, disjunction *or* in English is [-PPI]. Therefore,

when it appears within the scope of negation, it receives a conjunctive interpretation (“not > or” reading). In contrast, in adult Japanese, the disjunction *ka* is [+PPI] and is not interpreted within the scope of negation. However, Japanese children aged 6 years or older incorrectly interpret it conjunctively since the default value is [-PPI], and it takes time to set the correct value from [-PPI] to [+PPI]. Therefore, Japanese children’s interpretation of the disjunction in negative sentences can be used to detect where it is located, higher than negation (i.e., the specifier of TP) or lower than negation. One might wonder whether another quantified NP, such as the universal quantifier used in Han et al. (2007), could be suitable for our examination. See the following examples.

- (16) Taro-wa ringo-o zenbu tabe-nakat-ta
 Taro-Top apple-Accall eat-neg-Past
 “Taro didn’t eat all the apples.” (all > not, not > all)
- (17) Taro-wa dono-ringo-mo tabe-nakat-ta
 Taro-Top every-apple eat-neg-Past
 “Taro didn’t eat every apple.” (every > not, *not > every)

First, as in (16), the accusative-marked object is universally quantified by *zenbu* (*all* in English), and both interpretations (“all > not” and “not > all”) are available. According to Terunuma (2001), Japanese-speaking children strongly preferred “all > not” reading for sentences, such as (16). Additionally, in (17), the universal quantifier *dono* (*every* in English) must take scope over negation. Therefore, it is easy or obligatory to access the wide-scope interpretation of this type of quantified object. In other words, these types of quantified NPs cannot indicate where they are syntactically placed. Hence, these items are not suitable for our examination of where the theme argument of an unaccusative verb is located.

3.2. Subject and Procedure

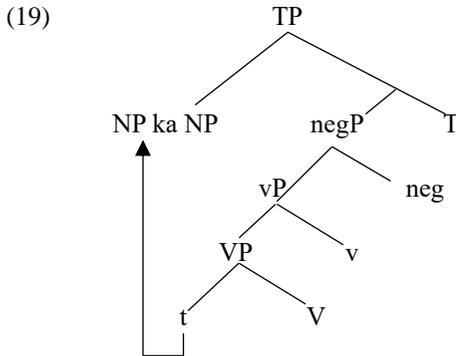
In our experiment, we examined 16 Japanese monolingual children (5;5-6;4, mean 5;11) using the Uncertainty Mode of the TVJT (Crain & Thornton 1998, Goro 2017). The procedure is as follows: In this experiment, some animals took part in “dropping context.” The animals were challenged to drop two types of vegetables (e.g., a pepper and a carrot) and received a medal based on what was dropped. See Table 1 for each situation and medals.

Table 1. Situation and Medal

Situation: How many vegetables dropped?	Medal
Two: Pepper and Carrot	Gold
One: Pepper or Carrot	Blue
Zero: Neither of them	Black Cross

Now, let us consider the sample target item given in (18) and the schematic representation given in (19).

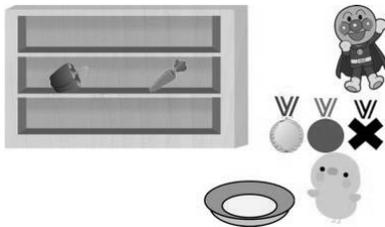
- (18) Piiman ka ninjin-ga oti-nakat-ta
 pepper or carrot-Nom drop-neg-Past
 “The pepper or the carrot didn’t drop”



We assume here that, in adult Japanese, the theme argument with the disjunction moves to the specifier of TP, as shown in (19).³ The procedure for the experiment is shown in (20).

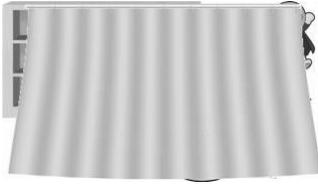
- (20) A sample story is given in (i)–(iii) below.

- (i) A chick is trying to drop the vegetables



³ According to Goro (2007), the [+PPI] disjunction moves to the specifier of FP, which is located higher than NegP but lower than TP. Hence, it is not interpreted within the scope of negation. Also, Saito (2009) and Takano (2011), among others, argue that the subjecthood is assigned in the specifier of vP. Given these, the theme argument would move to TP via vP and FP. We leave this issue open.

(ii) Then, a curtain appears and hides them.



(iii) The chick appears with a blue medal.



Then, the target item (18) is given. If children interpret the disjunction in (18) disjunctively, they accept the test sentence. However, if the participants interpret it conjunctively (i.e., “Neither of them dropped.”), they should reject it because the chick has a blue medal, which indicates that it managed to drop at least one of them.

Following Goro & Akiba (2004) and Shimada & Goro (2021), as control items, we also examined sentences, such as (21), which contain the conjunction *...mo...mo* (both *A* and *B* in English).

(21) Piiman-mo ninjin-mo oti-nakat-ta. (* not > and, and > not)
 pepper-also carrot-also drop-neg-Past
 “Both the pepper and the carrot didn’t drop.”

The sentence in (21) is also given under the blue-medal condition. This sentence means “Neither of them dropped.” Therefore, the correct response was rejection. According to previous studies, in contrast to disjunction, it was reported that they showed adult-like performance with the conjunction when it appeared with the subject and when it appeared with an object (Goro & Akiba 2004; Shimada & Goro 2021).

Target items such as (18) and control items such as (21) were given under the blue medal and black-cross conditions, and there were two trials for each item and condition.

Before moving on to the results, we spell out our prediction. If children put the theme argument with the disjunction in the object position, they should interpret it conjunctively (“not > or” interpretation) since it is within the scope of

negation. If so, it is predicted that they reject the target items, such as (18). In contrast, if children place it in the specifier of TP, as in other general subjects, they assign a disjunctive interpretation (“or > not” reading) to it. Then, children are expected to accept the target items, such as (18).

3.3. Results

The results of the experiment are shown in Table 2.

Table 2. Correct Response Rate

Condition	Disjunction Blue-medal	Disjunction Black-cross	Conjunction Blue-medal	Conjunction Black-cross
Correct Response	Accept	Accept ⁴	Reject	Accept
Percentage	26/32 81.3%	7/32 21.9%	31/32 96.9%	29/32 90.6%

First, let us examine the result of the target items under the target conditions (i.e., disjunction under the blue-medal condition). The correct response rate was 81.3%. On the other hand, the acceptance rate of the target items under the black-cross condition was only 21.9%. Taken together, Japanese-speaking children systematically assigned the disjunctive interpretation (“or > not” reading), but not the conjunctive interpretation (“not > or” reading), to the disjunction in our experiment. In addition, following the pattern of previous research, the participants did not show any difficulty interpreting the conjunction...*mo...mo* in our experiment. They correctly rejected them under the blue-medal condition at 96.9% of the time, but accepted them under the black-cross condition 90.6% of the time. Therefore, it is not the case that they always accepted the test items under the blue medal condition.

4. Discussion

In our experiment, Japanese-speaking children assigned a disjunctive interpretation to the disjunction in the target items 81.3 % of the time. This rate is quite high compared with previous studies that examined children’s interpretation of disjunction in object position. Let us see Table 3, which summarizes the data obtained in previous studies.

⁴ Under the black-cross condition, the target item is truth-conditionally true, but pragmatically false since the disjunction is generally interpreted exclusively.

Table 3. Rates of the Disjunctive Interpretation (Adult-like Response)

Disjunction in...	Experiment in...	Mean Age	N =	Adult-like Response
Transitive Object	Goro & Akiba 2014	5;3	30	25.0%
	Komine 2012	5;9	13	38.5%
	Shimada 2014	5;6	10	45.0%
	Caley-Komine 2018	6;2	13	50.0%
	Shimada & Goro 2021	5;3	15	46.6%
Transitive Subject	Shimada 2014	5;4	10	85.0%
	Shimada & Goro 2021	5;6	15	96.7%

As shown in Table 3, these studies have shown that the rate of adult-like responses (i.e., disjunctive interpretation) is around chance level or less. In contrast, as reported by Shimada (2014) and Shimada & Goro (2021), when disjunction appears in the subject position, they correctly assign the disjunctive interpretation to it. Taken together, our findings indicate that the participants in our experiment placed the theme argument in the subject position, which is higher than negation (i.e., the specifier of TP).⁵

As discussed earlier, unlike English, there is no decisive cue for the NP movement of theme arguments in Japanese. Thus, there is a possibility that Japanese-speaking children also result in a lack of convergence on one grammar; there are two types of populations in Japanese-speaking children and the

⁵ The acceptance rate of the target items in this study is quite high, compared with the results reported by the previous studies that examined the transitive object with disjunction. However, it is slightly lower than the results observed in Shimada (2014) and Shimada & Goro (2021), which investigated transitive subject with the disjunction. We speculate one possible reason for this; it may be related to the unaccusativity. Let us see the following examples below taken from Shibata (2015) (originally, the example in (ii) was provided by Miyagawa (2003)).

(i) Subete-no gakusei-ga ko-nakat-ta.
 all-Gen student-Nom come-neg-Past
 “All students didn’t come.” (Subject > Neg; Neg > Subject)

(ii) Zen’in-ga sono tesuto-o uke-nakat-ta.
 all-Nom that test-Acc take-neg-Past
 “All did not take that exam.” (All > Neg; *Neg > All)

According to Shibata, as shown in (i), the universally quantified subject of the unaccusative verb “*куру*” (“*come*” in English) can be interpreted within the scope of negation. However, the universally quantified subject of the transitive verb “*ukeru*” (“*take*” in English) cannot be interpreted within the scope of negation. Thus, the availability of the narrow scope interpretation of the theme argument may be related to the unaccusativity. We would like to leave this issue for future research.

distribution would be bimodal, as in the case of V-raising in Korean, as observed in Han et al. (2007). We also claim that there is another possibility: they randomly place the theme argument in the subject and object positions on each occasion within a Japanese-speaking child individual. If we look at the distribution of our experimental participants, out of the 16 participants, 11 children consistently showed adult-like behavior; that is, they accepted the target items. Four children accepted one of the target items and rejected the other. Only one child consistently rejected the target item.

As discussed above, according to Han et al. (2007), the distributions of the populations (i.e., with/without V-raising) are, roughly speaking, even and bimodal. In other words, they randomly choose one grammar, with or without V-raising. However, in the case of our observation, it is unlikely that Japanese-speaking children randomly choose one grammar, with or without NP movement, because the distribution of the populations (i.e., with/without NP movement) is far from even and bimodal. This finding suggests that Japanese children at 5 years of age know that the EPP feature is active in Japanese. Therefore, our findings support the argument that the EPP feature is universally active (Ura 2011). Furthermore, the remarkably consistent placement of the theme argument in the subject position in our experiment, despite the lack of crucial input data from adults, seems to be in harmony with Chomsky's (1991) "least effort" condition on movement that there is no optional derivation in the human linguistic computational system. If so, our result may be conceived as a new piece of evidence for the innateness of the "least effort" condition on movement under discussion.

One might claim that the theme argument is base-generated in the specifier of TP (or the specifier of vP, and moves to the specifier of TP). This analysis is essentially the same as an Unergative Misanalysis (Babyonyshev et al. 2001; Machida et al. 2004). In the literature, there has been a long-standing debate on the acquisition of the NP movement involved in passives and unaccusatives. Babyonyshev et al. (2001) and Machida et al. (2004), among others, claim that children misanalyse unaccusative verbs as unergative verbs because of a deficit in forming an A-chain. In other words, children apply the unergative structure to unaccusatives. However, such an analysis is conceptually undesirable and does not seem to be empirically supported. First, if children misanalyse unaccusative verbs as unergative verbs and apply the syntactic structure of unergatives to unaccusatives, then how do children correct their analysis? At least, to do so, they need to receive "Negative Evidence," which is widely recognized to be unavailable in child-directed speech and insufficient for language acquisition. In other words, this analysis causes learnability problems. Furthermore, it has been reported cross-linguistically that young children are sensitive to the distinction between unaccusative and unergative verbs (Bel 2003; Friedmann 2007; Friedmann and Costa 2011; Snyder et al. 1995). In Japanese, as discussed in Section 2.1., Shimada & Sano experimentally showed that even 3-year-olds correctly distinguish unaccusative verbs from unergative verbs. Given this observation, it is unlikely that children misanalyse unaccusative verbs as

unergative. Rather, they place the theme argument in the object position (i.e., the complement of V) and move it to the specifier of TP, presumably via the specifier of the vP (Saito 2009; Takano 2011).

Finally, our finding provides us with a piece of evidence for the parametric scope account for the non-adult-like behavior concerning interpretation of the disjunction. In this experiment, 11 out of 16 children consistently assigned the disjunctive interpretations to the disjunction, and only one child consistently assigned the conjunctive interpretation. In addition, when the target items were given under the black-cross situation, which means “Neither of them dropped,” the acceptance rate of the target items was only 21.8%. Only two children consistently accepted the target items in the black-cross condition. To our knowledge, whether children alter their interpretation of the disjunction based on their syntactic positions (i.e., within the scope of negation or outside the scope of negation) has not received much attention in the literature. This study reveals that Japanese-speaking children systematically and correctly assign the disjunctive interpretation to the subject, which is compatible with the parametric scope account discussed by Shimada & Goro (2021).

5. Conclusion

In this study, we investigated whether Japanese-speaking children also show a lack of convergence on single grammar, or whether they randomly place the theme argument of an unaccusative verb in the subject position and object position. Given the findings of Han et al. (2007), it is likely that Japanese children do so since there are no decisive cues for the NP movement of the theme argument; in Japanese, the NP movement is string-vacuous, and there are no overt expletives. However, our results were not consistent with the expectations along the line of Han et al. (2007). Our study revealed that Japanese-speaking children systematically place it in the subject position, which is higher than negation. This finding suggests that the EPP feature is innately active and would be supporting evidence for the claim that the EPP feature is universally active regardless of whether a given language has overt expletives (Ura 2011).

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