# Countering the Input-Driven Semantic Subset Principle Account of Disjunction Under Negation

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## 1. Introduction

This paper investigates Japanese children's interpretation of negative sentences with disjunction in object position. While extensive previous research has shown that Japanese children incorrectly reject a disjunctive reading of such sentences, our experiment shows that they already have access to the adult-like disjunctive reading when the experimental design incorporates salient plausible dissent. We argue that this finding challenges the well-known input-driven Semantic Subset Principle account of children's acquisition of negated disjunction.

Negated disjunction exhibits a well-known cross-linguistic variance: in English, a negative sentence containing disjunction in object position is interpreted conjunctively (Neg > Or), whereas in Japanese, it is interpreted disjunctively (Or > Neg) (Szabolcsi, 2002; Crain, 2012).[1] Consider the following examples:

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[1] Szabolcsi (2002) notes that English-type languages also have the disjunctive interpretation for negated disjunction, while Crain (2012) focuses on the fact that the conjunctive interpretation is primary for negated disjunction in English-type languages in neutral usages. We adopt Crain's generalization because we propose an alternative to his account on child language acquisition. By contrast, Crain (2012) notes that Japanese-type languages also have the conjunctive interpretation for negated disjunction; however, this interpretation in adult Japanese only arises when a scalar implicature is suspended for some reason. Although Hiraiwa & Nakanishi (2025) argue that the conjunctive interpretation of Japanese negated disjunction is in fact ungrammatical, we set this issue aside, because the aim of the present paper is to evaluate an acquisition theory developed on the basis of Crain's (2012) generalization (explained in Section 2).

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(1) **English: Conjunctive (NEG > OR) interpretation**
The pig didn't eat the pepper or the carrot.
'The pig did not eat the pepper' AND 'The pig did not eat the carrot.'

(2) **Japanese: Disjunctive (OR > NEG) interpretation**
Buta-wa piiman ***ka*** ninjin-o tabe-***nakat***-ta.
pig-TOP pepper ***or*** carrot-ACC eat-***NEG***-PST
'The pig did not eat the pepper' OR 'The pig did not eat the carrot.'

The interpretive difference between Japanese *ka* and English *or* is attributed to a distinction in their syntactic positions. Sentences containing *ka* allow only the wide-scope interpretation of disjunction over negation (Or > Neg). Goro (2007) attributes this fact to Japanese *ka* being a Positive Polarity Item (+PPI), which has a syntactic feature that triggers obligatory movement above Neg. In contrast, English *or* is assumed to be −PPI, and therefore need not occupy a position above negation. In English, therefore, if the disjunction *or* appears in object position, it is interpreted within the scope of negation (Neg > Or). Goro (2007) proposes that this cross-linguistic difference is associated with a lexical parameter including the +PPI value and the −PPI value (p. 287).

Given this cross-linguistic difference, there arises an interesting question on its acquisition: How do children acquire the correct target value of this parametric difference (+PPI vs. −PPI)? Below, we introduce a classical approach to this issue.

## 2. Negated disjunction in child Japanese: major previous studies

Goro & Akiba (2004; hereafter GA) and Goro (2007) present the first investigation of Japanese children's interpretation of negative sentences containing disjunction in object position. These studies reported that Japanese children tend to reject the disjunctive reading (Or > Neg) and instead accept the conjunctive reading (Neg > Or). The authors conclude from this that Japanese children initially have the English-type grammar.

In their experiment, animals try to eat a cake, a green pepper and a carrot. Every animal eats the cake, and depending on how well they eat the vegetables, they receive medals: If an animal eats both the vegetables, it gets a gold medal, if an animal eats one of the vegetables and leaves the other, it gets a blue medal, and if an animal eats none of the vegetables, it gets a black cross. Afterwards, a puppet tries to guess how well each animal ate the vegetables solely on the basis of the medal it received. For example, when a pig is holding a blue medal, the puppet utters the sentence (3).

(3) Butasan-wa keeki-o tabe-ta kedo,
pig-TOP cake-ACC eat-PST but
piiman ka ninjin-o tabe-nakat-ta.
pepper or carrot-ACC eat-NEG-PST
'The pig ate the cake, but didn't eat the pepper or the carrot.'
(adapted from Goro, 2007, p. 228)

In this situation, the disjunctive reading yields a true answer, whereas the conjunctive reading yields a false answer.

GA and Goro (2007) reported that Japanese children ($n$ = 30, 3;7–6;3, Mean: 5;3) accepted the puppet's statement (3) in the blue medal condition only 25% of the time, unlike Japanese adults ($n$ = 10) who accepted the same condition 100% of the time.[2] Based on these results, they concluded that Japanese children initially set the value of the disjunction parameter to −PPI (as in English).

This remarkable claim raises the question of how Japanese children eventually acquire the correct Japanese parameter setting (+PPI) if their initial grammar corresponds to the English-type (−PPI). Goro (2007) and Crain (2012) explained children's acquisition of the correct value based on the Semantic Subset Principle (SSP). According to this account, learners choose the parametric option with the most restrictive reading (i.e., the subset reading) and later expand the range of options (i.e., to the superset reading) based on direct positive evidence.

More specifically, under the SSP account, children initially adopt the English-type parameter setting, namely the −PPI option (see footnote 1 for the reason why the −PPI is a subset of +PPI). Upon encountering direct positive evidence showing that negative sentences with disjunction in object position in Japanese, such as sentence (3), receive a disjunctive interpretation, Japanese children then shift to the superset +PPI setting, which corresponds to the adult grammar of Japanese.[3] Crucially, this account predicts that Japanese children need to be exposed to direct positive evidence to attain the adult-like grammar.

## 3. Critical issues in Goro & Akiba (2004) and Goro (2007)

Although GA and Goro (2007) provided important experimental findings and proposed an influential explanation of children's behavior, we identify two issues in these studies, one methodological and the other theoretical.

### 3.1. Methodological issue

Our first point of concern is that the experiment used in these studies lacks salient plausible dissent (Wason, 1965; Crain & Thornton, 1998). To create appropriate plausible dissent for sentences containing "didn't eat X," the experimental design should include failed attempts to eat X when acting out a scenario in the experiment. However, in GA's experiment (and subsequent

[2] GA and Goro (2007) also reported that children accepted the puppet's statement (3) for the black cross condition 78% of the time. However, since the statement (3) can be true for the black cross condition when the scalar implicature is suspended, we set this case aside in our discussion of children's acquisition of the Japanese parametric value.

[3] According to this account, Japanese disjunction *ka* is a Positive Polarity Item (PPI), like English *some*, which is always interpreted higher than local negation. Since English *or* can be interpreted lower than negation, English is designated as −PPI in this account.

experiments adopting their methodology), there is no trace of any failed attempt to eat in the final scene of the story portion of their Truth Value Judgment task.[4]

Consider, for example, a simple negative sentence "The pig didn't eat the green pepper." Even though the pig may display some attempt to eat the green pepper during the course of the scenario, there is no visible evidence of such a failed attempt to eat in the final scene. The puppet's statement, therefore, is not fully felicitous. Figure 1 illustrates the first and the final scenes for this sentence.

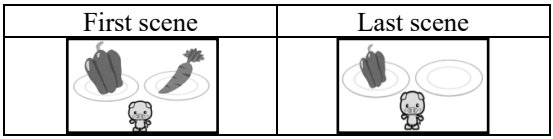



**Figure 1: First and last scenes to depict the situation where the pig ate the carrot but did not eat the pepper**

In fact, throughout the act-out of the story, nothing happens to the green pepper. Although the experimenter acted out the situation where the pig tries to eat the pepper but did not eat it, there was no trace of the failed attempts to eat in the final scene. In this sense, we argue that GA's experiment lacks salient plausible dissent.[5]

We address this lack of salient plausible dissent as follows. We divide each food item to be eaten into five pieces. In the critical stories (tested with a negative test sentence), the animal eats four of the five pieces of a vegetable (e.g., a pepper) and leaves one piece uneaten. This uneaten piece of vegetable serves as visible evidence of the failure to eat, and therefore constitutes salient plausible dissent. However, this situation is not naturally described by the predicate "didn't eat the green pepper," because the animal did eat four pieces of the pepper. To make this scenario natural, we replace the Accomplishment-type predicate "didn't eat X"

[4] In GA, as in the target part of our experiment, each target sentence was presented with a scene in which an animal had a medal. Thus, in the crucial TVJT, the final scene did not depict the eating event itself, but only the medal. Prior to the presentation of the critical test sentences, however, there was a story phase in which the experimenter demonstrated how each animal ate, showing the eating behavior of twelve animals one by one. This phase constitutes the story part of the TVJT. Accordingly, the term "final scene" as used here refers to the final scene of the story part of the task, rather than to the visual display shown at the time the test sentence was presented. See p. 8 for further details in terms of our TVJT. For the sake of simplicity, we use the term "final scene" throughout the remainder of the paper to mean the final scene of the story part of the task.

[5] Given this point, a new question arises regarding why children were able to largely interpret *ka* disjunctively when it is in the subject position or the nominative object position in Shimada & Goro (2020), although their experiment method was parallel to the style of GA. We conjecture that this difference is due to the hierarchical difference between the subject and nominative object on the one hand and the accusative object on the other (i.e., the former is higher than negation while the latter is lower than negation), but we would like to leave this discussion for future work.

(Vendler, 1967) with the Achievement-type predicate (ibid.), which is compatible with incrementally eating (eating little by little) events.

With these modifications, salient plausible dissent arises in the final scene because the remaining piece clearly indicates that the animal attempted to eat the whole green pepper but failed to finish it. Figure 2 shows the scenes illustrating the story where the elephant finished eating the carrot but did NOT finish eating the pepper, which is appropriate for the sentence "the elephant didn't finish eating the green pepper."

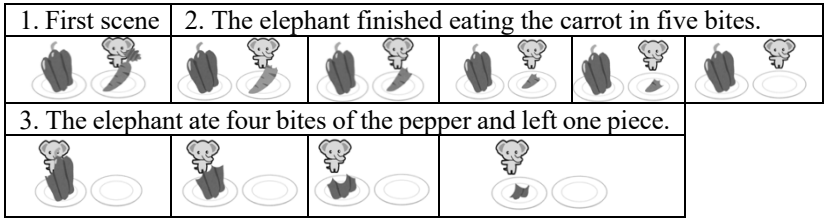



**Figure 2: Scenes depicting the sentence "the elephant didn't finish eating the green pepper"**

In fact, this methodological change had a substantial impact on the results of our experiment, as we will show later.

### 3.2. Empirical Issue in the theoretical account based on SSP

Our second concern is a theoretical and empirical one, based on the SSP. As reviewed in the previous section, the SSP approach explains the acquisition of the Japanese value of the disjunction parameter in terms of input: Japanese children are assumed to initially adopt the −PPI setting, with direct positive evidence necessary in order to shift to the correct +PPI value.

However, this account faces a serious empirical problem. Disjunction under negation is virtually absent from child-directed speech. Sano et al. (2024) reported the result of their CHILDES search where there were zero instances of disjunction under negation among five children's child-directed speech. This raises doubts about whether children can in fact obtain the type of direct positive evidence required by the SSP account.

### 3.3. Preview of our proposal

Our first contribution is the methodological change that adds salient plausible dissent—unlike in GA. Below, using this innovated TVJT, we show that (contra GA and Goro, 2007) Japanese children already possess the adult-like disjunctive interpretation of negative sentences with disjunction in object position. Second, we argue that Japanese children acquire this knowledge from indirect evidence, as opposed to direct evidence that the Semantic Subset Principle account requires (see Section 5 for details). We will make these two claims clear in the sections

that follow. In this way, we will challenge the SSP account of children's acquisition of negated disjunction.

## 4. Our experiment

The aim of our experiment is to investigate whether 5-year-old Japanese children, equivalent in age to those tested by GA and Goro (2007, roughly 3;7-6;3), can access the disjunctive interpretation of negated disjunction when salient plausible dissent is provided. To create salient plausible dissent, a piece of a vegetable is left in the final scene as evidence of a failed eating event, making the negative sentence more natural. We include a control condition replicating the original methodology used by GA/Goro (2007), comparing it to a condition with this modified protocol, with salient plausible dissent.

### 4.1. Participants

We divided our participants into two groups: the Target group and the Control group. For the Target group, we used our manipulations where salient plausible dissent was provided. For the Control group, we followed the method of GA without salient plausible dissent. Table 1 shows the information of participants in each group.

**Table 1: Number of participants and age range**

| | Japanese children | Japanese adults |
|---|---|---|
| Target group | *n* = 20 (5;0–6;3, mean: 5;7) | *n* = 20 |
| Control group | *n* = 15 (5;0–6;3, mean: 5;7) | *n* = 20 |

The two groups differ only regarding whether the new manipulation was used or not; everything else was the same, including the presentation order of target sentence types.

### 4.2. Materials and procedure

Our experiment consisted of three phases: (i) practice with the Truth Value Judgment Task (Crain & Thornton 1998; TVJT), (ii) a medal giving game to familiarize with the meanings of the medals, and (iii) the crucial TVJT. All the participants were exposed to these three phases in this order.

#### 4.2.1. Practice of the TVJT

The first part of the experiment involved practice with the TVJT which served to ensure that participants can correctly judge truth values of simple negative sentences that did not contain disjunction, as well as to familiarize the children with the relevant event types—either *not finishing eating* or *not eating* (depending on the group to which they are assigned). In the Target group, children observe an

animal eating vegetables incrementally and leaving one piece uneaten. In the Control group, children observe an animal eating vegetables in one bite and leaving untouched those vegetables when the animal does not eat them (as in GA and Goro, 2007). Figure 3 illustrates the final scenes and sample test sentences for the Target group and the Control group.

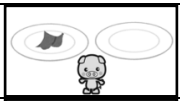
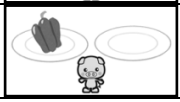
| Group | Final scene | Test sentence |
|---|---|---|
| Target group |  | Buta-wa piiman-o tabe-oe-nakat-ta.<br>pig-TOP pepper-ACC eat-finish-NEG-PST<br>'The pig didn't finish eating the pepper.' |
| Control group |  | Buta-wa piiman-o tabe-nakat-ta.<br>pig-TOP pepper-ACC eat-NEG-PST<br>'The pig didn't eat the pepper.' |

**Figure 3: Sample target-true practice items for the Target group and the Control group**

For the Target group, the pig ate vegetables little by little, and in the final scene, the remaining piece of the pepper was left on the dish. This final piece functions as an indicator of plausible dissent (failed attempts to finish eating the pepper). For the Control group, the pig ate a carrot instantly, and in the final scene, the untouched pepper remained on a dish. Therefore, no salient plausible dissent was provided for the Control group.

There were four practice items: two matching (target-true) ones and two mismatching (target-false) ones. Participants who did not perform perfectly on the practice items were excluded from further analysis; two children were excluded on this basis.

### 4.2.2. The medal giving game

Next, we conducted a medal giving game to familiarize children with the meaning of the medals. As in GA's experiment, animals tried to eat a green pepper and a carrot.[6] Depending on how well they ate the vegetables, they received medals, but instructions were slightly different between the Target and Control groups. For the Target group, animals ate the vegetables incrementally and left one piece uneaten when they did not finish eating them. Accordingly, the medal

[6] In GA's experiment, there was a cake in addition to the pepper and the carrot. Every animal ate the cake, and when the stimulus sentence was presented, it was preceded by a lead-in such as "X ate the cake, but …" GA claim that this lead-in makes the negative stimulus sentence felicitous, because the positive statement highlights the contrast with the negative statement. However, in experiments reported by Shimada & Goro (2020), for example, no such lead-in was used, yet the performance by children (most notably with respect to negated disjunction) did not deteriorate. This suggests that a positive lead-in does not make negated disjunction sufficiently natural for children. For this reason, we decided not to include the positive lead-in, to keep the stimulus sentences as simple as possible.

rules were explained as follows: if an animal finished eating both vegetables, it received a gold medal; if it finished eating one vegetable but did not finish the other, it received a blue medal; and if it finished eating neither vegetable, it received a black cross.

For the Control group, animals ate vegetables in one bite and did not touch the vegetables they did not eat. Accordingly, the medal rules were as follows: if an animal ate both vegetables, it received a gold medal; if it ate one vegetable but left the other untouched, it received a blue medal; and if it ate neither vegetable, it received a black cross.

Thus, although children's task was the same (medal assignment), the two groups differed with respect to: i) whether there was salient plausible dissent for negative action in each story and ii) the type of predicate used. In all other respects, the method was identical across the groups.

### 4.2.3. The main TVJT

The final part of the experiment was the main TVJT (TVJT in the uncertainty mode, Goro 2017) involving negated disjunction. In this phase, as in the previous phases, an animal attempted to eat a green pepper and a carrot (the first scene of Figure 4). However, before the animal starts eating, a curtain was lowered so that participants could not see what was happening inside (the middle scene, Figure 4). In the next scene, the curtain was raised, and the animal appeared having a medal (last scene, Figure 4). Thus, the participants could not see what the animal had eaten but could only see a medal depending on how much they ate.

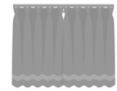
| First scene | Middle scene | Last scene |
|---|---|---|
|  |  |  |

**Figure 4: Scenes of the main TVJT**

A puppet then produced a test sentence, guessing how the animal had eaten the vegetables solely on the basis of the medal. The participant's task was to judge whether the puppet's sentence was the right statement for the situation indicated by the medal. The two participant groups heard test sentences with different predicates: *tabe-oe-nakat-ta* 'didn't finish eating' for the Target group and *tabe-nakat-ta* 'didn't eat' for the Control group.

(4) Buta-wa piiman ka ninjin-o {tabe-nakat-ta / tabe-***oe***-nakat-ta}.
pig-TOP pepper or carrot-ACC eat-NEG-PST / eat-***finish***-NEG-PST
'The pig didn't {eat / finish eating} the pepper or the carrot.'

This experiment had three factors: (i) *Predicate type* (*didn't eat* vs. *didn't finish eating*) as a between-subject factor, (ii) *Particle type* (disjunction vs. conjunction) as a within-subject factor, and (iii) *Medal type* (blue vs. black cross) as a within-

subject factor. For example, the children in the Target group were exposed to the following two types of sentences either with a blue medal or a black cross.

(5) a. Buta-wa piiman ka ninjin-o tabe-oe-nakat-ta.
pig-TOP pepper or carrot-ACC eat-finish-NEG-PST
'The pig didn't finish eating the pepper or the carrot.'
b. Target answer for a blue medal: true
c. Target answer for a black cross: logically true, pragmatically false

(6) a. Buta-wa piiman-mo ninjin-mo tabe-oe-nakat-ta.
Pig-TOP pepper-also carrot-also eat-finish-NEG-PST
'The pig didn't finish eating both the pepper and the carrot.'
b. Target answer for a blue medal: false
c. Target answer for a black cross: true

Crucially, in this main TVJT phase, exactly like the methodology used in GA, children did not observe the actual eating events; instead, they relied on the event types with which they had been familiarized in the first two phases—namely, incremental eating events for the Target group and instant eating events for the Control group. Consequently, when presented with a blue medal, children in the Target group were expected to imagine a situation in which the animal finished eating one vegetable but left a piece of the other vegetable uneaten, whereas children in the Control group were expected to imagine a situation in which the animal ate one vegetable and left the other completely untouched. In this way, the presence versus absence of salient plausible dissent was hypothesized to influence children's interpretation of negated disjunction. More specifically, children who had been familiarized with situations in which a remaining piece of vegetable served as evidence of a failed attempt to eat were expected to judge negated disjunction sentences as more felicitous.

There were two items for each condition, resulting in eight items in total per child. These eight items were pseudo-randomized. Each child was asked to respond by choosing a card for Right (a circle) or a card for Wrong (a cross). An experimenter wrote down which card the child chose, and when children responded verbally (e.g., *atteru* 'right' or *chigau* 'wrong'), we wrote down their answers and checked by listening to audio-recorded sessions afterwards.

## 5. Results

The children in the two groups responded significantly differently for the negated disjunction, just like adults. Table 2 shows adults' acceptance rates by group and condition, and Table 3 shows corresponding results for children. We did not include a figure with error bars and individual data points for adults because their responses were highly consistent across participants. Figure 5 shows child results, and reveals variability in their responses.

**Table 2: Adults' mean acceptance rates by group and condition**

| | Target group | | Control group | |
|---|---|---|---|---|
| | Disjunction | Conjunction | Disjunction | Conjunction |
| Blue medal | 100% (30/30) | 0% (0/30) | 100% (30/30) | 0% (0/30) |
| Black cross | 20% (6/30) | 100% (30/30) | 20% (6/30) | 100% (30/30) |

**Table 3: Children's mean acceptance rates by group and condition**

| | Target group | | Control group | |
|---|---|---|---|---|
| | Disjunction | Conjunction | Disjunction | Conjunction |
| Blue medal | 97.5% (39/40) | 12.5% (5/40) | 33.3% (10/30) | 6.6% (2/30) |
| Black cross | 22.5% (9/40) | 95.0% (38/40) | 50.0% (15/30) | 93.3% (28/30) |

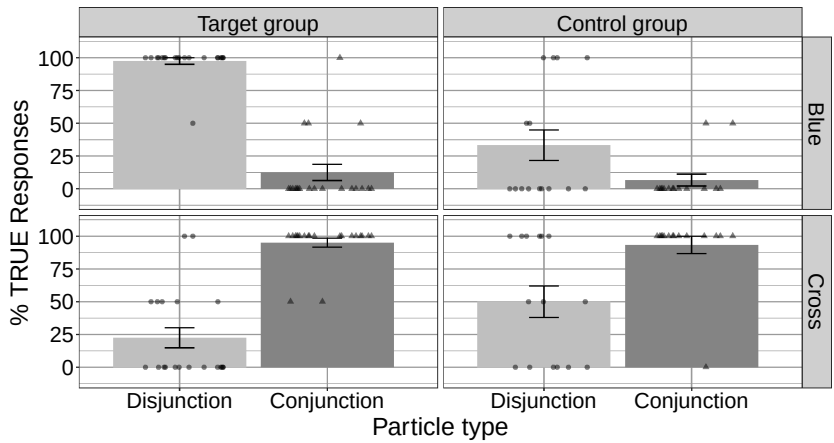



**Figure 5: Children's mean acceptance rates by *Particle type*, *Group*, and *Medal type*. Error bars indicate standard errors of participant mean.**

Table 3 and Figure 5 show that children in the Target group accepted negative sentences containing disjunction with a blue medal 97.5% of the time, indicating that Japanese 5-year-olds were able to access the disjunctive reading for negated disjunction in an adult-like way (100%). This significantly contrasts with the children in the Control group who accepted the disjunctive reading only 33.3% of the time and children in GA's experiment who accepted this reading only 25% of the time. We attribute this difference to whether salient plausible dissent was present in the experimental design. We argue that children acquiring a +PPI

language can access the disjunctive interpretation of negated disjunction when salient plausible dissent is provided, as in the Target group of our experiment.[7]

In addition, we would like to note that our experiment did not have unfair bias toward the disjunctive reading. Children in the Target group accepted negated conjunction sentences in the blue-medal condition only 12.5% of the time. That is, they almost always rejected the disjunctive interpretation when the sentence contained negated conjunction (e.g., *The pig did not eat both the pepper and the carrot*). This demonstrates that the experimental manipulation in which animals ate vegetables incrementally did not generally bias children toward disjunctive interpretations; rather, it facilitated access to the appropriate interpretation of negated disjunction by making the negative sentences more natural through the provision of salient plausible dissent.

To determine whether children in the two groups behaved differently in the blue-medal condition, we conducted mixed-effects logistic regression analyses. We extracted data from the blue-medal condition and fit a model with *Group* (Target group vs. Control group) and *Particle type* (disjunction vs. conjunction) as predictor variables.[8] The largest model that successfully converged included *Participant ID* as random intercepts. Table 4 presents the output of this model.[9]

**Table 4: Output of the binomial logistic regression model**

| | $\beta$ | SE | $z$ value | $p$ |
|---|---|---|---|---|
| Intercept | −1.0415 | 0.8278 | −1.258 | 0.20833 |
| Group | −1.9799 | 0.8126 | −2.437 | 0.01483 |
| Particle type | −3.0484 | 0.9474 | −3.218 | 0.00129 |
| Group * Particle type | 1.5122 | 0.6733 | 2.246 | 0.02472 |

The significant interaction between *Group* and *Particle type* indicates that, in the blue-medal condition, the effect of *Particle type* differed across the two groups. In other words, the difference between the disjunction and conjunction conditions was not uniform for the Target group and Control group. Together with Figure 5 above, this significant interaction can be interpreted as showing that the children in the Target group accepted the disjunctive reading of negated disjunction significantly more often than the children in the Control group.

To further examine this interaction, we ran post-hoc analysis using the Tukey Honestly Significant Difference test to assess whether children's performance differed between disjunction and conjunction in each group. For the Target group, the comparison between conjunction and disjunction was significant ($\beta = -9.12$, $SE = 3.03, z = -3.011, p = 0.0026$). For the Control group, the comparison between

[7] Also, children's acceptance rate for negated disjunction with a black cross is remarkably lower in our Target group (22.5%) than in GA (78.3%). However, since this condition may reflect children's pragmatic knowledge regarding scalar implicature, rather than grammatical competence, as noted in fn.2, we put this point aside from our main points.

[8] The predictor variables were both sum-coded.

[9] Model: glmer(Response ~ 1 + Group * Particle_type + (1 | Participant_ID), data)

conjunction and disjunction was also significant ($\beta = -3.07$, $SE = 1.28$, $z = -2.408$, $p = 0.0160$). Overall, both groups showed a significant difference between disjunction and conjunction, with a stronger effect in the Target group ($p < 0.01$) compared to the Control group ($p < 0.05$).

## 6. Discussion

The goal of this study was to investigate whether Japanese 5-year-olds—who are reported to interpret negated disjunction conjunctively—are in fact able to access the disjunctive reading of negated disjunction, as adults do, when salient plausible dissent is provided. Our experiment shows that this is indeed the case: children in the Target group accepted the disjunctive reading almost 100% of the time, whereas children in the Control group did so only 33.3% of the time, thereby replicating the pattern observed in GA.

The main implication of the result of our new experiment is that it runs counter to the input-driven SSP account (cf. section 2) of cross-linguistic variation in the interpretation of negated disjunction. According to the input-driven SSP account, the initial parameter value of disjunction is −PPI, the English value, and Japanese children are predicted to switch to the Japanese value +PPI, only after receiving relevant direct positive evidence. The conjunctive responses exhibited by 5-year-olds in GA's experiment were taken as evidence that Japanese children initially possess the English value, −PPI, as predicted by the SSP account.

However, the results from our Target group have shown that Japanese 5-year-olds are already capable of accessing the disjunctive interpretation of negated disjunction.[10] Given the virtual absence of relevant direct positive evidence in the input available to Japanese children (Sano et.al., 2024), this new finding poses a serious challenge to the input-driven SSP account, which predicts that the disjunctive interpretation should emerge in Japanese children's grammar only after such direct positive evidence has been encountered. That is, Japanese children already know that Japanese *ka* is +PPI at age five, even though it is highly unlikely that these children have received the necessary direct positive evidence by this age.

A new question that arises from our findings is how children acquire the +PPI value before the age of five, despite the apparent absence of relevant direct positive evidence. We hypothesize that children rely on certain types of indirect positive evidence to acquire the +/−PPI value in the target language. Specifically, we propose that children acquire the relevant parameter value based on the following innate principle:

[10] A further question that arises from our observation is why children in the Control group and GA's experiment chose the conjunctive reading for negated disjunction. We speculate that, in the absence of salient plausible dissent, children select the conjunctive reading, because the conjunctive reading is pragmatically simpler than the disjunctive reading, as pointed out by Jing (2008).

(7) Principle of Hierarchical Uniformity
   a. The PPI-hood of homophonous lexical items is hierarchically uniform across said items.
   b. If a non-disjunctive lexical item homophonous with disjunction occurs in a position higher than Negation before the PPI value of disjunction has been set, then the disjunction lexical item is set to +PPI.
(Sano et al., 2024, p. 451, (13))

We observe that, in some languages for which we have evidence so far, the lexical item used for disjunction has homophonous lexical items within the same language, and that these homophonous items exhibit the same hierarchical relationship with negation as the disjunction. With respect to Japanese, we have two such items that are homophonous with the disjunction *ka*: one is *ka* in existential indeterminate pronouns such as *nanika* 'something,' *dareka* 'someone,' etc., and the other is the question marker *ka*.

First, Japanese *ka* appears in existential indeterminate pronouns when combined with a *wh*-phrase, as in *nani-ka* 'something' in (8) below.

(8) Taro-wa nani-***ka***-o tabe-***nakat***-ta.
Taro-TOP what-ka-ACC eat-NEG-PST
'Taro didn't eat something.' (Some > Neg, *Neg > Some)

Existential indeterminate pronouns such as *nani-ka* 'something' are known as PPIs universally, which must take scope over local negation. Because this property is universal, children may innately know that existential indeterminate pronouns are PPIs. Because *ka* in those pronouns is homophonous to the disjunction *ka*, we argue that Japanese children can deduce that disjunction *ka* is likewise +PPI which must take scope over local negation by applying the Principle of Hierarchical Uniformity.

Second, Japanese has a question marker *ka* that is homophonous with the disjunction *ka*, and it must occur above negation, as shown in (9) below.

(9) Taro-ga piiman-o {tabe-***nakat***-ta-***ka***-o /*tabe-ta-***ka-nai***-o} sit-teiru.
Taro-NOM pepper-ACC eat-NEG-PST-ka-ACC eat-PST-ka-NEG-ACC know-PROG
'I know whether Taro didn't eat a green pepper.'

The unacceptable pattern in (9) indicates that the question marker *ka* cannot occur below negation. Since a question marker in Japanese always appears higher than negation, we suggest that it could be considered as +PPI in a broad sense. Then, again, given the Principle of Hierarchical Uniformity, Japanese children deduce the +PPI value for the disjunction *ka*, on the basis of their prior knowledge that the question marker *ka* must occur above negation. Therefore, in Japanese specifically, there are two types of indirect positive evidence that children can use to infer that the disjunction *ka* is +PPI.

Note that our proposal is so far largely based on the facts about scope in adult grammar. In particular, questions such as whether children have access to

evidence involving sentences in which the question marker *ka* and negation co-occur in the same clause, and whether they already know that the question marker *ka* must take scope over local negation prior to acquiring the +PPI property of Japanese disjunction *ka*, remain open and must be addressed in future research. As for existential indeterminate pronouns, GA and Goro (2007) showed that children in the same age range as those who interpreted negated disjunction conjunctively correctly interpreted *nanika* 'something' with scope over negation (Some > Neg). This finding may support our hypothesis that the PPI property of the disjunction *ka* is acquired based on that of existential indeterminate pronouns. We therefore argue that the Principle of Hierarchical Uniformity is one possible learning strategy for children to arrive at this Japanese +PPI value at an early age in the absence of the direct positive evidence (i.e., negated disjunction used disjunctively).

We also would like to make it clear that the Principle of Hierarchical Uniformity is a sufficient condition. When a disjunction item can be used as a homophonous item which always appears higher than negation, it is always set as +PPI by the Principle of Hierarchical Uniformity. In contrast, when a disjunction item has a homophonous counterpart that always appears below negation, it is consistently set as −PPI by the Principle of Hierarchical Uniformity. We predict that these correlations will hold without exception. See Sano et al. (2024) for sample acquisition scenarios for Korean, which has a −PPI disjunction and Mandarin, which has a +PPI disjunction. However, as for languages in which disjunction items do not have other uses as homophonous items, they may be beyond the scope of the Principle of Hierarchical Uniformity.

## 7. Conclusion

We have shown that 5-year-old Japanese children already can access the disjunctive reading when *salient* plausible dissent is provided. This finding challenges the input-driven SSP account of children's acquisition of negated disjunction, which has been quite dominant in the literature.

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