Revisiting the difficulty with subject-*dake* 'only' in Japanese:
The impact of visual information on children's comprehension

Background: Previous studies (cross-linguistically) have shown that children often struggle to interpret subject-*only*, unlike VP-*only* or object-*only* (see Table 1) ([1], a.o.). In our target language, Japanese, this difficulty has been found in various constructions, not only in declarative sentences but also in right dislocation and clefts ([2][3]). Several hypotheses have been proposed to explain why children misinterpret subject-*only* but not VP-*only* or object-*only*. [1] argues that children mistakenly assign sentential scope to *only* (only [the cat is holding the flag]). [4] and [5] proposed that sentences with *only* were presented after incongruent *wh*-questions in previous studies and showed that children's accuracy with both subject- and VP-*only* improved when congruent *wh*-questions were provided. However, even here, a statistically significant difference between subject-*only* and VP-*only* was found (72.9% vs. 95.8%). In this study, we suggest a new extra-linguistic factor for the difficulty with subject-*only*, and we show that once this factor is taken away, children can interpret subject-*only* correctly.

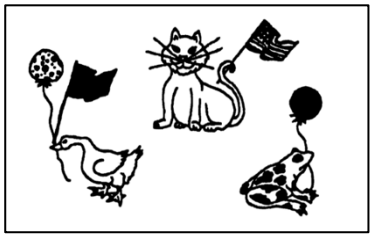
Our hypothesis: Our hypothesis is one based upon incremental sentence processing [6] and how visual processing integrates with that. Suppose you hear subject-*only* (1) with the picture in Table 1. Upon hearing the first segment of the sentence (*only the cat*…), there are multiple possible visual referents to focus on (e.g., the cat has whiskers but the other animals don't, the cat has one flag but other animals have more than that or something else, etc.). It is not until the completion of the sentence that you come to know what visual information you actually needed to look at (i.e., whether or not any animal other than the cat is holding a flag), and thus at this point, you need to modify your visual focus. We hypothesize that this modification is cognitively taxing for children, as it requires children to then re-inspect not only the cat, but each of the other characters in the scene, before being able to make a judgment. In contrast, for VP-*only* or object-*only*, the subject argument immediately clarifies which animal children should look at, and children do not need to modify their visual focus (i.e., the cat) even after the sentence completes.

Research question: Do Japanese-speaking children interpret subject-*dake* 'only' in an adult-like manner when visual information is withheld until after the entire sentence is processed, thereby reducing the cognitive load of modifying their visual focus?

Method: We recruited 16 monolingual Japanese children so far (data collection is ongoing, 5;0–5;10, Mean: 5;4). We developed a combined act-out and question-answer task. Children heard 4 subject-*only* sentences and 4 object-*only* sentences (2 *yes*-targeted questions and 2 *no*-targeted questions for each sentence type) plus practice and fillers. Cleft constructions were used, as they are natural questions in this context and children have been reported to struggle with subject-*dake* 'only' in cleft constructions ([3]). Table 2 shows the actual experimental setting. Crucially, children hear the *yes-no* question with *dake* 'only' without any information about what each animal bought ((5) or (6)), and it's only after that, children were asked to check a box/boxes to answer the question (7). Thus children are not distracted by visual information while processing a sentence with *dake* 'only.' This method also allowed us to assess if children create a correct contrast set—a set of possible alternatives that must be false for a sentence with *only* to be true (Table 3). Both boxes should be opened for subject-*dake* 'only,' and one for object-*dake* 'only.'

Results and discussion: Table 4 compares the accuracy of subject-*dake* 'only' and object-*dake* 'only' in our study with previous studies in Japanese. Children in our study performed significantly better with subject-*dake* 'only' (84.3%) than in previous experiments where all objects were visible while children heard the sentence. Notably, all 12 children who were accurate with subject-*dake* 'only' checked both boxes, indicating they correctly formed the contrast set. These findings suggest that children's difficulty with subject-*dake* 'only' is not (wholly) attributable to issues with scope assignment or contrast set creation, but it is in large part attributable to visual processing and how this affects linguistic interpretation. We conclude that 5-year-olds (and possibly younger) can correctly interpret subject-*dake* 'only' when the cognitive load of modifying a visual focus is reduced by withholding visual cues until after the sentence is processed.

Table 1: The picture in Crain et al. (1992, 1994) and sentences in English and Japanese

	Subject-*only*	(1) **Only** the cat is holding a flag. False
	VP-*only*	(2) The cat is **only** holding a flag. True
	Subject-*only* in Japanese	(3) Neko-**dake**-ga hata-o mot-teiru. False cat-only-NOM flag-ACC hold-PROG 'Only the cat is holding a flag.'
	Object-*only* in Japanese	(4) Neko-ga hata-**dake**-o mot-teiru. True cat-NOM flag-only-ACC hold-PROG 'The cat is holding only a flag.'

Note: In Japanese (the target language of this study), object-*only* sounds more natural than VP-*only*, and thus object-*only* has been used to compare with subject-*only* in previous studies.

Table 2: The experimental setting and the procedure

 *Note*: In the frog's box, there are two carrots (🥕🥕), and in the elephant's box, there is a carrot and a tomato (🥕🍎).	Narration	The pig and the frog went for a shopping. In the store, there were many veggies and fruits like carrots and tomatoes. They came home with the boxes.
	Question with subject-*only*	(5) Ninjin-o kat-ta no wa kaeru-**dake** ka na? carrot-ACC buy-PST NMLZ TOP frog-only Q SFP 'Is it only the frog that bought a carrot?'
	Question with object-*only*	(6) Kaeru-ga kat-ta no wa ninjin-**dake** ka na? frog-NOM buy-PST NMLZ TOP carrot-only Q SFP 'Is it only the carrot that the frog bought?'
	Instruction to children	(7) Hako-o akete tasikamete mite. box-ACC open check look 'Check by opening a box/boxes' "No" for (5) "Yes" for (6) *Note*: in Japanese, the bare noun *hako* 'box' can mean either one box or multiple boxes.

Note: We used two animals instead of three, since all previous studies in Japanese used two animals and the difficulty with subject-*only* is still robust (See Table 4).

Table 3: Contrast sets to be rejected for subject-*only* and object-*only* in Table 2 to be true

Sentence type	Contrast set
Subject-*only* (5)	A set of potential alternative(s) that bought a carrot
Object-*only* (6)	A set of potential alternative(s) that the frog bought

Table 4: Comparison of accuracy rates for subject-*dake* 'only' and object-*dake* 'only'

Study	Sentence type	Accuracy of subject-*dake* 'only'	Accuracy of object-*dake* 'only'
This study	**Cleft questions + hiding objects in boxes**	**84.3% (54/64)**	**96.8% (62/64)**
Endo (2004)	Declarative sentences	31.7% (19/60)	83.9% (52/62)
Mochizuki et al. (2021)	Right dislocation	25.0% (4/16)	81.3% (13/16)
Shimada et al. (2022)	Cleft sentences	55% (11/20)	90% (18/20)

References: [1] Crain, S., Ni, W., & Conway, L. (1994). Learning, parsing, and modularity. In *Perspectives on sentence processing* (pp. 73–94). Lawrence Erlbaum Associates. **[2]** Mochizuki, R., Shimada, H., & Yamakoshi, L. (2021). Children's asymmetrical responses and the incorrect association of focus particles in Japanese right dislocation. In *Proceedings of BUCLD 45* (pp. 554–567). **[3]** Shimada, H., Mochizuki, R., & Yamakoshi, K. (2022). Children's incorrect association of the focus particle *dake* in Japanese clefts. In *Proceedings JK 29* (pp. 457–466). **[4]** Hackl, M., Sugawara, A., & Wexler, K. (2015). Question-answer (in)congruence in the acquisition of *only*. In *Proceedings of BUCLD39* (pp. 204–217). Cascadilla Press. **[5]** Sugawara, A. (2016). *The role of question-answer congruence (QAC) in child language and adult sentence processing* (Doctoral dissertation). MIT. **[6]** Omaki et al. (2015). No fear of commitment: Children's incremental interpretation in English and Japanese *wh*-questions. *Language Learning and Development*, *10*(3), *206–233*.