

Article

The Acquisition of Verb-Echo Answers: Evidence from Child Japanese

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Abstract

The present study investigates Japanese-speaking children's interpretation of verb-echo answers (VEAs) to yes/no questions. Previous syntactic research suggests that VEAs are derived via ellipsis, with Japanese VEAs specifically analyzed as being derived by TP ellipsis involving verb movement. This study assumes that parameter settings for *pro*-drop and verb movement are prerequisites, and that the knowledge of both the possibility of VEAs being answers to questions with existential indefinite subjects and the possibility of the adverb-inclusive interpretation are required for acquiring Japanese VEAs. We conducted a series of three experiments with 4- to 6-year-olds acquiring Japanese to test whether they have knowledge of these factors relevant to Japanese VEAs. The results of the experiments indicate that most children correctly assigned adult-like interpretations to VEAs for questions involving existential indefinite subjects and adverbs. These findings support the hypothesis that children's VEAs in Japanese are derived through verb movement and TP ellipsis, and suggest that parameters for *pro*-drop and verb movement, together with evidence regarding the possibility of VEAs to questions with existential indefinite subjects and the possibility of the adverb-inclusive reading, may determine the adult-like interpretation of Japanese VEAs.

Keywords: acquisition; verb-echo answer; Japanese; *pro*-drop; adverb-inclusive interpretation; TP ellipsis; verb movement

1. Introduction

In many languages such as Japanese, yes/no questions can be answered not only by using an affirmative or negative particle but also by echoing the finite verb of the question alone (Holmberg, 2016). The question in (1) can be answered by repeating the verb *kita* 'came' used in the question.¹

(1) Question:	Taro-ga	daigaku-ni	ki-ta	no?
	Taro-NOM	university-DAT	come-PST	Q
'Did Taro come to the university?'				
Answer:	Ki-ta	(yo).		
	come-PST	(PRT)		
	'Came.' (=Yes.)			

In syntactic studies (e.g., Holmberg, 2016), this type of answer is called a verb-echo answer (VEA). In many languages that allow VEAs, verbs in VEAs have tense and agreement, as evidenced by the past tense of the verb in the Japanese VEA in (1), which raises



Academic Editor: Yosuke Sato

Received: 4 June 2025

Revised: 9 November 2025

Accepted: 24 December 2025

Published: 31 December 2025

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the question of how VEAs are derived. In his seminal work founded on a massive cross-linguistic data, Holmberg (2016) argues that VEAs are derived by ellipsis of full sentences, and that these derivations can be categorized into at least two different types: subject *pro*-drop along with verb-stranding VP ellipsis; and ellipsis of a large chunk of a sentence, such as TP ellipsis. Holmberg (2016) claims that those languages which employ the latter type of derivation can be further categorized into at least two types, one involving verb movement and the other involving phrasal movement. As for Japanese VEAs, Sato and Hayashi (2018) and Sato and Maeda (2021) provide evidence such as a restriction on the indefinite *pro*-drop and adverb-inclusive interpretations which supports the analysis of TP ellipsis with verb movement.

These previous syntactic studies have revealed that there is cross-linguistic variation as to the types of VEAs, prompting the question: What parameters and conditions are involved in this variation? Although the previous studies do not explicitly show the full picture, their detailed analyses of individual languages have identified some relevant factors, such as the indefinite *pro*-drop restriction and the adverb-inclusive interpretation. Accordingly, at least the following two parameters may determine the derivation of Japanese VEAs: the null subject (or *pro*-drop) parameter,² and a parameter regulating the availability of verb movement. In other words, setting these parameters is a prerequisite for the acquisition of VEAs in child grammar. Previous acquisition studies have shown that Japanese-speaking children acquire adult-like knowledge of both empty arguments and verb movement by age 4, suggesting that children set the parameters relevant to VEAs by that age. We further predict that the children whose parameters have already been set will be able to understand VEAs in an adult-like way once they receive positive evidence that Japanese VEAs are possible as responses to questions with existential subjects and that VEAs should be interpreted adverb-inclusively.

The present study aims to test this acquisitional prediction through experiments with Japanese-speaking children aged 4 to 6. The experiments investigate whether children can correctly interpret VEAs in response to questions containing an existential subject and an adverb. The results show that most children are able to assign the adult-like interpretation to both VEAs for questions with existential indefinite subjects and those with adverbs, which lends support to the above prediction being borne out.

This paper is organized as follows: In the next section, we begin by reviewing previous studies on VEAs, with a particular focus on Holmberg (2016), which proposes syntactic analyses of VEAs, as well as Sato and Hayashi (2018) and Sato and Maeda (2021), which examine Japanese VEAs in light of Holmberg (2016). We will also consider what their analyses tell us about children's acquisition of VEAs and develop an argument concerning the conditions for acquiring Japanese VEAs. Section 3 is devoted to our experiments which evaluate an acquisitional prediction with respect to VEAs to questions with existential indefinite subjects and adverb-inclusive interpretations of VEAs. Section 4 discusses what the current experimental results tell us about VEAs in child Japanese and the theory of child language acquisition. Section 5 concludes the current paper.

2. Background

2.1. Derivation of VEAs: Holmberg (2016)

Holmberg (2016) is an intriguing cross-linguistic investigation dealing with the syntax of yes/no questions and their answers across languages. Yes/no questions can be answered not only with answer particles such as English *yes* and *no* but also with VEAs. He reports that among 130 languages from various families, 62 allow VEAs, while 68 do not. The former category includes languages from diverse areas such as Finnish, Japanese, and Thai,

while the latter encompasses many Germanic and Romance languages such as English, Dutch, Italian, and Spanish, as well as languages of other families.

Holmberg claims that answers to yes/no questions have sentential structure and that VEAs as well as answer particles are derived by ellipsis of full sentences. He assumes the following structures in (2) for a yes/no question and answer in many languages such as English and Finnish (Holmberg, 2016, p. 53).

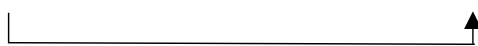
- (2) a. Does John like this book?
 [Q-force [_{CP} [does, ±Pol] [_{CP} C [_{PolP} John [_{Pol'} [does, ±Pol] [_{TP} like this book]]]]]]]
 b. Yes.
 [_{FocP} [+Pol] [_{Foc'} Foc [_{PolP} John [_{Pol'} [+Pol] [_{TP} like this book]]]]]
 yes 

(Holmberg, 2016, p. 53)

As shown in (2a), the question has an unvalued polarity variable [±Pol] meaning “positive or negative polarity,” which is the highest head in the TP domain. [±Pol] moves to the C-domain to assign sentential scope to the disjunction and become the center of attention, and a Q-force operator, which means “Tell me the value of [±Pol] such that *p*, expressed by PolP, is true,” is added to this. Accordingly, (2a) is interpreted as “Tell me the value of [±Pol] such that ‘John [±Pol] likes this book’ is true”.

He claims that the answer in (2b) has the same PolP as (2a). The PolP in the question is copied and merged with a focused valued polarity feature, i.e., [+Pol] in (2b). This [+Pol] is merged with a phrase headed by Foc, which assigns the positive value to the [±Pol] in PolP, resulting in a positive proposition. The PolP in the answer can be elided since it is recoverable from the question, but the value of [±Pol] remains and is realized as the answer particle *yes*.

A question–answer pair in (3) shows how Holmberg assumes VEAs in Finnish are derived. In (3a), the verb moves to the C-domain and hosts the question particle *-ko*. The VEA in (3b) has the same PolP as (3a), except it has [+Pol], which is externally merged with FocP. [+Pol] assigns the positive value to the [±Pol] in PolP, which yields an affirmative sentence. The PolP in the answer is not spelled out at PF, resulting in the VEA.³

- (3) a. Luki-ko Jussi sen kirjan?
 read-Q Jussi that book
 ‘Did Jussi read that book?’
 [Q-force [_{CP} [±Pol luki [±Pol -ko]] C [_{PolP} Jussi [_{Pol'} [<±Pol> luki [±Pol -ko]]
 [_{T/MP} [_{VP} <Jussi> <luke> sen kirjan]]]]]]]
 b. Luki.
 read
 ‘Yes’
 [_{FocP} [+Pol luki, +Pol] [_{Foc'} Foc [_{PolP} Jussi [_{Pol'} [+Pol luki, +Pol] [_{T/MP} T/M [_{VP}
 <Jussi> <luke> sen kirjan]]]]]]]


(Holmberg, 2016, p. 110)

Holmberg states that it is uncontroversial that VEAs are derived from a full sentence through ellipsis because the verbs in VEAs have tense and agreement. For example, the Finnish VEA in (4) not only has subject person information but also carries conditional mood marking.

- (4) Q: Osta-isi-t -ko sen kirjan?
 buy-CON-2sg Q that book
 ‘Would you buy that book?’

A: Osta-isi-n.

 buy-CON-1sg

 ‘I would buy.’ (=Yes.)

(Holmberg, 2016, p. 73)

Holmberg argues that there are at least two possible explanations for how VEAs are derived: One is *pro*-drop plus verb-stranding VP ellipsis; and the other is what he calls big ellipsis, i.e., ellipsis of a large chunk of a sentence containing a subject, such as TP.⁴ In order to distinguish these two types of derivation, he proposes the following test: If a VEA is possible as a response to a question with an existential indefinite subject, the response cannot be derived by *pro*-drop, because an indefinite pronoun cannot be *pro*-dropped (Holmberg, 2016, p. 79). The sentence in Italian in (5) has a null subject, which can be interpreted only as definite third person singular. The subject is not allowed to be interpreted as an indefinite pronoun.

- (5) Può controllare questo macchinario con una mano sola.
 can.3sg control this machine with one hand only
 ‘He/She/*Someone can control this machine with one hand.’

(Holmberg, 2016, p. 79)

Likewise, in the following Thai sentence in (6), the null subject in the embedded clause can be interpreted as a definite person in the local discourse or as an inclusive generic pronoun, but it cannot be interpreted as an existential indefinite subject. This shows that existential indefinite subjects cannot be *pro*-dropped.

- (6) cim bòok wâa khrau uŋcàk nûi [e] baŋkháb dâaj dâaj muu diiw
 Jim say COMP machine DEM control able with hand one
 ‘Jim says that he/one/*someone can control this machine with one hand.’

(Holmberg, 2016, p. 80)

On the other hand, the Thai question in (7) has an indefinite subject and the VEA is perfectly acceptable. According to Holmberg’s diagnosis, this fact indicates that the *pro*-drop analysis cannot be maintained.

- (7) Q: khray maa mǎy mûa-waan?
 who come Q yesterday
 ‘Did somebody come yesterday?’

A: maa

 come

 ‘Yes.’

(Holmberg, 2016, p. 84)

Similarly, (8) demonstrates that the VEA is grammatical as an affirmative answer to a question containing an existential indefinite pronoun in Finnish.

- (8) Q: Toi-ko joku sokeria?
 brought-Q someone sugar
 ‘Did someone bring sugar?’

A: Toi.

 brought.3sg

 ‘Yes.’

(Holmberg, 2016, p. 82)

In contrast, (9) shows that Georgian, a VEA language, does not allow VEAs when the question contains an indefinite subject. This suggests that Georgian VEAs are derived through *pro*-drop and VP ellipsis.

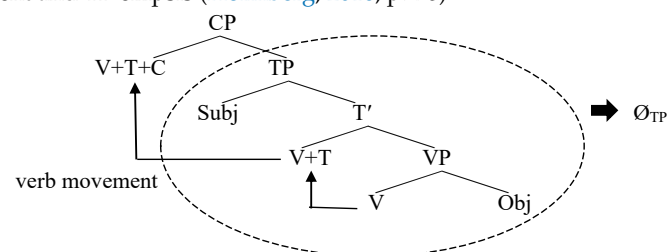
- (9) Q: Gushin vinme movida?
yesterday anyone-NOM came-AOR
'Did anyone come yesterday?'
A: xo (*movida)
yes (*came)
'Yes.'

(Holmberg, 2016, p. 84)

In this way, Holmberg demonstrates that VEAs in languages such as Finnish and Thai are derived by big ellipsis, while languages such as Georgian use subject *pro*-drop and verb-stranding VP ellipsis to derive VEAs.

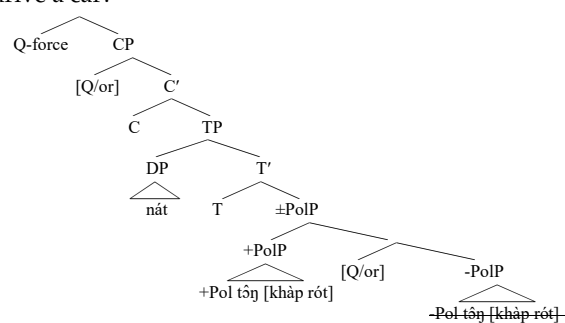
Holmberg claims that those languages which employ the big ellipsis derivation can be further categorized into at least two types: languages such as Finnish in which VEAs are derived by verb movement and TP ellipsis, as shown in (10); and languages such as Thai in which VEAs are derived by remnant PolP movement and TP ellipsis, as shown in (11).

- (10) Verb movement and TP ellipsis (Holmberg, 2016, p. 78)

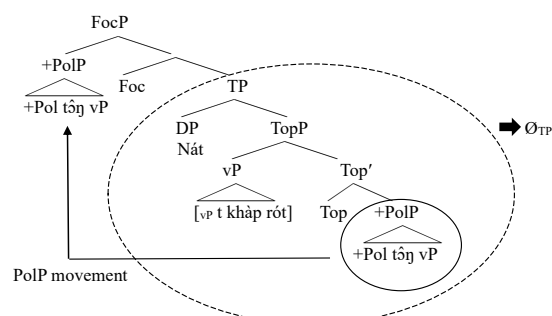


- (11) Remnant PolP movement and TP ellipsis (Holmberg, 2016, pp. 123–124)

- a. nát tǝŋ khàp rǝt mǎy
Nath must drive car Q/or
'Must Nath drive a car?'



- b. tǝŋ
must



In (11a), the predicate consists of a disjunction of an affirmative PolP and a negative PolP. In (11b), the disjunctive PolP in the question is copied and the vP of +PolP and -PolP is ATB-moved to SpecTopP. Subsequently, one of the PolPs moves to SpecFocP, and the TP is elided in PF. Holmberg (2016, p. 121) observes that Thai lacks head movement of V, noting that in Thai transitive clauses, the verb must directly precede the object unless the object itself has moved. Any sequence of the type S-V-X-O, where X represents an element such as an adverb, a negator, or a partially fronted object, is ungrammatical.

2.2. Japanese VEAs

As outlined in the preceding section, Holmberg (2016) shows that VEAs in different languages exhibit variation in their derivation. This influential study has inspired many other studies on VEAs in various languages, such as Chinese (e.g., Simpson, 2015; Chen, 2022), Korean (Park & Park, 2018), and Mongolian (Sakamoto & Bao, 2019). As we have seen in (1), Japanese is a language that permits VEAs, and some studies have examined the question of how VEAs in Japanese are derived.⁵

Japanese is a radical *pro*-drop language and permits both subjects and objects to have a definite pronominal interpretation. Sato and Hayashi (2018) argue that the Japanese null subject cannot receive an indefinite reading, and, therefore, Japanese follows Holmberg (2016, p. 79) indefinite *pro*-drop restriction. In sentence (12) below, the null subject in the embedded clause can be interpreted as a definite person in the local discourse or as an inclusive generic pronoun, but not as an existential indefinite subject. This shows that existential indefinite subjects cannot be *pro*-dropped in Japanese.

- (12) Yoichiro-ga [kono kikai-wa e katate-de soosadekiru-to] itteiru.
 Yoichiro-NOM this machine-TOP one hand-with can.control-COMP say
 'Yoichiro says that he/one can control this machine with one hand.'
 *'Yoichiro says that someone can control this machine with one hand.'

(Sato & Hayashi, 2018, p. 75)

On the other hand, the question in (13) has the indefinite subject *dareka* 'someone,' and both VEAs in Answer 1 and Answer 2 are perfectly acceptable.

- (13) Q: Dareka-ga daigaku-ni ki-ta no?
 someone-NOM university-DAT come-PST Q
 'Did someone come to the university?'
 A1: Ki-ta yo.
 come-PST PRT
 'Came.' (= 'Someone came.')
 A2: Ko-nakat-ta yo.
 come-NEG-PST PRT
 'Didn't come.' (= 'Nobody came.')

Thus, while Japanese does not allow existential indefinite subjects to be *pro*-dropped, VEAs are allowed even when questions have indefinite subjects. According to Holmberg (2016) diagnosis, this fact indicates that the *pro*-drop analysis for Japanese VEAs cannot be maintained even if the VP can be elided through VP ellipsis (Sato & Hayashi, 2018, p. 76). Instead, following Holmberg (2016), Sato and Hayashi (2018) and Sato and Maeda (2021) propose that Japanese VEAs are derived through string-vacuous V-T-C movement in overt syntax, followed by TP ellipsis at PF as shown in Figure 1.

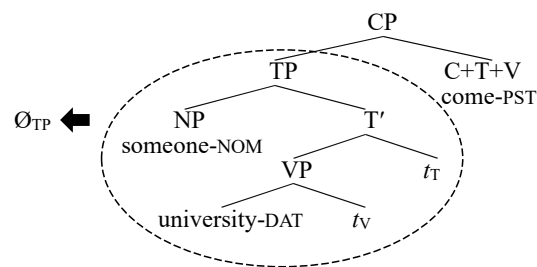


Figure 1. Verb movement and TP ellipsis analysis.

Sato and Hayashi (2018) also claim that the TP ellipsis analysis can nicely explain why negation can take scope over the existential subject in (13, A2), but not in (14) below.

- (14) Dareka-ga daigaku-ni ko-nakat-ta.
 someone-NOM university-DAT come-NEG-PST
 ‘Someone didn’t come to the university.’

The declarative sentence in (14), which corresponds to the question in (13), has the indefinite subject *dareka* ‘someone,’ which is a positive polarity item. Therefore, the subject cannot take scope below negation, and the sentence simply means “There is someone who didn’t come to the university.” As for (13, A2), the *pro*-drop analysis would predict that it means the same as (14), because this analysis assumes that the subject argument in (13, A2) can be *pro*-dropped. On the contrary, the VEA in (13) means “Nobody came to the university,” i.e., it is not the case that someone came to the university. The TP ellipsis analysis can explain why the negation can take scope over the indefinite pronoun: The VEA in (13) is derived by TP ellipsis after the negated and tensed verb has moved to C, while the subject stays in Spec TP, making the negation structurally higher than the subject, as shown in Figure 2.

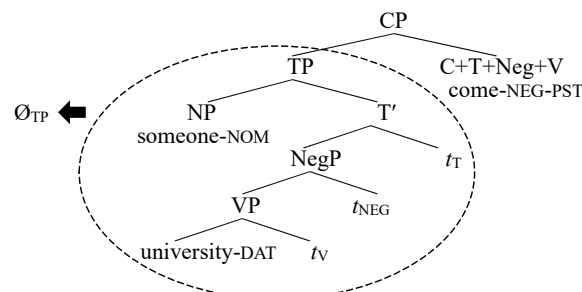


Figure 2. Verb movement and TP ellipsis analysis for negative VEAs.

Sato and Hayashi (2018) and Sato and Maeda (2021) further point out that if VEAs are derived through verb movement and TP ellipsis, the adverb-inclusive interpretation should be available. It has been argued since Oku (1998) that Japanese adjuncts cannot be elided in isolation. Therefore, the second clause in (15) cannot be interpreted as “Hanako didn’t polish a car carefully.” Rather, it simply means “Hanako didn’t polish a car”.

- (15) Taro-wa kuruma-o teineini migai-ta kedo,
 Taro-TOP car-ACC carefully polish-PST but
 Hanako-wa kuruma-o migaka-nakat-ta
 Hanako-TOP car-ACC polish-NEG-PST
 ‘Taro polished a car carefully, but Hanako didn’t polish a car.’
 *‘Taro polished a car carefully, but Hanako didn’t polish a car carefully.’

In contrast, the question in (16) “Did you already polish a car carefully?” has the adverb *teineini* ‘carefully,’ and the adverb-inclusive interpretation in the VEA is not only available,

but it is actually the only possible reading. This means that the adverb is included within the TP in the answer and the VEA is derived through TP ellipsis after string-vacuous V-T-C movement.

- (16) Q: Moo kuruma-o teineini migai-ta no?
 already car-ACC carefully polish-PST Q
 ‘Did you already polish your car carefully?’
 A: Migai-ta yo.
 polish-PST PRT
 ‘Polished’ (=‘Yes, I already polished my car carefully.’)

(Sato & Hayashi, 2018, p. 83)

2.3. Cross-Linguistic Variation of VEAs

As we have seen above, Holmberg (2016) points out based on his extensive survey on many languages, that languages which allow VEAs are further divided into at least two types: those in which VEAs are derived by big ellipsis (e.g., Finnish, Thai, and Japanese); and those which use subject *pro*-drop and verb-stranding VP ellipsis to derive VEAs (e.g., Georgian). The key distinction between these two types of VEA languages lies in the indefinite subject test (Holmberg, 2016, p. 79). While languages such as Finnish and Japanese do not allow indefinite subjects to be *pro*-dropped, VEAs are still permitted in questions with existential indefinite subjects, as shown in (8) and (13). In contrast, languages like Georgian do not permit VEAs to questions with an indefinite subject, as illustrated in (9).

According to Holmberg (2016), the languages analyzed as employing big ellipsis to derive VEAs are further divided into at least two groups based on the type of movement producing the VEAs. More specifically, Finnish and Japanese derive VEAs by verb movement, while Thai resorts to remnant PolP movement. This difference in movement type seems to be linked to the availability of adverb-inclusive readings for VEAs. In the languages which employ verb movement, including Japanese, a verb moves all the way to SpecCP string-vacuously, with an adverb being left behind in the TP domain to be elided in PF. These languages yield adverb-inclusive readings for VEAs even when the adverb is not overtly expressed. Conversely, in the languages using PolP movement, including Thai, since an adverb is included in the PolP which is moved out of the TP domain, the adverb should overtly exist in the VEA as an answer to a question involving the adverb. Thus, the adverb-inclusive reading is not available for VEAs without an overt adverb.

According to judgements by our native-speaker consultants, the adjunct-inclusive interpretation for Finnish VEAs exemplified in (17) is permitted, whereas that for Thai VEAs is not, as shown in (18).

- (17) Finnish
 Q: Luki-ko Jussi sen kirjan hiljaa?
 read-Q Jussi that book quietly
 ‘Did Jussi read that book quietly?’
 A: Ei lukenut.
 NEG read
 ‘Didn’t read.’ (=No, Jussi did not read that book quietly.)

(18) Thai

- Q: nát àan nǎn-sǔu ngiap-ngiap râu-plaaw
 Nath read book quietly Q
 'Did Nath read that book quietly?'
- A1: mây àan
 NEG read
 'Didn't read.' (=No, Nath did not read any book.)
- A2: mây àan ngiap-ngiap
 NEG read quietly
 'Didn't read quietly.'

In Finnish, the VEA with negation in (17, A) means that Jussi did read the book but not quietly, even though the VEA does not have the overt adverb *hiljaa* 'quietly.' As expected, adverb-inclusive reading is possible for VEAs in Finnish. The VEA with negation in Thai in (18, A1), on the other hand, cannot mean that Nath did not read the book quietly. Instead, the consultant pointed out that the VEA (18, A2) which has an overt adverb is the appropriate answer to the question. This observation is compatible with the analysis that VEAs in Thai are derived by PolP movement.

This constitutes further evidence that Finnish VEAs are derived by verb movement and TP ellipsis while Thai VEAs are derived by remnant PolP movement; and Japanese VEAs are similar to Finnish VEAs in this respect. Based on the previous syntactic studies reviewed in the preceding section and the availability or unavailability of adverb-inclusive interpretation in Japanese, Finnish, and Thai, we can say that Japanese should be categorized together with Finnish in terms of its VEA derivation.⁶ Furthermore, it follows that the adverb-inclusion property constitutes a necessary condition for Japanese and Finnish VEAs to questions with an existential indefinite subject.

2.4. Prediction for Acquisition

Considering the cross-linguistic variations discussed above, questions arise as to whether there are parameters that regulate the types of VEAs in VEA languages and how children acquire the linguistic properties of their own languages. While the exact parameters have not yet been fully identified, previous studies on VEAs have uncovered relevant properties, including the indefinite *pro*-drop restriction and the adverb-inclusive interpretation, as reviewed above. Based on these studies, we can speculate that the *pro*-drop parameter and a parameter regulating the possibility of verb movement determine the availability and the variation of VEAs. In other words, setting these parameters is a prerequisite for children to acquire VEAs in their grammar.

Several acquisition studies have been conducted regarding Japanese-speaking children's setting of these two parameters. For the parameter related to the indefinite *pro*-drop restriction, Nakayama (1996) analyzed three children's spontaneous speech produced at ages one and two, as well as adults' speech. He found that the occurrence of null arguments did not differ between children and adults, and he argued that children as young as one year of age had already acquired adult-like knowledge of empty arguments in Japanese. The finding suggests that the *pro*-drop parameter is set very early.⁷ If that is the case, as "an indefinite pronoun cannot be null by virtue of the usual rule deriving a null subject in *pro*-drop languages (Holmberg, 2016, p. 79)," we can assume that the knowledge that an existential indefinite subject cannot be *pro*-dropped is readily acquired once the *pro*-drop parameter is correctly set.

As for verb movement, there has been a long-standing debate on whether string-vacuous head movement exists in Japanese syntax (e.g., Otani & Whitman, 1991; Hoji, 1998; Koizumi, 2000; Fukui & Sakai, 2003). While there is no widely accepted evidence for

overt head movement, Hayashi and Fujii (2015) provide new evidence supporting head movement in Japanese, focusing on benefactive V(erb)-*te* constructions such as V-*te morau* ‘get’ and V-*te ageru* ‘give.’ They argue that in the example of V-*te morau* in (19) below, for instance, the head of the complement *te*-clause undergoes string-vacuous movement to the higher verb, i.e., *morau*, and merges with it, while the head of an adjunct *te*-clause does not.

- (19) Taro-ga [Ziro-ni piza-o tukut-te] morat-ta.
 Taro-NOM Ziro-DAT pizza-ACC cook-TE get-PST
 ‘Taro had Ziro cook pizza.’  (Hayashi & Fujii, 2015, p. 32)

Acquisitional studies on Japanese V-*te* constructions have shown that children acquire these constructions by age 4 at the latest, suggesting that verb movement is available to them by then. Okabe (2019) analyzed spontaneous speech data from five Japanese-speaking children, available in the CHILDES database (MacWhinney, 2000), to identify their utterances containing benefactives such as V-*te morau*. Her analysis found that children’s FRU (First clear use, followed soon after by Repeated Uses; e.g., Snyder, 2007) of benefactive V-*te* clauses appears at age 2. In addition, Ohba and Deen (2020) experimentally demonstrated that Japanese-speaking 4-year-olds correctly interpret sentences containing complement *te*-clauses. These studies provide evidence that young children have already acquired Japanese verb movement; in other words, they have correctly set the parameter regulating verb movement.

Now that we have established that Japanese-speaking children complete the setting of both parameters as a prerequisite for the acquisition of VEAs by age 4 at the latest, our next step is to examine when and how children successfully acquire the properties that Japanese VEAs exhibit. As we have seen in the previous section, the availability of the adverb-inclusive reading in Japanese constitutes a necessary condition for VEAs to questions with an existential indefinite subject. It is therefore reasonable to assume that the knowledge of the following two properties of VEAs in (20a) and (20b) is a prerequisite for the acquisition of Japanese VEAs in addition to the setting of parameters as described above.

- (20) a. VEAs to a question with an existential indefinite subject are possible.
 b. VEAs have adverb-inclusive interpretations.

Building on this, we can further formulate the following acquisitional prediction shown in (21).

- (21) *Prediction for acquisition:*

Any child who knows adverb-inclusion property of Japanese VEAs will also understand VEAs to existential subject questions.

To test the prediction in (21), we first manually examined a total of 55 files for Aki (1;6–3;0) (Miyata, 2004a) and 82 files for Ryo (1;6–3;0) (Miyata, 2004b), which are available in CHILDES, to identify their FRU of a VEA. The results showed that Aki’s FRU of a VEA occurred at the age of 2;1 and Ryo’s at 1;11.⁸ The mother-child interactions containing these FRUs are presented in (22).

- (22) a. MOT: Ommo mi-e-ta?
outside see-can-PST
'Could you see outside?'
CHI: Mi-e-ta.
see-can-PST
'Could see.'
(Aki (2;1), File 20117)
- b. MOT: Hait-ta?
go into-PST
'Did it go into (the box)?'
CHI: Hei-ta.⁹
go into-PST
'Went into.'
(Ryo (1;11), File 11109)

These findings suggest that Japanese-speaking children begin to produce VEAs around age two.

Next, let us focus on the property in (20a), i.e., a VEA is a grammatical response to a question with an existential indefinite subject. If Holmberg (2016) and Sato and Hayashi (2018) are on the right track regarding the cross-linguistic variations and syntactic derivations of VEAs, upon hearing the use of a VEA to a question with an existential subject, the child realizes that Japanese VEAs are derived by TP ellipsis, not *pro*-drop along with VP-ellipsis. This is because *pro* cannot have an existential pronoun as its antecedent and thus the elided subject in the VEA cannot be *pro*. Since we found that corpus database of Aki and Ryo did not contain any question–VEA interactions with existential subjects, we conducted addition search for database of five children; Asato (1;1–5;0, 63 files, Miyata & Nisisawa, 2009), Nanami (1;1–5;0, 57 files, Nisisawa & Miyata, 2009), Tai (1;5–3;1, 75 files, Miyata, 2004c), Taro (2;2–3;7, 32 files, Hamasaki, 2004), and Tomito (1;2–5;0, 61 files, Nisisawa & Miyata, 2010). As a result, we found two interactions from Tomito's files in which existential indefinite subjects such as *nanika* 'something' and *dareka* 'someone' appeared in the questions followed by VEAs. The interactions are given in (23).

- (23) a. MOT: Nanika at-ta?
something be-PST
'Was there something?'
CHI: At-ta yo, mama.
be-PST PRT Mom
'(There) was, Mom.'
(Tomito (2;1), File 20113)
- b. CHI: Dareka ki-ta kana?
someone come-PST Q
'Did someone come?'
MOT: Ki-te-nai ya.
come-PST-NEG PRT
'Didn't come.'
(Tomito (3;3), File 30302)

We can see that Tomito not only heard a VEA to his question with *dareka* 'someone' in (23b), but he also replied using a VEA to his mother's question with *nanika* 'something' in (23a), which was observed more than one year before (23b). These examples show that VEAs to questions with existential indefinite subjects are available in the input, and that children even have the ability to produce them before long, though they are far from frequent. Therefore, it is essential to examine in an experimental condition whether children have knowledge that VEAs preceded by a question with an existential indefinite subject are possible in Japanese. A positive result would further show that children's VEAs are derived by TP ellipsis.

As for the property in (20b), we propose that an effective trigger for children to acquire the adverb-inclusion property of Japanese VEAs is overt morphology for tense. Recall that verb movement is involved in derivation of Japanese VEAs while PolP movement in Thai VEAs, and that this distinction determines the availability of adverb-inclusive readings of VEAs in each language. Moreover, considering grammatical difference between Japanese and Thai, we may well be able to attribute the distinction regarding the adverb-inclusion property to the presence or absence of tense morphology in VEAs. In Japanese, there is overt morphology for tense, such as the past form *-ta*, and it is quite autonomous, i.e., it can be separated from the verb by other morphemes such as negation and passive morphemes, such as *mi-rare-nakat-ta* (see-PASS-NEG-PST) ‘was/were not seen.’ On the other hand, Thai does not have any overt morphology for tense on verbs (e.g., Dahl, 1985). Given the grammatical distinction between these two languages, we can think of the following scenario: Upon noticing a tense morpheme such as past tense *-ta* on a verb of the VEA, Japanese-acquiring children realize that the VEA is derived by verb movement, which automatically allows them to acquire the availability of adverb-inclusive reading in Japanese. We thus propose that a tense morpheme attached to the verb in VEAs is an effective trigger which tells a child that Japanese VEAs have the adverb-inclusion property.

As already shown in (22), our corpus search of the CHILDES database for Aki and Ryo identified interactions in which the mother produced a yes/no question in the past tense, and the child echoed the past-tense verb. In total, we found 14 caregiver-child exchanges containing yes/no questions in the past tense and past-tensed VEAs for Aki and 40 for Ryo. It is therefore reasonable to assume that, if our proposal is correct, positive evidence indicating that Japanese VEAs are interpreted adverb-inclusively is available for children.

However, spontaneous speech data do not provide sufficient and direct evidence for children’s knowledge of the adverb-inclusion property. In fact, some of the caregiver-child exchanges mentioned above include questions containing an adjunct, such as *densya-de itta no* (by-train go-PST) ‘(Did you) go (there) by train?’ (Aki, File 20513). The children appropriately respond to the questions using VEAs; for example, Aki answers properly with *Itta* (go-PST) ‘(I) went (there).’ These VEAs, however, do not decisively reveal that the VEA is adjunct-inclusive. Accordingly, to test the prediction in (21), analysis of spontaneous speech alone is insufficient; therefore, we conducted experiments with children. The next section reports these experiments and their evaluation of prediction (21).

3. Experiments

In this section, we report on three consecutive experiments designed to elucidate children’s interpretation of VEAs in Japanese by testing the acquisitional prediction presented in (21). Experiment 1, whose original version was published in Isobe and Okabe (2021), focuses on the first property in (20a). Experiments 2 and 3 deal with the second one in (20b).

3.1. Experiment 1

3.1.1. Goal

The objective of Experiment 1 was to verify the acquisition of the first property of VEAs in (20a) by experimentally examining whether Japanese-speaking children could correctly interpret VEAs to questions with indefinite subjects.

3.1.2. Participants

A total of 20 Japanese-speaking children (9 boys and 11 girls) aged 4;8–6;6 (mean = 5;6) were tested individually in person in a quiet room at a nursery school in Tokyo.

3.1.3. Procedure

Each child sat next to a puppet called Mell, which was manipulated by an experimenter. The child and experimenter were seated in front of a monitor which showed pictures, while another experimenter was behind the monitor and thus unable to see the pictures. The experimenter behind the monitor explained to the child that she wanted to know what kinds of pictures the child and Mell were looking at and would ask them questions in turn about the pictures shown on the monitor. The experimenter also asked the child to judge if Mell's responses to the questions or descriptions about the pictures were congruous with the pictures.

3.1.4. Test Sentences and Design

We prepared three types of sentences with the following set of items: 3 affirmative and 3 negative VEAs to questions with a definite subject, as in (24) (*Definite VEAs*); 6 declarative sentences with indefinite pronouns as in (25) (*Declaratives with Indefinite Subject*); and 6 affirmative and 9 negative VEAs to questions with an indefinite subject, as in (26) (*Indefinite VEAs*).

(24) Definite VEAs

Experimenter: Neko-ga suwatteru no?
cat-NOM sitting Q
'Is the cat sitting?'

Mell:

A1: Suwatteru yo.
sitting PRT
'Sitting.' (= 'The cat is sitting.')

or

A2: Suwatte-nai yo.
sitting-NEG PRT
'Not sitting.' (= 'The cat is not sitting.')

(25) Declaratives with Indefinite Subject

Mell: Dareka-ga suwatte-nai yo.
someone-NOM sitting-NEG PRT
'Someone is not sitting.'

(*not > some, some > not)

(26) Indefinite VEAs

Exp: Dareka-ga suwatteru no?
someone-NOM sitting Q
'Is someone sitting?'

Mell:

A1: Suwatteru yo.
sitting PRT
'Sitting.' (= 'Someone is sitting.')

or

A2: Suwatte-nai yo.
sitting-NEG PRT
'Not sitting.' (= 'Nobody is sitting.')

(not > some, *some > not)

The definite VEAs like (24) were designed to test whether children understand the basic function of VEAs; that is, answering yes/no questions by repeating the verb used in the questions. The declaratives with indefinite subject like (25) were included to test whether children recognize that an indefinite subject takes scope over negation in a declarative sentence. We showed the participants pictures like Figure 3, in which one character was

not sitting but the other two were seated, to examine whether they would correctly accept (25). The face of the one who is not sitting in the picture is unidentified, covered with a hat so that the test sentences with an indefinite subject sounded natural.



Figure 3. Picture accompanied with Sentence (25).

Finally, the indefinite VEAs like (26) were used to test whether children interpret affirmative VEAs like (26, A1) as “Someone is sitting” and negative VEAs like (26, A2) as “Nobody is sitting.” For both affirmative and negative VEAs like (26, A1 and A2), we used pictures like Figures 4 and 5.



Figure 4. Picture accompanied with (26, A1).

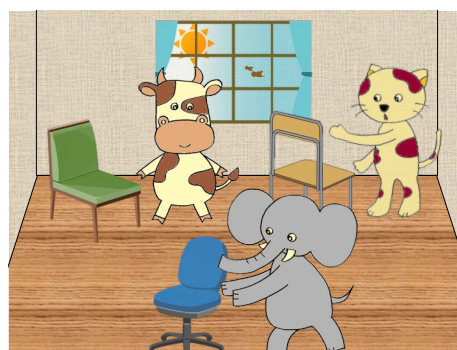


Figure 5. Picture accompanied with (26, A2).

A summary of the type and number of test sentences and their true/false conditions is given in Table 1 below.

The main focus of our experiment was placed on whether children can interpret declarative sentences with an indefinite subject such as (25) and negative VEAs such as (26, A2) in an adult-like way.¹⁰ As shown in Section 2.2, negation cannot take scope over the existential subject in (14), which corresponds to sentences like (25), but it can in (13, A2), which corresponds to sentences like (26). In (25), the subject in SpecTP is structurally

higher than negation and, therefore, negation cannot take scope over the existential subject. In contrast, in the negative VEA in (26, A2), negation can take scope over the subject, which is accounted for by assuming that the VEA is derived through verb movement. If a child can correctly derive the reading in which negation takes scope over the subject when given a negative VEA like (26, A2), we can conjecture that the child does not just change the indefinite subject of the preceding question into *pro* in her VEA, but derives the VEA by TP ellipsis after verb raising.

Table 1. Test sentences (Experiment 1).

Sentence Types	T/F Conditions	
Definite VEAs (24)	3 affirmative VEAs (A1)	1 True and 2 False
	3 negative VEAs (A2)	3 False
Declarative w/indefinite subj. (25)	6 sentences	6 True
Indefinite VEAs (26)	6 affirmative VEAs (A1)	3 True and 3 False
	9 negative VEAs (A2)	3 True and 6 False

All the test items have intransitive verbs such as *suwaru* ‘sit,’ *naku* ‘cry,’ *neru* ‘sleep,’ *hasiru* ‘run,’ *iru* ‘be (there)’ and *warau* ‘laugh.’ The experiment was divided into two sessions. All test sentences in the negative indefinite VEAs condition as in (26, A2) were administered in one session and all of the declaratives with indefinite subject as in (25) in the other session. Each child participated in the second session between two weeks and two months following the first session.

3.1.5. Results and Discussion

The overall percentages of correct responses for each type of test sentence are shown in Table 2.

More specifically, all 20 children correctly interpreted affirmative and negative definite VEAs like (24) 100% of the time, showing that they know the basic function of VEAs. Of the 20 children, 15 children (4;8–6;6, mean = 5;9) showed almost perfectly adult-like performance on the declaratives with indefinite subject condition as in (25), providing the correct reading in which the existential indefinite pronoun takes scope over negation (98.9% (=89/90)). This indicates that these children have acquired the existential indefinite pronoun *dareka* ‘someone.’ The remaining five children (4;10, 5;2, 5;3, 5;5, 5;6, mean = 5;2) gave correct responses only 23.3% (=7/30) of the trials, that is, they almost always rejected sentences like (25) when shown a picture like Figure 3. The performance of one child (5;5) was at chance level, and two children (4;10, 5;2) performed below chance. The other two children (5;3, 5;6) produced no correct answers. In other words, they gave the reading in which negation scopes over the subject for sentences like (25), which is not allowed in adult Japanese. Likewise, they strongly preferred the *not > some* interpretation when presented with negative VEAs as in (26, A2) together with a picture like Figure 4 (93.3% (=28/30)).

Of the 15 children who showed adult-like responses in the declaratives with indefinite subject condition, 12 children (4;8–6;6, mean = 5;8) correctly interpreted affirmative VEAs as in (26, A1) 100% (=72/72) of the time. Also, the same 12 children correctly accepted negative VEAs as in (26, A2) when given a picture like Figure 5 where nobody is sitting 100% (=36/36) of the time, and correctly rejected them when given a picture like Figure 4 where there is somebody who is not sitting but the other two are sitting 98.6% (=71/72) of the time. These results provide further evidence that these children were able to access the reading in which negation takes scope over the indefinite subject.

Table 2. Correct response rates (Experiment 1).

Sentence Types		% of Correct Responses
Definite VEAs (24)	affirmative VEAs (A1)	100% (=60/60)
	negative VEAs (A2)	100% (=60/60)
Declarative w/Indefinite Subj. (25)		80.0% (=96/120)
Indefinite VEAs (26)	affirmative VEAs (A1)	96.7% (=116/120)
	negative VEAs (A2) <True>	98.3% (=59/60)
	negative VEAs (A2) <False>	85.8% (=103/120)

As for the remaining 3 children, two of them (5;6 and 6;0) correctly interpreted affirmative VEAs like (26, A1) but wrongly accepted negative VEAs like (26, A2). These results suggest that they persistently interpreted the indefinite subject taking scope over negation when given VEAs like (26, A2). The other child (5;5) consistently gave wrong responses to affirmative VEAs like (26, A1), saying, for example, “The cow is not running” and “The giraffe is not sleeping.” We conjecture, based on her comments, that she focused on the salient animal which is not doing the same action as the other animals in the picture.

A generalized linear mixed model (GLMM) (binomial, logit link) was fitted in R (R Core Team, 2025) to the accuracy data with age, sentence type (declaratives, indefinite negative VEAs, indefinite affirmative VEAs), and truth value as fixed factors and random intercepts for participants.¹¹ Among the fixed effects, sentence type was the only significant predictor: relative to declaratives, accuracy increased markedly in both indefinite negative VEAs ($\beta = 1.63$, $SE = 0.58$, $z = 2.82$, $p = 0.005$) and indefinite affirmative VEAs ($\beta = 2.82$, $SE = 0.71$, $z = 4.00$, $p < 0.001$), whereas age and truth value were not significant. Pairwise Tukey-adjusted contrasts confirmed these effects: accuracy in declaratives differed significantly from both indefinite negative VEAs (log-odds difference = -1.63 , $p = 0.013$) and indefinite affirmative VEAs (-2.82 , $p < 0.001$), whereas the contrast between Indefinite negative VEAs and indefinite affirmative VEAs did not reach significance (-1.19 , $p = 0.11$). These results indicate that both types of indefinite VEAs produced higher accuracy than declaratives, with no reliable difference between the two indefinite conditions.

The results confirm that the first property in (20a) was already available to Japanese-speaking 4- to 6-year-olds, suggesting that their VEAs are derived through big ellipsis, possibly verb movement and TP ellipsis.

In the next section, we will report on our acquisition study which examined the property in (20b).

3.2. Experiment 2

3.2.1. Goal

The aim of Experiment 2 was to investigate Japanese-speaking children’s adjunct-inclusive interpretation in VEAs, thereby verifying the prediction in (21).¹² As we have seen in Section 2.2, a VEA to a question with an adverbial phrase, for example, *ogyogi-yoku* ‘in a well-mannered way’ in (27), has an adverb-inclusive reading. Even though the VEA *tabete-nai* ‘not eating’ does not overtly contain an adverbial phrase, its only interpretation is “Nobody is eating bread in a well-mannered way.”

- (27) Q: Dareka-ga pan-o ogyogi-yoku tabeteru no?
 someone-NOM bread-ACC well-mannered eating Q
 'Is someone eating bread in a well-mannered way?'
 A: Tabete-nai yo.
 eating-NEG PRT
 'Not eating.' (= 'Nobody is eating bread in a well-mannered way.')

We will examine whether Japanese-acquiring children can access this adverb-inclusive reading for VEAs to questions with adverbial phrases.

3.2.2. Participants

We tested 17 Japanese-speaking children (9 boys and 8 girls) aged 4;2–5;9 (mean = 4;10), who lived in suburban Tokyo. None of them had participated in Experiment 1. They were tested individually in person in a quiet room at Senshu University.

3.2.3. Procedure

The experimental procedure was the same as that of Experiment 1. Each child and Mell were asked to answer questions about pictures shown on a monitor posed by the experimenter behind the monitor. The child was then asked to listen to a question by the experimenter, an answer by Mell, or a description of the picture by Mell, and judge if Mell's responses or descriptions were congruous with the pictures.

3.2.4. Test Sentences and Design

We prepared three types of sentences with the following set of items: 6 VEAs preceded by questions (4 negative VEAs (28, A1) (4 true conditions) and 2 affirmative VEAs (28, A2) (2 false conditions)) and two declarative sentences like (29) under false conditions.

- (28) Exp: X-chan, kondo-wa donna e?
 X (=child's name) now-TOP what-kind-of picture
 'X, what kind of a picture are you looking at now?'
 Child: Usagi to tanuki to buta(-ga
 rabbit and raccoon and pig-NOM
 oheya-ni iru). Pan-to hon(-ga aru).
 room-in be bread-and books-NOM be
 '(There are) a rabbit, a raccoon, and a pig (in a room). (There are) some
 bread and books.'
 Exp: Mell-chan, sono e de-wa,
 Mell that picture in-TOP
 dareka-ga pan-o ogyogi-yoku tabeteru no?
 someone-NOM bread-ACC well-mannered eating Q
 'Mell, in the picture, is someone eating bread in a well-mannered way?'
 Mell:
 A1: Tabete-nai yo.
 eating-NEG PRT
 'Not eating.' (= 'Nobody is eating bread in a well-mannered way.')
- or
- A2: Tabeteru yo.
 eating PRT
 'Eating.' (= 'Someone is eating bread in a well-mannered way.')

- (29) Mell: Buta-wa ringo-o ogyogi-yoku tabeteru kedo,
 pig-TOP apple-ACC well-mannered eating but
 zou-wa ringo-o tabete-nai yo.
 elephant-TOP apple-ACC eating-NEG PRT
 'The pig is eating an apple in a well-mannered way, but the elephant is not
 eating an apple at all.'
 *'The pig is eating an apple in a well-mannered way, but the elephant is not
 eating an apple in a well-mannered way.'

The question–VEA pair as in (28) is accompanied by Figure 6, in which the rabbit is eating bread *in a bad-mannered way* and the other two are not eating anything.

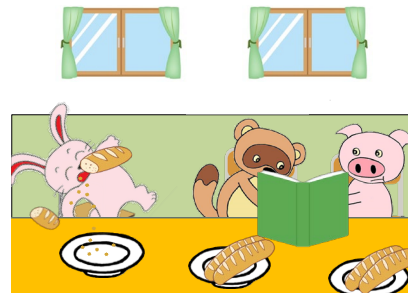


Figure 6. Picture accompanied with the question–VEA pair (28).

Although the VEA in (28) has no overt adverb, only the adverb-inclusive reading is possible. It is predicted that children will accept target negative VEAs like (28, A1) if they know that VEAs are derived through string-vacuous verb raising and TP ellipsis, and they will reject them if their VEAs are derived by *pro*-drop. We also tested if children were able to correctly provide negative responses for affirmative VEAs like (28, A2) given a picture such as Figure 6.

In contrast, the first clause of (29) has the adjunct *ogyogi-yoku* 'in a well-mannered way,' but the second clause does not. This sentence is suitable only for a situation where the pig is eating an apple in a well-mannered way but the elephant is not eating an apple at all. The sentence cannot mean that the elephant is not eating an apple in a well-mannered way. The adverb-inclusive reading is impossible in the second conjunct. We tested whether children possessed this knowledge, building on Sugisaki (2013), who experimentally demonstrated that Japanese-speaking children do not allow adjunct ellipsis in sentences like (29). Specifically, we examined whether children could correctly reject test sentences like (29) while looking at Figure 7.

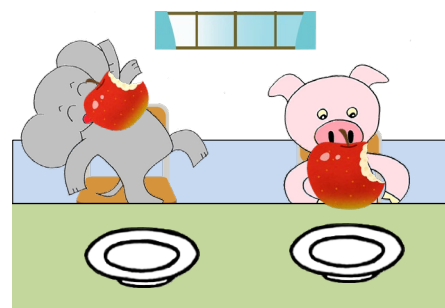


Figure 7. Picture accompanied with Sentence (29).

Since the elephant is eating an apple in a bad-mannered way in the picture, we would expect that if children wrongly accessed adjunct-inclusive readings, they would accept the sentence.

We used the following verb phrases with an adverb for our test sentences in addition to *pan-o ogyogi-yoku taberu* ‘eat bread in a well-mannered way’: *kureyon-o kirei-ni simau* ‘put crayons back in the box tidily,’ *siiru-o massugu-ni haru* ‘apply stickers neatly,’ and *hon-o sizuka-ni yomu* ‘read a book quietly.’

3.2.5. Results and Discussion

Of the 17 children, one child (4;6) answered true to 7 out of 8 test items, and, therefore, we exclude those data from further analysis and consider the data from the remaining 16 children. The overall percentages of correct responses for each type of the test sentences were given in Table 3.

Table 3. Correct response rates (Experiment 2).

Sentence Types	T/F	% of Correct Responses
4 Negative VEAs (28, A1)	T	78.1% (=50/64)
2 Affirmative VEAs (28, A2)	F	90.6% (=29/32)
2 Declaratives (29)	F	90.6% (=29/32)

More specifically, for the two declarative sentences like (29), 14 (mean = 4;10) out of 16 children correctly rejected these sentences when given pictures like Figure 7. The other two children (4;7 and 5;5) correctly interpreted only one or neither of the two test sentences. This result is consistent with that of Sugisaki (2013) and suggests that the 14 children know that Japanese adjuncts cannot be elliptical.

For the target VEAs like those in (28), the 14 children overall showed adult-like responses 79.8% (=67/84) of the time. Among these 14 children, eight (mean = 5;0) performed almost perfectly on the target VEAs in (28) (47/48). In contrast, five children (mean = 4;9) answered correctly 60% (=18/30) of the time, and the remaining child (4;7) answered correctly on only 2 out of 6 items.

As for the two children who showed poor performance on the two declarative sentences with adjuncts in the first conjunct as in (29), they showed perfect performance on the VEAs in (28). This means that these two children seemed to indiscriminately allow the adjunct-inclusive reading for (28) as well as for (29).

A GLMM (binomial, logit link) was fitted in R (R Core Team, 2025) to the accuracy data with age, sentence type (declaratives, negative VEAs, affirmative VEAs), and truth value as fixed effects and random intercepts for participants.¹³ None of the fixed effects reached significance: the negative VEA condition showed a non-significant tendency toward lower accuracy relative to the declaratives ($\beta = -1.11$, OR = 0.33, $p = 0.12$), the affirmative VEA condition showed no difference at all ($\beta \approx 0$, OR ≈ 1.00 , $p = 1.00$), and age exhibited only a small, non-significant positive effect ($\beta = 0.10$, OR = 1.10, $p = 0.13$). The intercept indicated above-chance accuracy in the declaratives ($\beta = 1.61$, OR = 4.99, $p = 0.07$). Marginal and conditional R^2 values (0.14 and 0.29, respectively) show that the fixed effects accounted for only a modest share of the variance, with a considerable proportion attributable to individual differences. Together, these results indicate that children’s performance was relatively stable across age and sentence type.

Overall, our experiment found that Japanese-speaking children aged 4–5 were able to correctly give the adverb-inclusive interpretation to VEAs, confirming that they already have the knowledge of the second property of Japanese VEAs in (20b). This can be accounted for by positing that children move the verb to the C position before deleting the whole TP containing the subject and adjunct at PF. The results thus lend further support to

the analysis that VEAs are derived by way of successive-cyclic V-T-C movement followed by TP ellipsis, as proposed by Sato and Hayashi (2018).

Yet, there remains a possibility that the participants in Experiment 2 performed like adults simply because they interpreted only the audible negated verb *tabete-nai* ‘not eating’ in (28, A1). We used Figure 6 for (28), and it is possible that the children focused on the animals that are not eating anything and seemingly succeeded in accepting the VEA by simply ignoring the preceding question and interpreting only the negated verb. One way to eliminate this possibility is to test children’s interpretation of the same VEAs using pictures where all the animals are eating bread in a bad-mannered way. As there is no one who is not eating anything in the picture, if the child interprets only the negated verb ignoring the prior question, he/she would respond negatively. On the other hand, if the child gives a positive response, we can be certain that he/she interprets the VEA adverb-inclusively. This approach was employed in Experiment 3.

3.3. Experiment 3

3.3.1. Goal

The aim of Experiment 3 was to further the investigation of Japanese-speaking children’s adjunct-inclusive interpretation in VEAs using a revised version of Experiment 2. In doing so, we attempt to reinforce our finding that children around age 5 indeed have adult-like adjunct-inclusive interpretation in VEAs, thereby providing further supporting evidence that VEAs in Japanese are derived by verb movement followed by TP ellipsis. In addition, this experiment allowed us to evaluate our acquisitional prediction for VEAs given in (21); we tested if any child who knows adverb-inclusion property of Japanese VEAs also understands VEAs to existential subject questions.

3.3.2. Participants

A total of 19 Japanese-speaking children (9 boys and 10 girls) aged 4;6–5;5 (mean = 5;0), who live in Tokyo or suburban Tokyo, participated in the experiment. None of them had participated in Experiments 1 or 2. They were tested individually online via Zoom. We also tested 13 undergraduate students in person as adult controls using the same materials as the child participants. None of them had participated in our previous study, either.

3.3.3. Procedure

The experimental procedure for the children was almost the same as that of Experiment 2. One experimenter shared the pictures on the screen with each child alongside a lion puppet named Leo, manipulated by the other experimenter, and told them that she was unable to see the pictures due to trouble with her computer. The child was asked to listen to exchanges between the experimenter and Leo containing question–VEA pairs regarding the images on the screen and then tell the experimenter whether Leo’s responses were congruous with the pictures. The child was also asked to listen to the experimenter’s guesses about pictures and judge if these guesses correctly described the pictures.

In the adult control group, each participant was given a response sheet and asked to write down his/her judgements about the congruency of Leo’s responses and the experimenter’s guesses on the sheet.

3.3.4. Test Sentences and Design

We prepared three types of sentences with the following set of items: 4 VEAs preceded by questions which include an adjunct, as in (30) (4 true conditions), 4 declarative sentences like (29) under false conditions, and 4 negative VEAs preceded by questions which contain an indefinite subject and an intransitive verb like (26, A2) as control (4 false conditions). The four question–VEA pairs between the experimenter and Leo, exemplified in (30), were

accompanied by pictures like Figure 8, in which all the animals are eating bread *in a bad-mannered way*.

(30) Exp: Leo, sono e de-wa,
 Leo that picture in-TOP
 dareka-ga pan-o ogyogi-yoku tabeteru no?
 someone-NOM bread-ACC well-mannered eating Q
 'Leo, in the picture, is someone eating bread in a well-mannered way?'
 Leo: Tabete-nai yo.
 eating-NEG PRT
 'Not eating.' (= 'Nobody is eating bread in a well-mannered way.')

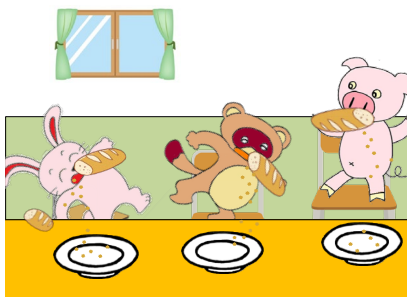


Figure 8. Picture accompanied with the question–VEA pair (30).

All VEAs used in this experiment are negative answers like (30). Although the VEAs consist solely of audible verbs with negation, only the adverb-inclusive reading is permitted. Because the VEAs were presented under true conditions according to the adult interpretation, we predicted that the participants would accept the VEAs if they knew that VEAs are derived through string-vacuous verb movement and TP ellipsis and reject them if they interpreted only the audible verbs with negation. The other three verb phrases adopted in the test sentences are the same as those in Experiment 2, except for one adverb: *kureyon-o gucyagucya-ni simau* ‘put crayons back in the box haphazardly,’ *siiru-o massugu-ni haru* ‘apply stickers neatly,’ and *hon-o sizuka-ni yomu* ‘read a book quietly’.

We also tested whether the participants could correctly interpret four declarative transitive sentences like (29), where the second conjunct does not allow the adverb-inclusive reading, when presented under false conditions, just like Experiment 2. Furthermore, we included four pairs of control questions with the existential indefinite subject *dareka* ‘someone’ and a negative VEA such as (26), also under false conditions, to examine whether the children would allow the reading in which negation takes scope over the VEA’s subject.

3.3.5. Results and Discussion

The overall percentages of correct responses for each type of the test sentences were given in Table 4.

Table 4. Correct response rates (Experiment 3).

Sentence Types	T/F	% of Correct Responses
4 Negative VEAs (26, A2)	F	90.8% (=69/76)
4 Declaratives (29)	F	86.8% (=66/76)
4 Negative VEAs w/adjunct (30)	T	88.2% (=67/76)

First, the child participants almost correctly interpreted negative VEAs to questions with existential indefinite subjects like (26, A2). They also performed like adults on declara-

tive sentences such as (29), suggesting that the children know that Japanese adjuncts cannot be elliptical by nature. More to the point, we found that they gave adult-like responses to VEAs like (30) 88.2% of the time when given situations like those depicted by Figure 8. This clearly shows that they interpreted the VEAs adverb-inclusively even though the VEAs do not have overtly pronounced adverbs, and we successfully eliminated the possibility that the children simply perceived the negated verbs and gave superficially adult-like responses.

For the child data alone, we employed a generalized linear mixed model (GLMM) with a binomial distribution and logit link, implemented in R (R Core Team, 2025). The model included age, sentence type (controls, declaratives, and VEAs), and truth value as fixed effects and random intercepts for participants and items, and it revealed no significant predictors of accuracy.¹⁴ None of the fixed effects reached significance: age showed only a small, non-significant positive effect ($\beta = 0.06$, OR = 1.06, $p = 0.36$), and neither the Declaratives ($\beta = -0.40$, OR = 0.67, $p = 0.44$) nor the VEA condition ($\beta = -0.28$, OR = 0.75, $p = 0.60$) differed from the controls. The intercept was positive but only marginally significant ($\beta = 1.60$, OR = 4.95, $p = 0.056$), suggesting above-chance performance overall. The marginal R^2 was only 0.019, confirming that the fixed factors explained very little of the variance.

To directly compare the crucial conditions, a paired-samples *t*-test was carried out and it was revealed that the children accepted (i.e., gave significantly more “yes” responses to) VEAs like (30) ($M = 3.53$, 95% CI [3.12, 3.93]) than declarative sentences such as (29) ($M = 0.53$, 95% CI [0.15, 0.90]), $t(18) = 11.32$, $p < 0.0001$. This means that they correctly accepted VEAs like (30) and correctly rejected declarative sentences like (29), allowing adverb-inclusive readings only for the VEAs.

As for the results of the adult control group, we confirmed that they gave correct responses to negative VEAs to questions with indefinite subjects like (30) 96.2% (=50/52). Although a few adults could not perfectly reject declarative sentences with adverb ellipsis like (29), they demonstrated almost perfect (92.3% (=48/52)) performance with the target VEAs, accessing the adverb-inclusive interpretation.

To directly compare children with adults who completed the same task, a second GLMM included group (child vs. adult) along with sentence type and truth value as fixed effects and random intercepts for participants and items.¹⁵ Accuracy did not differ significantly between children and adults ($\beta = -0.36$, OR = 0.70, $p = 0.49$). Among sentence types, only the Declaratives approached significance, showing a trend toward lower accuracy than the Controls ($\beta = -0.91$, OR = 0.40, $p = 0.075$); the VEAs again showed no reliable effect ($\beta = -0.44$, OR = 0.65, $p = 0.41$). Marginal and conditional R^2 values (0.039 and 0.254, respectively) indicate that the fixed effects explained only a small proportion of the variance, while individual differences accounted for roughly a quarter.

Taken together, the two GLMMs indicate that neither age within the child group nor sentence type produced robust effects on accuracy, and children performed at a comparable level to adults across all sentence types.

Thus, the results of this follow-up experiment provide further evidence that children indeed know that VEAs have the adjunct-inclusive interpretation while adjunct ellipsis is not allowed in Japanese. Consequently, the results seem to confirm the acquisition of the property described in (20b) for Japanese VEAs. It is also revealed that the acquisitional prediction in (21) was borne out: Children who demonstrated adult-like knowledge of the adverb-inclusion property of Japanese VEAs were also able to interpret VEAs to questions with existential indefinite subjects.

4. Discussion

In this section, we first summarize several findings of our experimental study regarding the comprehension of VEAs by Japanese-speaking children. We then discuss what these findings suggest regarding the acquisition of VEAs.

Our experiments were designed to examine children's knowledge of two properties of VEAs in Japanese: (20a) that VEAs preceded by a question with an indefinite subject are possible; and (20b) that VEAs have the adjunct-inclusive interpretation. By investigating children's knowledge of these two properties, the experiments tested the acquisitional prediction stated in (21).

In Experiment 1, we first confirmed that children aged 4–6 were already adult-like in comprehension of both affirmative and negative VEAs to questions with definite subjects. We found that most of them successfully interpreted VEAs to questions with indefinite subjects, as well. It is noteworthy that they correctly responded to negative VEAs, giving the interpretation in which negation takes scope over the indefinite subject. They distinguished the interpretation of negative VEAs from that of declarative sentences with an indefinite subject, which suggests that they did not simply *pro*-drop the indefinite subject of the preceding question when interpreting VEAs. Thus, the results show that the first property of VEAs given in (20a) is acquired by around these ages.

Children's knowledge of the adverb-inclusive reading for VEAs was examined in Experiments 2 and 3. We confirmed in Experiment 2 that most children aged 4–5 who knew that Japanese adjuncts cannot be elided when used in declarative sentences performed quite well with VEAs for questions including adverbial phrases. Although the target VEAs did not overtly have adverbial phrases, the children overall were able to interpret the VEAs adverb-inclusively. Experiment 3 also revealed that 4- to 5-year-old children showed adult-like performance with VEAs to questions with adverbial phrases. The results obtained in Experiments 2 and 3 lead us to conclude that children by around age 5 come to know that the adjunct-inclusive reading is available for VEAs whereas adjunct ellipsis is not permitted.

The findings of our series of experiments provide empirical evidence that both properties of Japanese VEAs in (20a) and (20b) are available in child grammar. This supports our proposal that VEAs in Japanese are readily acquired once the *pro*-drop and verb movement parameters are both properly set, together with some crucial linguistic evidence available in their ambient input. Children first need to have set the relevant parameters so that they know Japanese is a *pro*-drop language and allows verb movement, and once they have received positive evidence that Japanese VEAs are possible as replies to questions with existential indefinite subjects, they naturally treat the VEAs as being derived by verb movement and TP ellipsis. We can further argue that Japanese-speaking children's successful acquisition of VEAs is accounted for by relying on the syntactic analysis by [Sato and Hayashi \(2018\)](#), i.e., that Japanese VEAs are derived through verb movement followed by TP ellipsis.

As for the acquisition of the second property of VEAs in Japanese in (20b), our experiments revealed that Japanese-speaking children do have the knowledge that VEAs should be interpreted adverb-inclusively. This fact can be accounted for if we assume that the Tense morpheme used in VEAs plays a crucial role in indicating that the verb movement, not PolP movement, is involved in the derivation of VEAs. Upon encountering tensed verbs in VEAs, a child can deduce that the VEAs are derived by verb movement and therefore the VEAs call for adverb-inclusive interpretation.

It is also worth discussing what our findings can tell us about the cross-linguistic variation of VEAs and their acquisition in more general terms. Based on [Holmberg \(2016\)](#) cross-linguistic observation of VEAs, we posited that the *pro*-drop and verb movement

parameters, along with certain positive evidence such as questions with existential subjects and VEAs with tensed verbs, play a role in the acquisition of VEAs, and we argue here that the prediction of successful acquisition of VEAs in Japanese was borne out: Those children who know adverb-inclusion property of Japanese VEAs will also understand VEAs to existential subject questions in an adult-like fashion. In a similar vein, we can predict that young Finnish-speaking children will also be able to derive VEAs in an adult-like way. However, the present study did not take the differences among types of null subject languages into account: Japanese is categorized as a radical *pro*-drop language, while Finnish is a partial null subject language (e.g., [Roberts, 2019](#)). Further theoretical and acquisitional research is necessary to elucidate whether the parameter settings identified here are also prerequisites for the acquisition of VEAs in Finnish and how Finnish-speaking children interpret VEAs with respect to the indefinite *pro*-drop restriction and adverb-inclusive readings. It would also be valuable to examine how children acquiring other radical *pro*-drop languages, such as Thai and Chinese, whose VEAs are analyzed to be derived differently from Japanese, understand VEAs in their languages. We hope to address these issues in future research.

5. Conclusions

This study examined how Japanese-speaking children interpret VEAs. [Holmberg \(2016\)](#) shows that VEAs can be derived in different ways across languages; for example, by subject *pro*-drop and verb-stranding VP ellipsis or through larger ellipsis such as TP ellipsis. He further categorizes VEA languages that employ TP ellipsis into those involving verb movement and those relying on phrasal movement. For Japanese, [Sato and Hayashi \(2018\)](#) and [Sato and Maeda \(2021\)](#) provide empirical evidence that supports the analysis of TP ellipsis with verb movement, based on restrictions observed with existential indefinite subjects and adverb-inclusive interpretations. The cross-linguistic variation in VEAs seems to suggest that their derivation depends on parameters regulating *pro*-drop and verb movement. We assume that Japanese-speaking children need to set these parameters correctly and receive positive linguistic evidence that VEAs to questions with existential indefinite subjects are possible and that VEAs can have tense morphology in order to realize that their VEAs are derived by verb-movement followed by TP ellipsis. Previous studies and our corpus search indicate that Japanese-speaking children set their relevant parameters and have received the positive evidence regarding the existential subjects and tensed verbs, leading to the prediction that their VEAs should be adult-like, by the time experiments can be conducted with the children.

We conducted experiments with Japanese-speaking 4- to 6-year-olds, examining their interpretation of VEAs to questions involving existential indefinite subjects and questions with adverbial phrases. The results show that children correctly assigned adult-like interpretations to VEAs, confirming our prediction given in (21) and supporting the hypothesis that their VEAs are derived via verb movement and TP ellipsis. The children were even able to interpret VEAs adverb-inclusively, though the data that directly show the possibility of adverb-inclusive readings presumably do not exist in their input. We assume that they can deduce this adverb-inclusion property of VEAs by making use of tense morphology on verbs in VEAs as indication of verb movement involvement in the derivation of Japanese VEAs. The findings of our experiments provide a new piece of empirical evidence for the syntactic analyses assumed to be related to the availability and variation of VEAs.

Author Contributions: Conceptualization, M.I. and R.O.; methodology, M.I. and R.O.; validation, M.I. and R.O.; investigation, M.I. and R.O.; resources, M.I. and R.O.; data curation, M.I. and R.O.; writing—original draft preparation, M.I. and R.O.; writing—review and editing, M.I. and R.O.; visualization,

M.I. and R.O.; funding acquisition, M.I. and R.O. All authors have read and agreed to the published version of the manuscript.

Funding: This research was partially funded by JSPS Grants-in-Aid for Scientific Research (C) Grant Numbers 19K00599 and 23K00499.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of Tokyo University of the Arts (date of approval 29 July 2019) and the Institutional Review Board of the University of Yamanashi (protocol code R4-011 and date of approval 1 August 2022).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Deidentified data can be accessed here: https://osf.io/ge5n7/?view_only=76027b1f1d4c4c89be940b0239d1d46d (accessed on 15 June 2025).

Acknowledgments: An earlier version of this paper was presented at ICTEAP-3 at National Tsing Hua University (November 2021) and ICTEAP-5 at Waseda University (April 2025). We would like to express our sincere gratitude to two anonymous reviewers and the Guest Editor, William Snyder, for all of their valuable comments on our manuscript. We also thank the children and their parents for agreeing to participate in our experiment, as well as Yoshiki Fujiwara, Yusuke Kubo, Hiroyuki Shimada, the members of TPL, and the audience of ICTEAP-3 and ICTEAP-5 for their comments and suggestions. We are further grateful to our linguistic consultants, Raija Okuda and Sunisa Wittayapanyanon, for providing crucial language data in their respective languages, and to Tamir Stulberg for proofreading the manuscript. All remaining errors are our own.

Conflicts of Interest: The authors declare no conflicts of interest.

Notes

- ¹ The abbreviations used in this paper are as follows: 1 = first person, 2 = second person, 3 = third person, ACC = accusative case, AOR = aorist, COMP = complementizer, CON = conditional mood, DAT = dative case, DEM = demonstrative, NEG = negation, NOM = nominative case, PASS = passive, PRT = (sentence-final) particle, PST = past tense, Q = question marker, sg = singular, TOP = topic.
- ² This study adopts the classical parametric approach (e.g., Chomsky, 1981), which suggests that children are born with a richly endowed Universal Grammar and must adjust parameter values based on the linguistic input they receive. We make use of the classical Null Subject Parameter (Chomsky, 1981; Rizzi, 1982), which divides languages into null-subject languages, such as Italian, and non-null-subject languages, such as English. Within this dichotomy, Japanese should be classified as a null-subject language, but it lacks the rich verbal agreement found in languages like Italian. There are also languages such as Finnish, which display rich agreement yet do not freely allow referential null subjects. Although many approaches have been proposed to address the empirical and conceptual problems of the classical Null Subject Parameter (e.g., Roberts & Holmberg, 2010), evaluating which version of the Null Subject Parameter provides the best account lies beyond the scope of our study. See, for example, Bertolino (2024) for a critical re-examination of the classical Null Subject Parameter.
- ³ In the remainder of the present paper, we will employ the simple CP-TP structure for the sake of exposition, except when a detailed structure is necessary.
- ⁴ Holmberg also discusses a third type of derivation: *pro*-drop of the subject and the object. However, we do not explore this in detail. See Park and Park (2018) for arguments that Korean VEAs are derived through *pro*-drop.
- ⁵ We adopt the theoretical framework proposed by Sato and Hayashi (2018) for our analysis of Japanese VEAs. However, studies such as Tanabe and Kobayashi (2024) and Tanaka (2024) have challenged this framework, for example, with regard to the adjunct-inclusive readings in VEAs, which we will briefly address at the end of this section. These studies argue that the unexpressed adverb in VEAs can be pragmatically recovered. A detailed discussion of their claims, however, falls outside the scope of this paper.
- ⁶ Simpson (2015) and Sakamoto and Bao (2019) provide evidence supporting the verb movement and TP ellipsis analysis of VEAs in Mandarin and Mongolian, respectively. See Chen (2022) for arguments supporting the PolP movement and TP ellipsis analysis for Mandarin VEAs.
- ⁷ As one of the reviewers kindly pointed out, it is worth mentioning that Nakayama (1996) does not directly discuss the acquisition of existential null subjects, and that existential null subjects could possibly follow the different developmental path from definite or generic null subjects. We will try to address this issue in future research.

- ⁸ The notation “x;y” indicates a child’s age. For example, 5;6 indicates “5 years and 6 months”.
- ⁹ Although this utterance is not an adult-like phonological form of *haitta* ‘went into,’ it is highly likely to represent *haitta*, based on the context and the fact that no lexical item would be pronounced *heita*.
- ¹⁰ We used pictures such as Figure 3 to test interpretation of 6 declarative sentences with an existential indefinite subject, as in (25), under *true* condition, and pictures such as Figure 4, which is almost the same as Figure 3, to test their interpretation of 6 negative VEAs, as in (26, A2), under *false* condition. Our focus was placed on the interpretational difference between these two sentences. For the similar situations depicted by Figures 3 and 4, declarative sentences require positive responses whereas negative VEAs require negative responses. We intended to directly compare their response patterns, preparing the same number of test items, i.e., 6 declaratives and 6 negative VEAs.
- ¹¹ The model formula was $correct \sim age + cond + torf + (1 | subid)$, where *cond* denotes sentence type, *torf* indicates true or false, and *subid* represents participant ID. Definite VEAs were excluded from *cond* because their accuracy rate was 100%. Items were excluded as a random effect because no detectable variation across items was observed when they were included in the model. The model fit the data well (AIC = 243.3, BIC = 267.6), with substantial participant variance (ICC = 0.54) and no detectable item variance. Converting the coefficients to odds ratios, responses were roughly five times more likely to be correct in Indefinite negative VEAs (OR = 5.10, 95% CI = 1.64–15.86) and seventeen times more likely in Indefinite affirmative VEAs (OR = 16.79, 95% CI = 4.21–66.99) compared with Declaratives. We also fit the two random-slope models— $(1 + Condition | Participant)$ with and without $(1 | Item)$ —but both yielded singular fits with unstable estimates and did not change the inferences.
- ¹² An earlier version of this experiment was published in Okabe and Isobe (2023).
- ¹³ The model formula was the same as that used in Experiment 1. The model fit the data reasonably well (AIC = 111.7, BIC = 125.9, log-likelihood = −50.8) and revealed substantial participant-level variability ($\tau_{00} = 0.66$, ICC = 0.17), while no additional item variance was detected. We also fit two random-slope variants— $(1 + Condition | Participant)$ with and without $(1 | Item)$ —but both were non-identifiable and did not change the fixed-effect conclusions.
- ¹⁴ The model formula was $correct \sim age + cond + torf + (1 | subid) + (1 | itemnumber)$. Model fit was adequate (AIC = 172.4, BIC = 192.9, log-likelihood = −80.2), but both participant- and item-level random intercept variances were estimated at zero (singular fit), indicating little detectable variability across individuals or test items. We also fit $(1 + cond | subid) + (1 | itemnumber)$, which was singular with near-perfect intercept–slope correlations and did not change the inferences.
- ¹⁵ The model formula was $correct \sim group + cond + torf + (1 | subid) + (1 | itemnumber)$, where *group* indicates children or adults. This model showed good convergence (AIC = 261.0, BIC = 284.7, log-likelihood = −124.5) and revealed appreciable variability across both participants ($\tau_{00} = 0.83$, ICC = 0.22) and items ($\tau_{00} = 0.12$). We also fit $(1 + cond | subid) + (1 | itemnumber)$, which yielded a singular and unstable fit and did not change the fixed-effect inferences.

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