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Acquisition of empathy in child Japanese

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ABSTRACT

This article investigates the acquisition of empathy verbs in child Japanese, focusing on verbs of giving/receiving: *age-ru* 'give,' *kure-ru* 'give,' and *mora(w)-u* 'receive.' These verbs are distinguished by which argument the speaker empathizes with when describing an event. For *age-ru* 'give,' the speaker empathizes with the subject (the giver); for *kure-ru* 'give,' the speaker empathizes with a non-subject (the recipient), and for *mora(w)-u* 'receive,' the speaker empathizes with the subject (the recipient). Using two diagnostics for empathy (alignment of first person with empathy loci; empathy loci being preferred antecedents in reflexive binding), 4- to 6-year-old children were tested. Our experiments show the following two findings: (i) children found *kure-ru* as most challenging, partially contradicting previous research; (ii) some children as young as age 4 have fully acquired the empathy-encoding properties of these verbs despite the speaker's empathy being unobservable in the input. We discuss the challenges that *kure-ru* poses for children in light of the potential learnability problem that these empathy verbs pose.

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1. Introduction

It is well known that children speak (and perhaps understand) differently from adults. The not so obvious is *why* they speak/understand differently from adults. One point of view posits some sort of break from adult competence: Children might have fundamentally different linguistic representations from adults (as espoused by, for example, usage-based theories of child language acquisition), or their representational abilities might be subject to maturation (e.g., Borer & Wexler 1987). Another point of view suggests that there is no representational deficit but that the difficulty arises from some other facet of human cognition. These other facets of cognition that impinge on a child's ability to speak/understand language in an adult-like manner are varied, including difficulty with reanalysis (Trueswell et al. 1999; see also Omaki & Lidz 2015, among others), different sensitivity to and knowledge of felicity conditions for the use of language (Hamburger & Crain 1984, among others), development of various aspects of executive functions (Mazuka, Jincho & Oishi 2009; Minai, Jincho, Yamane & Mazuka 2012), and others.

Among the various phenomena that children show non-adult-like behavior, the acquisition of verbs (specifically those that refer to perceptually nontransparent aspects of the world) is particularly challenging and so provides us with a fertile area to address the question of why children diverge linguistically from adults. One famous example is the acquisition of mental verbs such as *think, believe*, etc. Although children

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can produce and comprehend action verbs such as *go* and *eat* correctly before their second birthday, they still exhibit non-adult-like interpretations of mental verbs at around age 4 (e.g., de Villiers & de Villiers 2000; de Villiers & Pyers, 2002; cf. Lewis, Hacquard & Lidz 2017; etc.).

The key problem with such verbs, as discussed by Gleitman (1990), among many others, is that such verbs denote meanings that lack reliable observable real-world correlates. This removes a possible route that children might use to acquire verbs (observation), and so such mental verbs pose a particularly distilled case of an age-old learning problem: How does a child acquire verb meanings that can't be observed?

In this study, we focus on another type of verb that describes mental states of a different kind and that also lacks reliable, observable real-world correlates. Such verbs, henceforth referred to as *empathy verbs*, encode the speaker's empathy (defined and discussed in detail in the following) to a specific argument in a sentence (e.g., a subject, an indirect object, etc.). When speakers choose to use a certain empathy verb, this indicates that the speakers mentally place themselves closer to (empathizes with) a certain discourse participant when describing an event. More specifically, using a subject-empathy verb indicates that the speaker empathizes with the referent of the subject when describing an event; using an indirect-object-empathy verb indicates that the speaker empathizes with the referent of the indirect object when describing the same event. This means that the exact same event can be described by using different empathy verbs based on which discourse referent the speakers place themselves closest to. This is something that is not observable from the environment and must be acquired in some other way.

Empathy phenomena are widely attested in many languages. According to Oshima (2007:22), "while the effect of empathy is presumably present in all languages (Kuno & Kaburaki 1977, p. 670), how and in what domains it manifests itself varies from language to language." Empathy represents a phenomenon that might be ubiquitously present in the acquisition of all languages but one that has flown under the radar for scholars of child language. We hope this study brings to the forefront the importance of work on empathy phenomena and that this new-found focus will deepen our understanding of child language acquisition more broadly.

In this article, we investigate Japanese children's acquisition of empathy verbs that refer to giving/receiving events: *age-ru* 'give,' *kure-ru* 'give,' and *mora(w)-u* 'receive.' These verbs have been shown to be challenging for children (Horiguchi 1979; Okabe 2005, 2011; Uyeno, Harada, Hayashibe & Yamada 1978; among others), although the precise characterization of those challenges vary from researcher to researcher. Moreover, the empathy-encoding properties associated with these verbs are difficult for non-Japanese speakers to fully comprehend and (as far as we know) have not yet received full, rigorous, experimental investigation. In this article, we investigate whether Japanese preschool children have knowledge of the empathy-encoding properties of these verbs (Experiment 1) and whether they can apply these properties to the binding of the anaphor *zibun* 'self' (Experiment 2). In our discussion, we explore a possible developmental path related to theory of mind and how children can come to know the empathy-encoding properties of empathy verbs.

2. Japanese empathy verbs: Giving and receiving

There are numerous ways a speaker might linguistically encode an event. When describing an event, speakers often affiliate themselves with or places themselves closer to a certain discourse participant. This is a conceptual decision that must be made, but it is one that has grammatical consequences, as shown in the following. The degree to which speakers affiliate themselves with a certain discourse participant is referred to as "empathy," defined by Kuno (1987) as:

(1) Empathy is the speaker's identfication, which may vary in degree, with a person/thing that participates in the event or state that he describes in a sentence. (Kuno, 1987, p. 206)

Speakers, therefore, decide which event participant they affiliate with, and the grammatical argument that refers to that event participant is called the "empathy locus" (Oshima 2007:21; a.o.). The notion of empathy and the empathy locus form the backbone of this article, as discussed in detail in the following.

Japanese has rich morphological devices that grammatically encode an empathy relationship to specific discourse participants. The phenomenon we focus on is verbs of giving/receiving: *age-ru* 'give,' *kure-ru* 'give,' and *mora(w)-u* 'receive.' When Japanese speakers use these verbs, it is impossible to describe the event without empathizing with some discourse participant (Kuno & Kaburaki 1977; Kuno 1987; etc.). Indeed, this is similar to the English pair *give/receive*, which encodes a notion that we must distinguish from empathy: the speaker's *point of view* on the event, that is, which discourse participant the speaker is talking about (Gleitman, Cassidy, Nappa, Papafragou & Trueswell 2005:48).[1] When speakers are describing a transfer event, if the speakers are talking about the giver of the object, they use the verb *give*. Because of the subcategorization frame of *give*, the giver is encoded as the subject of the sentence. But if the speaker is talking about the recipient of the object, the speaker uses the verb *receive*. This encodes the recipient as the subject of the sentence. Either verb may be used to describe the very same event, depending on which argument's point of view the speaker chooses to adopt.

In Japanese, this same point-of-view distinction holds (*age-ru* and *kure-ru* are akin to *give*, and *mora(w)-u* is akin to *receive*). For most English speakers, the *age-ru*/*mora(w)-u* distinction is familiar, but the third verb, *kure-ru*, is unusual. *Age-ru* and *kure-ru* both have the same point of view (the speaker is talking about the giver) and the same subcategorization frame (giver is encoded as the subject), but they differ in terms of empathy (*age-ru* places empathy on the subject, and *kure-ru* places empathy on the indirect object; see the following for examples). On the other hand, *age-ru* and *mora(w)-u* have different points of view (the speaker is talking about the giver with *age-ru*, while the speaker is talking about the recipient with *mora(w)-u*) and different subcategorization frames (giver as a subject vs. recipient as a subject), but these two verbs have the same empathy properties (they both place empathy on the grammatical subject).

To exemplify, consider examples (2-4), which all describe the same event - John is the giver of a present and Mary is the recipient of it - but the different verbs signal different empathy loci. More specifically, *age-ru* 'give' encodes the speaker's empathy to the giver-subject argument, *kure-ru* 'give' does so to the recipient non-subject argument, and *mora(w)-u* 'receive' does so to the recipient subject argument.[2]

(2)	John-ga	Mary-ni	present-o	**AGE**-ta.
	John-NOM	Mary-DAT	present-ACC	give-PST
	'John gave a present to Mary.' (EMPATHY LOCUS: JOHN)			
(3)	John-ga	Mary-ni	present-o	**KURE**-ta.
	John-NOM	Mary-DAT	present-ACC	give-PST
	'John gave a present to Mary.' (EMPATHY LOCUS: MARY)			
(4)	Mary-ga	John-ni	present-o	**MORAT**-ta.
	Mary-NOM	John-DAT	present-ACC	receive-PST
	'Mary received a present from John.' (EMPATHY LOCUS: MARY)			
	(modified from Kuno & Kaburaki 1977:630)			

These verbs of giving can convey benefactive meanings by attaching to a gerundive form of another verb as shown in 5–7 (Okabe 2011:193), with the same empathy properties carrying over to this benefactive construction.

[1]The term *point of view* is used in many different ways in the literature, including how we define it here in this article. However, this usage is different from how it is traditionally used in the Japanese literature on empathy. In that body of work, best exemplified by the work of Kuno, *point of view* is often interchangeable with empathy. We make this distinction between point of view and empathy for the sake of exposition.

[2]It is worth noting that while Kuno (1987) judges sentences like (3) acceptable, there is disagreement on whether sentences with *kure-ru* 'give' are acceptable with a third-person empathy locus (as in 3). However, this controversy does not affect our experiments, and thus we will not discuss this issue any further.

(5) John-ga Mary-ni present-o katte **AGE**-ta.
John-NOM Mary-DAT present-ACC buy give-PST
'John bought a present for Mary.' (EMPATHY LOCUS: JOHN)

(6) John-ga Mary-ni present-o katte **KURE**-ta.
John-NOM Mary-DAT present-ACC buy give-PST
'John bought a present for Mary.' (EMPATHY LOCUS: MARY)

(7) Mary-ga John-ni present-o katte **MORAT**-ta.
Mary-NOM John-DAT present-ACC buy receive-PST
'Mary received benefit from John's buying a present.' (EMPATHY LOCUS: MARY)

Returning to the distinction between empathy and point of view, *age-ru* takes the point of view of the giver (encoding it as the subject), and the speaker empathizes with the same subject argument. *Kure-ru*, on the other hand, takes the point of view of the giver (encoding it as the subject), but the speaker empathizes with a non-subject argument. And *mora(w)-u* takes the point of view of the recipient (encoding it as the subject) and empathizes with that subject argument.

Kuno (1987) argues that empathy-encoding properties of these verbs are not absolute but rather occur in ranked scales, as in 8. So although previously we simplified and described the empathy locus for the verb *age-ru* 'give' as the subject, a more accurate way of describing it is that this verb ranks the subject higher than the non-subject for empathy. Likewise, the verb *mora(w)-u* 'receive' ranks the subject higher than the non-subject, and the verb *kure-ru* 'give' ranks the non-subject (an indirect object when it is used as a ditransitive main verb or attaches to a ditransitve verb but a direct object when it attaches to a transitive verb) higher than the subject.

Kuno (1987) further proposes that sentences become unacceptable when there is a conflict of empathy relationships, which we return to shortly. Example 8 summarizes the empathy rankings encoded by these verbs.[3]

(8) a. *Age-ru* 'give': Subject > Non-subject[4]

b. *Kure-ru* 'give': Non-subject > Subject

c. *Mora(w)-u* 'receive': Subject > Non-subject
(modified from Kuno 1987:252, 12.27)

We note here that our focus in this article will be the distinction between *age-ru* 'give' and *kure-ru* 'give' for a few reasons. First, the distinction between these verbs boils down to empathy and nothing else. Although *mora(w)-u* 'receive' also participates in this paradigm, it does differ in ways that are more observable from linguistic context (i.e., a giver as a subject with *age-ru* and *kure-ru* whereas a recipient as a subject with *mora(w)-u*). Moreover, as we will show, we find that the locus of difficulty for children appears to be this distinction between *age-ru* and *kure-ru*, and so although we describe some of the facts around *mora(w)-u* 'receive' in the introduction and Experiment 1, we wish to emphasize that our interest really involves the two verbs of giving.

[3]Kuno (1987) defines *age-ru* 'give' as a semi-honorific verb, and used *yar-u* 'give' instead as an informal form that is parallel to *kure-ru* 'give' and *mora(w)-u* 'receive.' However, *yar-u* 'give' sounds rude in colloquial speech, and it is inappropriate for children, thus we consistently use *age-ru* 'give' (a far more child-appropriate verb) in this article.

[4]Kuno (1987) argues that the empathy associated with *age-ru* as a main verb is not as strong as *age-ru* as a supporting verb (henceforth, a benefactive verb), but we will not discuss this difference any further because our experiments only used *age-ru* as a supporting verb.

Even though these verbs are different in terms of empathy encoding, empathy seems invisible in the example sentences we have seen thus far. That is, how can we detect the different empathy loci among these verbs without reading the speaker's mind? Fortunately, there are several linguistic clues that show that these verbs actually do encode the speaker's empathy, of which we present two: (i) the distribution of first-person pronouns, and (ii) the binding of the anaphor *zibun* 'self,' explained in the following.

First, the empathy restrictions of *age-ru, kure-ru*, and *mora(w)-u* can be grammatically detected by using a first-person pronoun, such as *watasi* 'I.' First-person arguments refer to the speaker (obviously), and this means such arguments are ranked highest in terms of empathy: There is no event participant that speakers can empathize with more than themselves (Speech Act Empathy Hierarchy, Kuno 1987:212). Because the referent of a first-person pronoun (the speaker) is ranked highest in empathy ranking, first-person arguments can only appear in the argument position that is defined as the empathy locus by the verb. In other words, if the first-person argument occurs in a non-empathy position, this yields a conflict of empathy relationships (first person being highest in empathy, the position it occurs in being for arguments that are lower in empathy), and this results in the sentence being judged as unacceptable. One way to think of this is that such a configuration results in two empathy loci in the same sentence: the empathy locus specified by the verb and the empathy locus specified by the first-person argument.

(9) a. **Watasi-ga** Mary-ni present-o katte **AGE**-ta.
I-NOM Mary-DAT present-ACC buy give-PST
'I bought a present for Mary.'

b.* Mary-ga **watasi-ni** present-o katte **AGE**-ta.
Mary-NOM I-DAT present-ACC buy give-PST
'Mary bought a present for me.'
(adapted from Kuno 1987:246)

(10) a.* **Watasi-ga** Mary-ni present-o katte **KURE**-ta.
I-NOM Mary-DAT present-ACC buy give-PST
'I bought a present for Mary.'

b. John-ga **watasi-ni** present-o katte **KURE**-ta.
John-NOM I-DAT present-ACC buy give-PST
'John bought a present for me.'
(adapted from Kuno 1987:246)

(11) a. **Watasi-ga** John-ni present-o katte **MORAT**-ta.
I-NOM John-DAT present-ACC buy receive-PST
'I received a benefit from John's buying a present.'

b.?? John-ga **watasi-ni** present-o katte **MORAT**-ta.
John-NOM I-DAT present-ACC buy receive-PST
'John received a benefit from my buying a present.'
(adapted from Kuno 1987:251–252)

The upshot is that if one of the arguments of a sentence is a first-person argument, *age-ru* requires this first-person argument to appear in the subject position (9); *kure-ru* requires the first-person argument to appear in a non-subject position (10); and *mora(w)-u* requires the first-person argument to appear in the subject position (11; judgments of these sentences are from Kuno 1987).

These verbs' empathy restrictions have consequences for interpretation, not just acceptability, which is most noticeable when both the subject and indirect object arguments are null. Imagine a situation where John and Mary had a gift-exchanging event yesterday, and now John utters the sentences 12 to 14 (the parentheses indicate null arguments). Different empathy verbs give us different

interpretations, since the speaker, John, has to be interpreted as an empathy locus encoded by each verb. Therefore, with *age-ru* in 12, *John* is interpreted as the giver of the flower, whereas with *kure-ru* and *mora(w)-u* in 13 and 14, *John* is interpreted as the recipient of the flower.

(12)	Kinou	(giver)	(recipient)	hana-o	katte age-ta-yo.
	Yesterday			flower-ACC	buy give-PST-SFP
(13)	Kinou	(giver)	(recipient)	hana-o	katte kure-ta-yo.
	Yesterday			flower-ACC	buy give-PST-SFP
(14)	Kinou	(giver)	(recipient)	hana-o	katte morat-ta-yo.
	Yesterday			flower-ACC	buy receive-PST-SFP

We will take advantage of this interpretive contrast in Experiment 1.

A second diagnostic for empathy comes from the reflexive *zibun* 'self.' One well-known property of *zibun* is that it takes as its antecedent an argument in an empathy locus. This means that *zibun*'s antecedent is dependent on which verb of giving/receiving is used (Kuno & Kaburaki 1977; Kuno 1987; see also Kishida 2011; Nishigauchi 2014; Oshima 2004, 2007). Let us begin with some basic facts about *zibun* that do not involve the verbs of giving/receiving. Consider example 15, which shows a complex sentence containing *zibun* 'self' in an embedded clause.[5]

(15)	Taroo$_i$-wa	[Hanako$_j$-ga	zibun$_{i/j}$-o	home-ta	atoni]	kaet-ta.
	Taro-TOP	Hanako-NOM	self-ACC	praise-PST	after	go.home-PST
	'Taro went home after Hanako praised self.'					
	(modified from Umeda et al. 2017)[5]					

As is well known, *zibun* 'self' allows both local and long-distance antecedents (similar to Korean *caki*, Chinese *ziji*, Germanic *sig/zich*, etc.). Therefore, 15 is ambiguous as to the antecedent of *zibun*: It could be the matrix subject (*Taroo*) or it could be the embedded subject (*Hanako*). Now consider a similar sentence with a verb of giving added, in this case *age-ru*, to the main verb *home-ru* 'praise':

(16)	Taroo$_i$-wa	[Hanako$_j$-ga	zibun$_{*i/j}$-o	homete	**AGE**-ta	atoni]	kaet-ta.
	Taro-TOP	Hanako-NOM	self-ACC	praise	give-PST	after	go.home-PST
	'Taro went home after Hanako praised herself.'						
	(modified from Umeda et al. 2017)						

Age-ru ranks the local (clause-mate) subject, *Hanako*, highest in the empathy ranking (see 8). Because *Hanako* is the empathy locus, this becomes the most preferred antecedent to *zibun* in this sentence. Therefore, with *age-ru*, a local interpretation of *zibun* is strongly preferred. Eliciting such readings from native speakers is delicate because the self-benefit interpretation is unusual - we will come back to this when we discuss the results of our second experiment.

Turning now to *kure-ru* (17), we see a change in readings.

(17)	Taroo$_i$-wa	[Hanako$_j$-ga	zibun$_{i/*j}$-o	homete	**KURE**-ta	atoni]	kaet-ta.
	Taro-TOP	Hanako-NOM	self-ACC	praise	give-PST	after	go.home-PST
	'Taro went home after Hanako praised him.'						
	(modified from Umeda et al. 2017)						

Kure-ru ranks non-subject arguments higher than subject arguments in the same clause. In sentence 17 then, the clause-mate subject, *Hanako*, is "downgraded" in empathy ranking, thus preventing it from serving as the empathy locus of the sentence. Because *zibun*'s antecedent must

[5]Umeda et al. (2017) tested the L2 acquisition of two types of long-distance reflexive, *zibun* (empathic *zibun* and logophoric *zibun*) by Chinese L2ers of Japanese. Our second experiment adopted Umeda et al.'s (2017) sentence types of the empathic *zibun* (*atode* 'after'-clauses and kae-ru 'go.home' as a matrix verb). See Umeda et al. (2017) for detailed discussions.

Table 1. Summary of the properties of *age-ru, kure-ru*, and *mora(w)-u*.

Verbs	*age-ru* 'give'		*kure-ru* 'give'		*mora(w)-u* 'receive'	
Grammatical roles	Subject	Non-subject	Subject	Non-subject	Subject	Non-subject
Theta-roles	Giver of a benefit	Recipient of a benefit	Giver of a benefit	Recipient of a benefit	Recipient of a benefit	Giver of a benefit
Distribution of a first person	Subject (Giver of a benefit)		Non-subject (Recipient of a benefit)		Subject (Recipient of a benefit)	
Binding of *zibun* 'self'	Embedded subject (Giver of a benefit)		Matrix subject (Recipient of a benefit)		Embedded subject (Recipient of a benefit)	

be an empathy locus, the clause-mate subject (*Hanako*) is ruled out as a possible antecedent to *zibun*. Moreover, empathic *zibun* requires a subject antecedent (e.g., Oshima 2007:23). This leads to the matrix (long-distance) subject, *Taroo*, being the most preferred antecedent for *zibun*. Thus with *kure-ru* 'give,' a long-distance interpretation of *zibun* is strongly preferred.

Finally, 18 is a complex sentence with *zibun* and *mora(w)-u* 'receive.' We did not test this particular pattern, but we present it here to make the differences among the three verbs clear.

With *mora(w)-u*, like *age-ru*, the local subject, *Hanako*, is the empathy locus. Therefore, *zibun* strongly prefers *Hanako* to be the antecedent. Note that this pattern has not been reported previously, as far as we know, and this is an informal judgment of the first author and two of her Japanese-speaking colleagues.

(18) Taroo$_i$-wa [Hanako$_j$-ga zibun$_{*i/j}$-o homete **MORAT**-ta atoni] kaet-ta.
Taro-TOP Hanako-NOM self-ACC praise receive-PST after go.home-PST
'(intended) Taro went home after Hanako received a benefit of someone's praising her.'

Table 1 summarizes the observations discussed so far.

In this article, we investigate whether Japanese preschool children (4- to 6-year-olds) know the empathy-encoding properties of the verbs of giving/receiving. We investigate this question through the lens of the distribution of first-person pronouns and the binding of *zibun* 'self.' The rest of this paper is organized as follows. Section 3 reviews previous acquisition studies testing the verbs of giving/receiving, and shows that previous findings are mixed. Section 4 presents our analysis of input frequencies of these verbs, showing that the results from previous studies in the literature cannot be accounted for by recourse to input frequencies alone. We then turn to our two experiments in Section 5 and Section 6, and Section 7 discusses the overall findings and concludes this article.

3. Previous studies on the acquisition of the verbs of giving/receiving in Japanese

Previous work on the acquisition of the verbs of giving/receiving, *age-ru* 'give,' *kure-ru* 'give,' and *mora(w)-u* 'receive,' report mixed findings, broadly categorized into production versus comprehension data.

Spontaneous speech data from one child (2;00–3;01) reported by Horiguchi (1979) (also discussed by Clancy 1985) shows that this child often incorrectly produced *kure-ru* 'give' with a first-person subject (43.3%, 65/150), but he incorrectly produced *age-ru* 'give' and *mora(w)-u* 'receive' with a first-person indirect object less frequently (9.9%, 66/669, for *age-ru*; 16.3%, 16/98, for *mora(w)-u*).[6] This indicates an asymmetry in the difficulty of these three verbs: *Kure-ru* appears to pose more of a challenge to children (at least insofar as the distribution of a first-person pronoun is concerned) than *age-ru* or *mora(w)-u*. Moreover, Uyeno et al. (1978) conduct several experiments, and in their elicited imitation task, they reveal an asymmetry: When the target sentence included *kure-ru*, 4- to 6-year-olds often produced *age-ru* instead of *kure-ru*, but when the target sentence included *age-ru*,

[6]The data shown here are combined results of those verbs as simple verbs and benefactive verbs. See Horiguchi (1979) for separate results of simple verbs and benefactive verbs.

children less frequently used *kure-ru*. And when the target sentence included *mora(w)-u*, children rarely used *age-ru* or *kure-ru*.[7] These previous studies indicate that the locus of difficulty appears to be *kure-ru; age-ru* and *mora(w)-u* occupy a position of privilege over *kure-ru*.

Comprehension studies, on the other hand, provide a very different picture of these three verbs of giving/receiving. For example, Uyeno et al.'s (1978) other experiments report that *mora(w)-u* is most problematic for children. They tested 3- to 6-year-olds with a picture-sentence matching task and an act-out task, the results of which showed that the children matched pictures and acted out sentences more accurately when the test sentence involved *age-ru* or *kure-ru* (with no significant differences between these two verbs) but not so for sentences involving *mora(w)-u*. Ishiguro (1985)[8] showed a similar but somewhat different picture. His act-out experiment revealed that children aged 3;05-4;06 were more accurate with *age-ru* than *kure-ru*, and both were responded to more accurately than *mora(w)-u*. Children aged 4;07-5;04 still have difficulty with *kure-ru* and *mora(w)-u*, but their accuracy on *kure-ru* and their accuracy on *mora(w)-u* were almost the same. Okabe (2005, 2011) also reported findings that partially corroborate those of Uyeno et al. (1978) and Ishiguro (1985). Okabe tested 4- to 6-year-old children using a Truth Value Judgment task (Crain & Thornton 1998), the results of which revealed that children have difficulty with *mora(w)-u* but not with *age-ru* (note: *kure-ru* was not tested).[9] These comprehension studies indicate that *age-ru* and *kure-ru* have privilege over *mora(w)-u* in contrast to results from production studies.

As this review shows, the acquisition of Japanese verbs of giving/receiving has been investigated for decades, but the previous findings are not uniform and the source of difficulty is still controversial. Moreover, as far as we know, previous experimental studies have not focused on the question of whether Japanese children have knowledge of the empathy-encoding properties associated with these verbs.

In this article, we investigate the understudied phenomenon of empathy verbs of giving/receiving in child language. We examine whether Japanese-acquiring 4- to 6-year-old children know the distinctions among *age-ru, kure-ru*, and *mora(w)-u* in terms of empathy by using two linguistic diagnostics: the distribution of first-person arguments (Experiment 1) and the binding of *zibun* 'self' (Experiment 2). Both experiments consistently show the following two findings. First, *kure-ru* is more challenging than other verbs for some children (contra the comprehension studies reviewed previously). Second, some young children are adult-like in their comprehension of verbs of giving/receiving with respect to both the distribution of first-person arguments and the binding of *zibun*, indicating that some children acquire this subtle property of empathy-encoding properties of the verbs as early as age 4 and certainly by age 6.

4. Evidence from the input: Corpus study

The studies reviewed in the previous section suggest that the verbs of giving/receiving—*age-ru, kure-ru*, and *mora(w)-u*—pose different challenges to children. In this section, we consider here whether these differences might be accounted for by differences in the frequencies of these verbs in the input. We conducted three types of corpus analyses of child-directed speech by four caregivers in the

[7]More specifically, overall, most of the errors were (incorrect) production of *age-ru* when the stimulus sentence was *kure-ru*, but younger children (4-year-olds) sometimes erroneously produced *kure-ru* when the stimulus sentence was *age-ru* and when the verb was used as a benefactive form (but not a simple form).

[8]Ishiguro (1985) tested both canonical and scrambled word order sentences with *age-ru, kure-ru*, and *mora(w)-u*, and the results are far too complex for a discussion here. Moreover, those complexities are not relevant to the current article.

[9]Okabe's (2005, 2011) work is far deeper than what we can cover in this article. Okabe (2005) showed that 4- to 6-year-olds' performance on *mora(w)-u* 'receive' improved when a source argument (i.e., a giver argument in (7)) was *kara* 'from'-marked, as opposed to being *ni*- 'DAT'-marked. Furthermore, Okabe (2011) showed that 4- to 6-year-olds performed well on *mora(w)-u* even with a *ni*-marked source argument when it is an indirect benefactive sentence (i.e., the subject argument of *mora(w)-u* is not an actual recipient of the accusative object but a recipient of a benefit), but not a direct benefactive sentence. None of this detracts from our point, which is that comprehension studies appear to show (contrary to the results of production studies reviewed earlier) that the locus of difficulty for children is *mora(w)-u*.

Table 2. Rate (%) of each verb of giving/receiving over all verbs in child-directed speech.

	age 'give'	*kure* 'give'	*mora* 'receive'
Arika (2;11–5;00)	0.72% (199/27,636)	0.75% (210/27,636)	0.30% (85/27,636)
Asato (3;00–5;00)	0.74% (280/37,562)	0.62% (234/37,562)	0.20% (78/37,562)
Nanami (1;01–5;00)	1.76% (614/34,760)	0.90% (316/34,760)	0.23% (80/34,760)
Tomito (2;11–5;01)	1.52% (261/17,142)	0.60% (103/17,142)	0.32% (56/17,142)
Total	1.15% (1,354/117,100)	0.73% (863/117,100)	0.25% (299/117,100)

CHILDES database (MacWhinney 2000). We used data from Arika, Asato, Nanami, and Tomito in MiiPro corpus (Miyata 2012). The first and the second corpus analyses targeted instances of the verbs of giving/receiving, and the third corpus analysis targeted instances of *zibun* 'self' with those verbs.

In the first corpus analysis, we identified all caregivers' utterances that contain the roots of the verbs *age, kure*, and *mora* (note: the data combine both the simple verb forms and benefactive verb forms). We then checked the context of each utterance by hand to exclude data other than the target utterances. The excluded data contained (i) homonyms and words that share the same sound as the roots of the target verbs (e.g., *age-ru* 'lift, deep-fly,' *kureensha* 'a crane track,' *moras-u* 'let something leak,' etc.), and (ii) utterances that are not spontaneous or child-directed speech (e.g., when the mother sang a song or spoke to the child's sibling but not the target child, etc.).[10]

After all exclusions, we aggregated the remaining utterances, presented in Table 2, which shows the rate of each caregiver's utterances of the verbs of giving/receiving over all verbal utterances.[11]

Of the three verbs, *mora(w)-u* 'receive' is the least frequent in the input to every child. The relative frequency of *age-ru* and *kure-ru* was different between children: *Kure-ru* was as frequent as *age-ru* in the input to Arika and Asato, and *age-ru* was much more frequent than *kure-ru* in the input to Nanami and Tomito.

Based on this corpus analysis, a simple frequency-based theory of acquisition predicts *mora(w)-u* to be the most difficult for children to acquire, and indeed previous comprehension studies (Okabe 2005, 2011; Uyeno et al. 1978) are consistent with this prediction (cf. the spontaneous speech results, Horiguchi 1979, and the repetition experiment, Uyeno et al. 1978). As we will see, the results from our experiments are not consistent with this input-based prediction, and thus we propose that children's differing performance with these verbs comes from a factor (or factors) other than the mere frequency with which children experience each verb.

Recall that first-person pronouns are restricted in their occurrence with each of these verbs: The first-person pronoun can only occur in the verb-determined empathy locus position. One might wonder if evidence for this distribution is available in the input to children. If so, it is possible that children might use this as a pathway into the empathy properties of each of the verbs of giving/receiving. In our second corpus analysis we investigate this issue in the same corpora discussed previously.

One complication with trying to determine whether first-person pronouns occur in empathy locus positions in the input is that first-person pronouns are almost always null (unpronounced) in Japanese. We therefore inspected all instances of *age-ru, kure-ru*, and *mora(w)-u* in child-directed speech, identifying all utterances that contained either an overt first-person pronoun, or (as best could be determined from context) a null first-person argument in the verb-determined empathy position. We found 927 instances of *age-ru* with first-person subjects, 625 instances of *kure-ru* with first-person non-subjects, and 134 instances of *mora(w)-u* with first-person subjects across all four children. Thus (taking data from Table 2), of the 1,354 instances of *age-ru*, 68% occur with clear first-person subjects; of the 863 instances of *kure-ru*, 72% occur

[10]We found transcriptions that seem to be duplicated in the MiiPro corpus because there were some pairs of utterances that appeared in exactly the same contexts but were assigned different line numbers in the corpus. We excluded those seemingly duplicated utterances by hand.

[11]Japanese has a verbal noun, *choodai*, which requires the speaker to be a non-subject recipient argument like *kure-ru*. *Choodai* is frequently used in imperative forms, such as *omotya choodai*! 'Give me the toy!. We do not report the input frequency of *choodai* above because *choodai* and *kure-ru* are different verbs, and we cannot assume that children who know *kure-ru* also know *choodai* or vice versa. For interested readers, Table 2a shows the input frequency of *kure-ru* and *choodai*:

Table 2a. Instances of *kure* and *choodai* over all verbs in child-directed speech.

	kure 'give'	*choodai* 'give'
Arika (2;11–5;00)	210/27,636	42/27,636
Asato (3;00–5;00)	234/37,562	172/37,562
Nanami (1;01–5;00)	316/34,760	126/34,760
Tomito (2;11–5;01)	103/17,142	16/17,142
Total	863/117,100	356/117,100

with first-person non-subjects; and of the 299 instances of *mora(w)-u*, 45% occur with first-person subjects. Note that these are only the instances that were clear to the first author, and so the real numbers are likely higher. And importantly, of all these first-person arguments (either overt or null), *none* appeared in non-empathy positions. This indicates that there is plenty of positive evidence in the input to acquire the empathy-encoding properties of the empathy verbs based on the distribution of the first-person referents. This does require that children be able to detect this statistical regularity and to know the link between first-person pronouns and empathy—an issue we return to in the discussion section.

The third corpus analysis explores whether children receive any positive evidence in terms of the binding of *zibun* 'self' associated with the verbs of giving/receiving (note: even though we did not experimentally test the pattern of *zibun* + *mora(w)-u* 'receive,' we examined the input frequency of this pattern too). Table 3 shows total instances of *zibun* over all utterances by the caregivers, and Table 4 shows instances of *zibun* co-occurring with any verb of giving/receiving in the same sentence, over all utterances with *zibun*. Again, utterances that are not spontaneous or child-directed speech are excluded.

From Table 3 we see that *zibun* is extremely rare overall, occurring in approximately 0.23% of utterances. Moreover, we only found five instances of *zibun* occurring with the verbs of giving/receiving in total. And what's more, none of the five instances provide positive evidence of the restrictions on binding for the following reasons. First, one instance of *zibun* and *age-ru* and one instance of *zibun* and *kure-ru* appeared in simple sentences (i.e., no embedding). Second, three relevant instances of *zibun* occurred with a form *zibun-de* 'by self.' *Zibun-de* is generally viewed as an adverbial idiom that is used "to emphasize that the action described by a sentence is performed by the subject referent, and not by some other person" as in the English sentence like *John painted the wall himself* (Gast & Siemund 2006; Kishida 2011), and it has a strong locality requirement in the adult grammar even if *zibun* allows long-distance antecedents (Kano & Nakayama 2004; Kishida 2011; Orita et al. 2021). Therefore, positive evidence of the empathic restrictions on *zibun*'s antecedent is vanishingly rare, perhaps utterly nonexistent, and thus children are very unlikely to learn this property just from the input.

Table 3. Instances of *zibun* over all utterances by caregivers.

	zibun 'self'
Arika (2;11–5;00)	38/40,412 (0.09%)
Asato (3;00–5;00)	142/14,937 (0.95%)
Nanami (1;01–5;00)	48/58,324 (0.08%)
Tomito (2;11–5;01)	87/18,657 (0.46%)
Total	315/132,330 (0.23%)

Table 4. Instances of *zibun* with give/receive verbs over all utterances of *zibun*.

	zibun + *age* 'give'	*zibun* + *kure* 'give'	*zibun* + *mora* 'receive'
Arika (2;11-5;0)	0/38	1/38	1/38
Asato (3;0-5;0)	0/142	1/142	0/142
Nanami (1;1-5;0)	0/48	0/48	0/48
Tomito (2;11-5;1)	1/87	1/87	0/87
Total	1/315	3/315	1/315

Our analysis of corpora shows us that children receive positive evidence for the distribution of first-person arguments with empathy verbs, while there is no positive evidence for the binding of *zibun* 'self' associated with these verbs. Given this, we investigate (i) whether Japanese 4–6-year-old children know the distribution of first-person arguments with the empathy verbs (Experiment 1), and (ii) whether they can apply this knowledge to the binding property of *zibun* which they have never been exposed to before (Experiment 2).

5. Experiment 1: Acquisition of the distribution of first-person arguments

We begin our experimental investigation of the verbs of giving/receiving with the question of whether Japanese children show evidence of knowledge of the different empathy-encoding properties of the three verbs. To test this, we make use of the distribution of first-person arguments as a diagnostic, as discussed previously, and repeated in Table 5. Recall that first-person arguments are restricted to grammatical positions that are determined by the verb of giving/receiving as the empathy locus of the sentence. We note again that of particular interest to us is the difference between *age-ru* 'give' and *kure-ru* 'give,' given their identity in the subcategorization frame (giver as a subject), with only empathy differing.

5.1. *Participants*

We tested a total of 60 children 4 to 6 years old, excluding 19 children (the exclusion criteria are explained in Section 5.2), leaving 41 child participants (shown in Table 6). The children belonged to a kindergarten in Shizuoka or Tokyo in Japan, and they were tested in a quiet room individually by the first author. The adults were also tested in a quiet room individually by the first author.

We conducted two experiments but combined them into Experiment 1. We first tested all three verbs, *age-ru, kure-ru*, and *mora(w)-u*, with 16 children (five 4-year-olds, six 5-year-olds, and five 6-year-olds). We then tested only *age-ru* and *kure-ru* with an additional 25 children (thirteen 4-year-olds and twelve 5-year-olds) with the same method. Hence, the total number of items of *mora(w)-u* is fewer than *age-ru* and *kure-ru*. This is because, as mentioned several times previously, our focus in this article is the difference between *age-ru* and *kure-ru*, which have the same subcategorization frame (giver as a subject) but are different only in terms of speaker's empathy.[12]

Table 5. The argument that can be a first person derived by *age-ru* and *kure-ru*.

	age-ru 'give'	*kure-ru* 'give'	*mora(w)-u* 'receive'
Distribution of a first person	Subject (Giver of a benefit)	Non-subject (Recipient of a benefit)	Subject (Recipient of a benefit)

Table 6. Participants of Experiment 1 (after exclusions).

	Children (n = 41)			
	4-year-olds (n = 18)	5-year-olds (n = 18)	6-year-olds (n = 5)	Adults (n = 17)
Age range	4;01–4;11 (Mean = 4;06, SD = 4.33)	5;00–5;10 (Mean = 5;04, SD = 4.35)	6;03–6;06 (Mean = 6;03, SD = 1.30)	19–59

[12]Here is more detailed explanation of why we did not include *mora(w)-u* in the second round of Experiment 1. In the second round, we added another task (after the TVJT, and so the additional task did not impact the results of the TVJT), which is not reported in this article. This second task was the Dimensional Change Card Sort (DCCS) task (Zelazo 2006). This task measures how quickly the children can switch their perspective from one dimension to another, and we examined whether children's ability to switch perspective in the DCCS task correlates with their performance with *age-ru* and *kure-ru*. This additional experimentation meant we needed to streamline the TVJT in some way, and we did so by excluding items with *mora(w)-u* (because our crucial interest was the difference between *age-ru* and *kure-ru*). The results of the correlation between DCCS and TVJT are reported in Ohba & Deen (2020).

Because we found no significant main effect of *Experimental Session* (with *mora(w)-u* vs. without *mora(w)-u*) on the accuracy of *age-ru* and *kure-ru* ($\beta = -1.19$, $SE = 1.10$, $p = .27$) and no significant interaction between *Verb Type* (*age-ru* vs. *kure-ru*) and *Experimental Session* (with *mora(w)-u* vs. without *mora(w)-u*) ($\beta = .79$, $SE = 1.16$, $p = .49$),[13] we will report aggregated results in the results section.

5.2. Materials and procedure

We used the Truth Value Judgment Task (TVJT; Crain & Thornton 1998). The TVJT stories were animated using Microsoft PowerPoint and were shown to each child on a laptop computer. There was only one factor in this experiment: *Verb type* (*age-ru, kure-ru*, and *mora(w)-u*; the last verb was given to 16 of the 41 children). There were three practice items, twelve test items that consisted of four items each for *age-ru, kure-ru*, and *mora(w)-u*, and six filler items (see Supplementary Appendix A for the complete set of items). The practice items were provided at the beginning of the experiment, and the filler items were randomly interspersed among the test items. In every test item, the main verb was *ka(w)-u* 'buy,' which was presented in the benefactive construction, as in *katte-age-ru* 'buy-give,' meaning "to buy (for the benefit of)."

In this experiment, the narrator of the story is a participant of an event described in the story, as shown in Figure 1. The narrating character thus has the floor through the bulk of the story portion of the experiment. After the story was narrated by this character (the panda in Figure 1), the speaking role is handed to another character (the mouse in Figure 2). The purpose of this shift in speaking role was to make the discourse saliency of each animal equal and to bring attention to who the speaker is.[14] The passage in 19 shows a sample story followed by the comprehension questions about the story. Each story line was accompanied by a visual scene (only the first scene and the final scene are shown in the following) that depicted what was happening, so the whole item took on the flavor of an animated, voiced story. We excluded the 19 children who could not correctly answer these comprehension questions or who did not answer correctly with practice items at the beginning of the experiment.[15] The task was to judge whether the speaker of the test sentence is telling the truth or a lie to a dinosaur, who pops up after the story. The last scene of the story was visible while participants heard the test sentence to prevent complications with remembering the story.

[13]We ran a simple logistic regression model with *Accuracy* (correct vs. incorrect) as a response variable and with *Verb Type* (*age-ru* vs. *kure-ru*) and *Experimental Session* (with *mora(w)-u* or without *mora(w)-u*) as predictor variables.

[14]One of the reviewers asked why the character uttering the test sentences was not varied between the one speaking first and second because this might have influenced the results. As shown in the following, the experiment is a complex one, and adding this as an additional factor would have resulted in unnecessary complexity. We think that the nonvariability of the speakers has little or no effect and does not explain our main finding (that young children performed well with *age-ru* and *mora(w)-u* but not with *kure-ru*, discussed in more detail later), since the same method was used for test sentences involving all three verbs.

[15]Seven children were excluded because they answered "true" to at least one false practice item. We also excluded two children who answered "false" to a true practice item. Ten children were also excluded because they did not answer correctly to at least one comprehension question given before a test sentence. When the child could not satisfy at least aforementioned one criterion, we did not test the child any further and finished the session. Thus the large number of exclusions is partly due to these strict exclusion criteria. Moreover, the remaining 41 children performed perfectly with the practice items (100%, 123/123) and almost perfectly with the filler items (96.7%, 238/246).

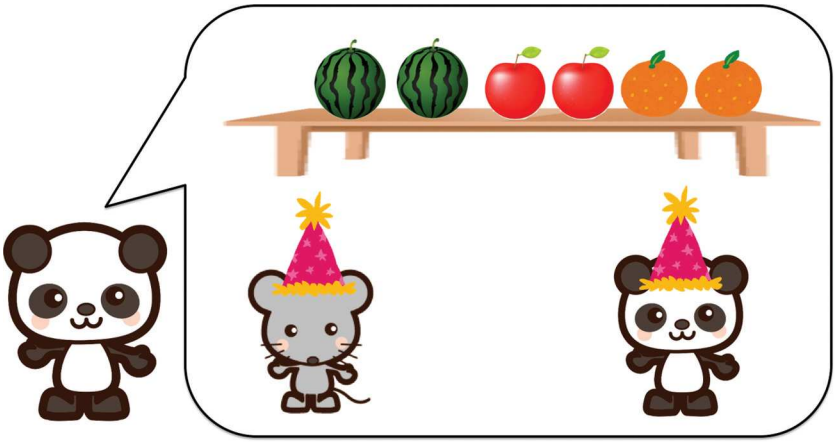


Figure 1. The first scene of the story.

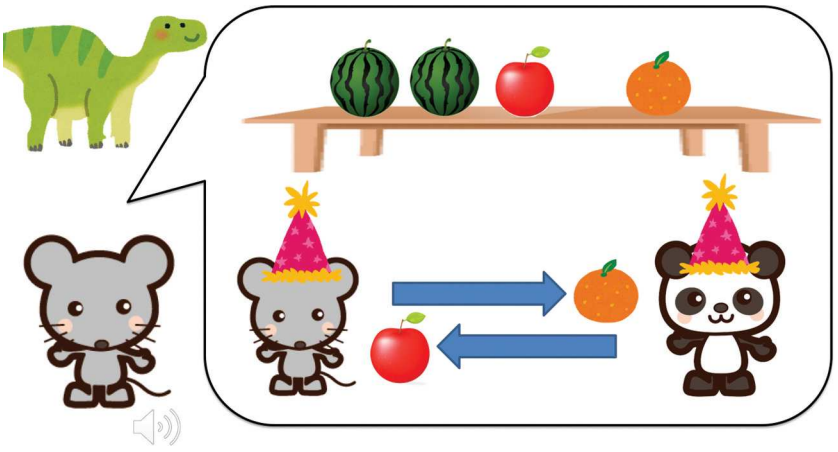


Figure 2. The last scene of the story.

(19) a. **The panda**: Yesterday was my (the panda's) and the mouse's birthday, so we decided to do a present exchange. I was about to buy an orange, but because the mouse didn't like oranges, I bought an apple for the mouse. The mouse was about to buy an apple for me as well, but the apples were expensive, so the mouse bought an orange for me.

b. **Comprehension questions (asked by the experimenter to the child):**
i. What did the mouse buy? (answer: the orange)
ii. What did the panda buy? (answer: the apple)

c. **Lead-in (spoken by the experimenter, addressing the child):**
Instead of the panda who got very tired of telling the story, the mouse is going to tell the dinosaur something about the story. However, the mouse sometimes tells the truth and sometimes tells a lie to the dinosaur. Can you tell the dinosaur whether the mouse tells the truth or a lie?

Examples 20a to 22a show the test sentences of *age-ru*, *kure-ru*, and *mora(w)-u*.[16] Most crucially, both the subject and the indirect object were elided in every test sentence (elided material shown in parentheses in the following examples). This manipulation allows us to investigate to which null argument—the subject or the indirect object—children assign first-

[16]We used different stories for each test sentence in the actual experiment. See Supplementary Appendix A.

person reference (i.e., the speaker of the test sentence). Examples 20a to 22a show the actual test sentences; 20b to 22b show the target interpretations, that is, interpretations after the first-person referent is assigned to the correct argument position based on the empathy-encoding property of the verb.

(20) *Age-ru* 'give' (EMPATHY LOCUS: GIVER SUBJECT)

a. Test sentence provided by the mouse

Kinou	(giver)	(recipient)	orenzi-o	katte **AGE**-ta-yo.
Yesterday			orange-ACC	buy give-PST-SFP

b. Correct interpretation: TRUE

Kinou	**watasi-ga**	panda-ni	orenzi-o	katte **AGE**-ta-yo.
Yesterday	I-NOM	panda-DAT	orenzi-ACC	buy give-PST-SFP

'Yesterday, I bought an orange for the panda.'

(21) *Kure-ru* 'give' (EMPATHY LOCUS: RECIPIENT NON-SUBJECT)

a. Test sentence provided by the mouse

Kinou	(giver)	(recipient)	orenzi-o	katte **KURE**-ta-yo.
Yesterday			orange-ACC	buy give-PST-SFP

b. Correct interpretation: FALSE

Kinou	panda-ga	**watasi-ni**	orenzi-o	katte **KURE**-ta-yo.
Yesterday	panda-NOM	I-DAT	orenzi-ACC	buy give-PST-SFP

'Yesterday, the panda bought an orange for me.'

(22) *Mora(w)-u* 'receive' (EMPATHY LOCUS: RECIPIENT SUBJECT)

a. Test sentence provided by the mouse

Kinou	(recipient)	(giver)	orenzi-o	katte **MORAT**-ta-yo.
Yesterday			orange-ACC	buy receive-PST-SFP

b. Correct interpretation: FALSE

Kinou	**watasi-ga**	panda-ni	orenzi-o	katte **MORAT**-ta-yo.
Yesterday	I-NOM	panda-DAT	orange-ACC	buy receive-PST-SFP

'Yesterday, the panda bought an orange for me (literally: I received a benefit from the panda's buying an orange.')

Recall that the first-person referent tracks the empathy locus established by the verbs of giving/receiving. That means the first-person referent should be a giver subject with *age-ru*, it should be a recipient indirect object with *kure-ru*, and it should be a recipient subject with *mora(w)-u*. Therefore, in 20, the first-person referent (the mouse) should be the giver of the orange, yielding a true answer—although in 21 and 22, the mouse should be the recipient, yielding an expected false answer in this item for each of the verbs *kure-ru* and *mora(w)-u*. Each verb was tested with four items (12 total critical test items), half of which were target-true and half of which were target-false.

5.3. *Results of Experiment 1*

5.3.1. *Overall results*

Figure 3 indicates the percentages of "yes" answers by *Verb Type* (*age-ru, kure-ru*, and *mora(w)-u*), *Target Answer* (true vs. false), and *Group* (adults and children). As we mentioned in Secion 5.1, only a subset of the participants was tested with *mora(w)-u*. That is, all the 41 children and 17 adults were tested with *age-ru* and *kure-ru*, but 16 of the children and 13 of the adults were tested with *mora(w)-u* as well as *age-ru* and *kure-ru*. Again, there was no significant difference between children in the different groups (with *mora(w)-u* or without *mora(w)-u*) as we reported in 5.1, thus we show the aggregated results.

As predicted, the adults performed perfectly with all the verbs of giving/receiving by giving "yes" responses to true conditions 100% of the time and giving "yes" responses to false conditions 0% of the time. As for children, they comprehended *age-ru* and *mora(w)-u* in an adult-like way in that they correctly gave "yes" responses to true conditions over 90% of the time and incorrectly gave "yes" responses to false conditions less than 10% of the time. This indicates that they correctly interpret sentences with *age-ru* and *mora(w)-u* with a first-person subject. However, their accuracy with *kure-ru* was clearly degraded in that they gave "yes" responses to true conditions only 69.5% of the time and incorrectly gave "yes" responses to false conditions 34.1% of the time. This suggests that they tended to

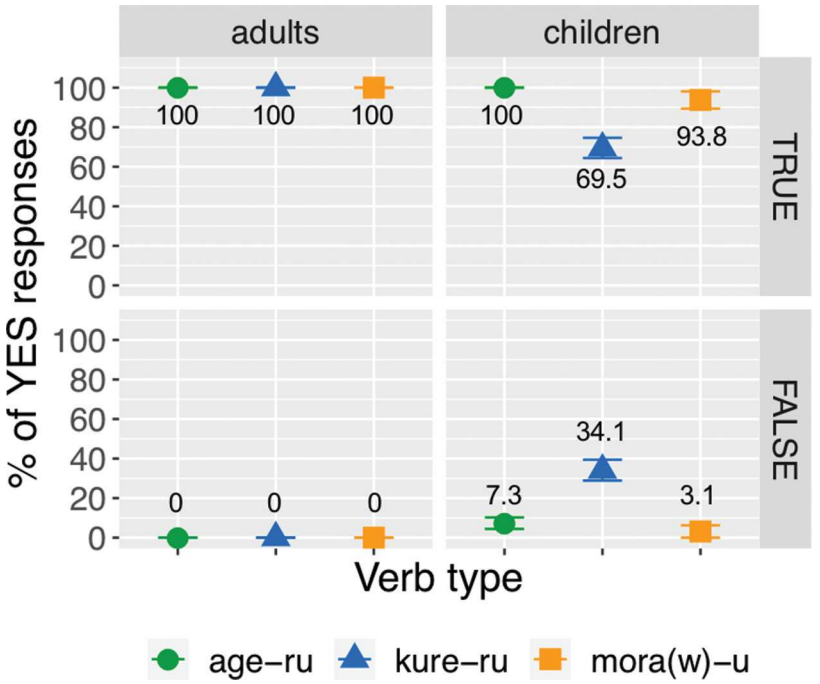


Figure 3. Mean rates (%) of YES responses by *Verb Type, Target Answer*, and *Group*. The error bars show standard errors.

incorrectly interpret sentences with *kure-ru* as having a first-person subject. This result is consistent with the previous studies that reported production data (Horiguchi, 1979) but inconsistent with the previous comprehension studies (Uyeno et al. 1978, etc.). We will discuss possible reasons for the differences from the previous comprehension studies in the general discussion section.

At this point, there are at least two possible reasons for the gap between adults and children in terms of their accuracy with *kure-ru*. First, these children might have not fully acquired the empathy-encoding property of *kure-ru* yet, and thus all of them performed at chance with *kure-ru*. Second, it is also possible that older children correctly interpreted *kure-ru* with a first-person indirect object as adults did, but it was concealed by the aforementioned aggregated results. We address this in the following, focusing on the child data and using *Age* as a predictor variable.

5.3.2. *Children*

To investigate the effect of *Age*, we first show the rates of "yes" responses in each condition divided by *Age Group*, as illustrated in Figure 4.

We found a clear difference in the performance of *kure-ru* among the age groups. The rates of "yes" responses in true conditions went up with age, and the rates of "yes" responses in false conditions went down. Thus, the accuracy of *kure-ru* improves as children grow older.

To examine whether accuracy is significantly different based on *Verb Type* and *Age*, we conducted a statistical analysis in which we coded "yes" responses in the true conditions and "no" responses in the false conditions as "correct (1)," and "yes" responses in the false conditions and "no" responses in the true conditions as "incorrect (0)." The data were fitted into a fixed-effects logistic regression model with *Verb Type* (*age-ru, kure-ru*, and *mora(w)-u*) and *Age* (month of age: continuous) as fixed effects and *Accuracy* (correct vs. incorrect) as a response variable (R Core Team 2019). For the variable *Verb Type*, we made the *age-ru* condition the reference level because all the previous studies and our current study agree that

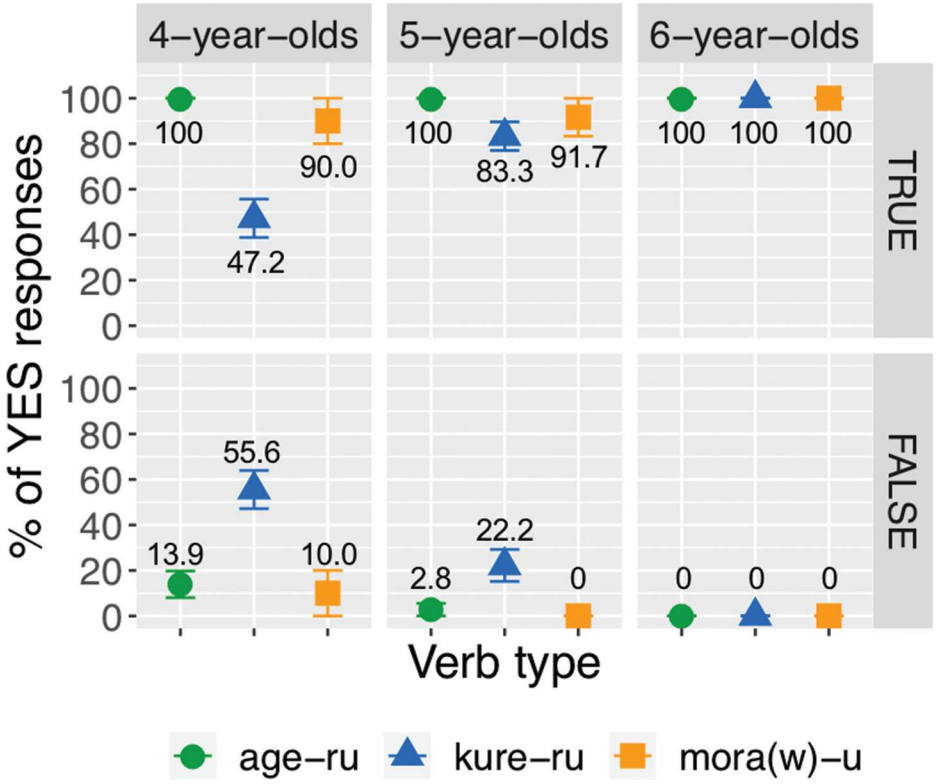


Figure 4. Mean rates (%) of YES responses by *Verb Type* and *Age Group*. The error bars show standard errors.

4-year-olds are fully adult-like in their comprehension of *age-ru*. We did not add any random effect because every possible model including random effect(s) failed to converge. Table 7 indicates the result of this model.

In this model, none of the main effects or interactions were significant. Focusing on the interactions with *Age*, several things become apparent. First, the interaction of *Age* and *Verb Type* (*mora(w)-u*) was not significant. This indicates that the difference in accuracy between *age-ru* and *mora(w)-u* was not significantly different based on children's ages. Looking at Figure 4, we interpret this nonsignificant interaction to indicate that the 4- to 6-year-olds provided adult-like interpretations with both *age-ru* and *mora(w)-u*.

Moreover, we did not find a significant interaction of *Age* and *Verb Type* (*kure-ru*). This was unexpected because the aggregated results in Figure 4 indicate that the younger children performed worse with *kure-ru* than the older children, and all the children performed well with *age-ru*. We speculate that this might be because of variability in the children's performance with *kure-ru*: Some younger

Table 7. Results of the fixed-effects logistic regression for the children in Experiment 1.

	Estimate (β)	Standard Error (*SE*)	*p*
(Intercept)	−4.36	4.16	.29
Verb Type (*kure-ru*)	−3.17	4.53	.48
Verb Type (*mora(w)-u*)	2.85	5.94	.63
Age	.12	.07	.07
Verb Type (*kure-ru*) * Age	.00	.07	.93
Verb Type (*mora(w)-u*) * Age	−.05	.10	.57

Note. Model: glm(Accuracy ~ 1 + Verb Type * Age, family = "binomial")

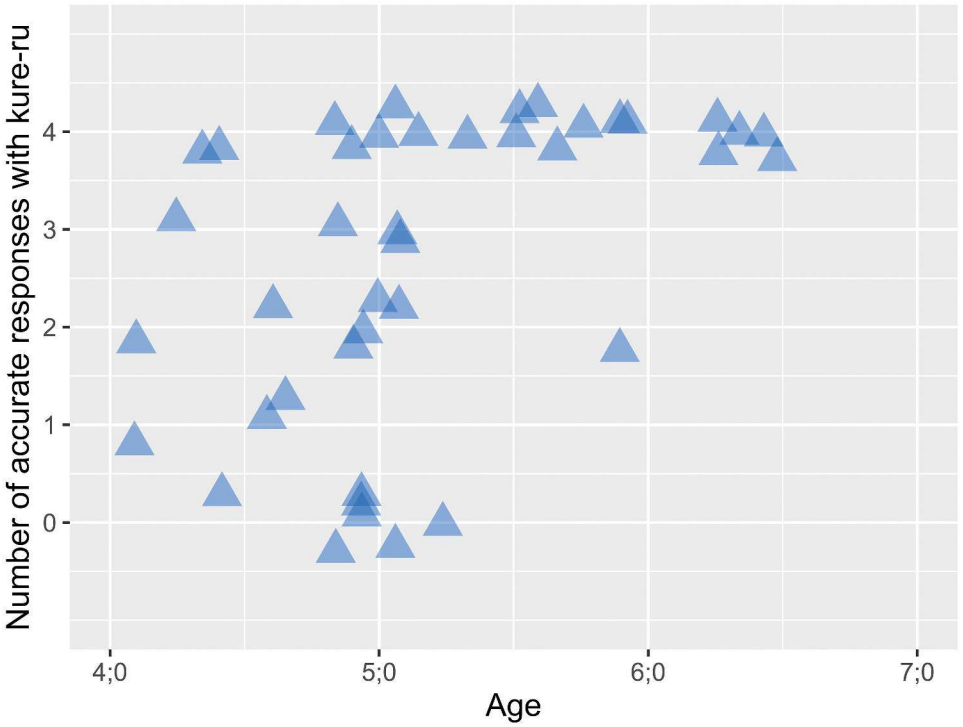


Figure 5. Number of accurate responses with *kure-ru* by the children (n = 41). Overlapping points are jittered.

children might perform well with *kure-ru*, and some older children might perform poorly with *kure-ru*, and thus the age effect was not significant. Therefore, we conducted another analysis to investigate individual differences among the children.

To examine individual differences in the comprehension of *kure-ru*, we created a scatter plot, as shown in Figure 5, with *the number of accurate responses with kure-ru by each child* (0 through 4) on the y-axis and *Age* (month of age) on the x-axis.

As we expected, the individual analysis indicates that there is variability in children's performance. Even though the number of correct responses with *kure-ru* increases as children get older, some younger children showed perfect performance with *kure-ru*, and some older children still show difficulty with *kure-ru*. But the uniform success by the 6-year-olds suggest that children acquire the empathy-encoding property of *kure-ru* by the age of 6.[17]

Recall that the mere frequency of these verbs in child-directed speech (in which *mora(w)-u* was by far the rarest of the three verbs and *age-ru* and *kure-ru* were both relatively frequent) does not reflect in these results, at least not in any straight-forward way. We discuss possible explanations for these results in the general discussion section, which is actually related to input frequency in a different way. Moreover, we would like to acknowledge that our results could certainly be strengthened by the addition of further participants (especially 6-year-olds) and test items. Nonetheless, our data suggest

[17]One of the reviewers suggested a possibility that the children ignored the benefactive verbs at the end of the sentences and only paid attention to the main verb, *ka(w)-u* 'buy.' This suggestion can explain why some of the children incorrectly interpreted *kure-ru* with the first person subject, since without *kure-ru*, it is most natural to assign the first person to the null subject with the verb of buying. However, it cannot explain why even the 4-year-old children correctly comprehended *mora(w)-u* 'receive.' That is, without *mora(w)-u*, the subject is the agent of the buying event, while with *mora(w)-u*, the theta-role of the subject switches to the recipient of the buying event. Therefore, if the children did not pay attention to the benefactive verbs at all, they should not be able to answer correctly with the sentences containing *mora(w)-u*. We therefore think that children did not ignore the benefactive verbs attached to the main verb.

that children as young as age 4 are not challenged by subject empathy verbs (*age-ru* and *mora(w)-u*), some young children have problems with the non-subject empathy verb (*kure-ru*), but children seem to acquire the empathy-encoding property of *kure-ru* before age 6.

5.4. *Interim discussion*

In Experiment 1, we found that 4- to 6-year-old children were adult-like with *age-ru* and *mora(w)-u*, and some children found *kure-ru* a major challenge. We note that these results are not consistent with a simple input frequency of these empathy verbs, nor are the results consistent with previous comprehension studies of verbs of giving/receiving. The results are, however, consistent with previous findings taken from production studies. These results seem to show that Japanese children initially prefer subject empathy, thus leading young children to make errors with *kure-ru*.

However, there remain some outstanding issues for this conclusion at this point. One might argue that while the speaker's empathy is unobservable from the environment, evidence for the distribution of first-person arguments is nonetheless present in the input. This line of reasoning (which we investigate in the following and ultimately reject) says that children simply learn the position where a first-person referent can appear with each verb regardless of the empathy-encoding properties of the verbs of giving/receiving. For example, even if children do not know that *kure-ru* encodes empathy to the recipient non-subject argument, they might be able to judge that the first-person referent should be in a non-subject position with *kure-ru* simply because that is where first-person pronouns typically occur with that verb. If so, although results from experimentation on the distribution of a first-person referent are indicative, they are not enough to precisely capture children's knowledge of the empathy-encoding properties of the empathy verbs. Note that there is reason to be skeptical of this possibility: If children are simply learning the distributional properties of arguments based upon verbs, then the challenge with *kure-ru* is mysterious. Nonetheless, we address this possibility directly in the next experiment.

To wit, Experiment 2 addresses this question by testing the empathy-sensitivity of *zibun* 'self.' As we showed in Section 4, the evidence indicating that the binding of *zibun* associated with the verbs of giving/receiving is almost nonexistent in the input. Therefore, if children can correctly interpret *zibun*'s antecedent depending on the verbs of giving/receiving, this adds to our conclusion from Experiment 1, providing far more convincing evidence for the acquisition of the empathy-encoding properties of these verbs.

6. Experiment 2: Acquisition of the binding of *zibun* 'self' with verbs of giving

The goal of Experiment 2 is to investigate whether Japanese children know the restrictions on *zibun* 'self' binding imposed by the empathy-encoding properties of *age-ru* and *kure-ru: Zibun* takes a local antecedent with *age-ru* but a long-distance (LD) antecedent with *kure-ru*. Given the results from Experiment 1 in which the challenge for children appears to be the distinction between *age-ru* and *kure-ru*, we decided to focus on that distinction. As such, we did not test *mora(w)-u* in this experiment. This allowed us to increase the number of items in the *age-ru* and *kure-ru* conditions, and it increased retention of child participants because the overall length of the experiment was slightly abbreviated.

Previous acquisition studies on reflexives report that with sentences in which the reflexive occurs in an embedded sentence, children have a preference for the local subject antecedent, even for monomorphemic reflexives like *zibun* (Chien, Wexler & Chang 1993 for Chinese; Lee & Wexler 1987 for Korean; Jakubowicz & Olsen 1988 for Danish; Okabe 2008; Orita et al. 2021 for Japanese[18]).[19] This

[18]Okabe's (2008) Experiment IV reported a "slight" preference toward local antecedents by 4- to 6-year-olds. However, Orita et al. (2021) point out that Okabe's (2008) TVJT did not satisfy the condition of plausible deniability. Adding plausible deniability, Orita et al. show that children chose the LD antecedent for *zibun* 20.8% of the time with LD-true stories, while they chose the local antecedent for *zibun* 66.7% of the time with local-true stories. Putting this all together, we conclude that Japanese children (like children acquiring other languages) do indeed have a locality preference.

[19]But there are also studies that showed that children preferred LD antecedents in specific conditions (Hyams & Sigurjónsdóttir1990 and Sigurjónsdóttir & Hyams 1992 on Icelandic *sig* 'self' and Joo 2014 and Joo & Deen 2019 on Korean *caki* 'self').

local-subject preference favors the interpretation of *age-ru*, since the empathy locus for *age-ru* is indeed the local antecedent—thus the empathy property of *age-ru* and children's preference for a local subject antecedent for *zibun* align, predicting that *age-ru* will not pose a challenge to children. However, the empathy property of *kure-ru* is quite different and sets up a clash with the local-subject preference for *zibun*. As we have repeatedly seen, *kure-ru* encodes the speaker's empathy to an argument other than the clause-mate subject. Previously, this meant that the empathy locus was the indirect object, but in the case of reflexive sentences, there is no eligible antecedent within the embedded clause (exemplified in the following). *Zibun*, therefore, must look elsewhere for an antecedent, and the only remaining antecedent for *zibun* is the matrix subject. Thus when children show a long-distance reading for *zibun* in *kure-ru*-sentences (above and beyond their baseline dispreference for long-distance antecedents), they are overcoming their preference for the local-subject, thus providing strong evidence of knowledge of the empathy-encoding property of *kure-ru*.

6.1. *Participants in Experiment 2*

We tested 30 children and 27 adults (different from the participants in Experiment 1). We excluded four children (three 4-year-olds and one 5-year-old child) who answered at least one of the practice items incorrectly, leaving 26 children (eight 6-year-olds, nine 5-year-olds, and nine 4-year-olds); details are shown in Table 8.

Table 8. Participants of Experiment 2 (after exclusions).

	Children (n = 26)			
	4-year-olds (n = 9)	5-year-olds (n = 9)	6-year-olds (n = 8)	Adults (n = 27)
Age range	4;04–4;11 (Mean = 4;05, SD = 2.693)	5;00–5;08 (Mean = 5;04, SD = 1.169)	6;00–6;08 (Mean = 6;03, SD = 2.994)	25–58 (Mean = 40.75, SD = 17.783)

All of the children belong to a kindergarten in Shizuoka, Japan, and they were tested in a quiet room individually by the first author.[20] Sixteen adults were tested with a written TVJT in a paper and pencil style without pictures; the rest of the adults were tested with a written TVJT on Google Form with pictures. We did not find any difference between these two groups of adults, and so we report aggregated results.

6.2. *Materials and procedure*

We used the Truth Value Judgment task (Crain & Thornton 1998) much like in the previous experiment. There were three types of sentences: no-empathy-verb (with no *give* verb, used as a control), *age-ru*, and *kure-ru* sentences. We prepared four items for each verb (two local-true/LD-false and two local-false/LD-true items), and two practice items, resulting in fourteen items per child. We did not test *mora(w)-u* this time mainly due to considerations of the length of the experiment and because our primary concern here is with the comparison between *age-ru* and *kure-ru*. The no-empathy-verb condition measures as a baseline whether there is a local or LD (long-distance) preference. We expect to find a local preference for the binding of *zibun* in this no-empathy-verb condition, consistent with previous research with children. In the *age-ru* condition, we predict the local subject to be the preferred antecedent because both the locality preference for *zibun*-binding and the empathy property of *age-ru* align. The empathy property of *kure-ru* strongly prefers the long-distance

[20]Due to the pandemic, five out of 26 children were tested online using Zoom. We did not find any notable difference from children tested in person; thus we provide aggregated results.

reading, so if children have knowledge of the empathy property of *kure-ru* and are able to use that knowledge, then we expect children to overcome the preference for a local antecedent to *zibun* and show some proclivity toward the matrix subject (long-distance) antecedent.

The experiment crossed two factors, resulting in a 3 × 2 design: *Verb type* (no-empathy-verb, *age-ru*, and *kure-ru*) × *Context type* (local-true vs. LD-true). All the test sentences involved an *atoni* 'after' clause and *kae-ru* 'go.home' as a matrix verb, as modeled by Umeda et al. (2017).[21] Moreover, the *give* verbs were attached to another verb to convey benefactive meanings. The main verbs that we used were *ara(w)-u* 'wash' and *huk-u* 'wipe,' and they formed a verbal complex such as *aratte age-ru 'wash give.'*[22]

Figure 6 shows a sample local-true story, and Figure 7 shows a sample long-distance-true story. Before the test sentence was uttered by the puppet, the experimenter provided a lead-in sentence (23 & 27) giving the matrix verb, *kaer-u* 'go.home,' and the *after* clause, both of which appear in the test sentences. This is done to minimize the load on children's memory. Examples 24 to 26 and 28 to 30 are sample test sentences in the no-empathy-verb, *age-ru*, and *kure-ru* conditions.[23] While the child was listening to each test sentence, all the pictures in the story were shown at the same time so that the child did not need to memorize what happened in the story. In this final scene, pictures other than the crucial picture were made smaller so as not to distract children.

6.3. *Results of Experiment 2*

6.3.1. *Overall results*

Figure 8 shows the percentages of "yes" responses by *Verb Type* (no-empathy-verb, *age-ru*, and *kure-ru*), *Context Type* (local-true stories and LD-true stories), and *Group* (adults and children).

As for the no-empathy-verb condition, both adults and children tended to respond "yes" in local-true stories (98.1% for the adults and 76.9% for the children) but did not tend to respond "yes" in LD-true stories (31.5% for the adults and 32.7% for the children). This shows that although both the local and the LD readings are permitted, both adults and children preferred local interpretations when there is no empathy verb. Thus in no-empathy-verb contexts, *zibun* 'self' seems to have a locality preference.

However, we found differences between adults and children in their responses to the *age-ru* condition and the *kure-ru* condition. First, as for the *age-ru* condition, the children responded "yes" 69.2% of the time in local-true stories and 15.4% of the time in LD-true stories, which indicates that they preferred local interpretations over LD interpretations. This is predicted because the existence of *age-ru* signals that the embedded subject is the empathy locus, which leads to a preference for the local interpretation. On the other hand, the adults responded "yes" 42.7% of the time in local-true stories

[21]Some previous acquisition studies of *zibun* 'self' in complex sentences used logophoric verbs as matrix verbs such as *i(w)-u* 'say' (Okabe 2008, Experiment I) and *omo(w)-u* 'think' (Otsu 1997; Orita et al. 2021). However, the logophoric verbs introduce logophoric *zibun*, which selects the agent of indirect discourse, thoughts, etc. (i.e., the matrix subject) as its antecedent (Oshima 2004, 2007, etc.). Because logophoric verbs loosen the preference for local antecedents (at least in the adult grammar), following precedent in the literature (Umeda et al. 2017), we used clause types that are not logophoric (using the connector *atoni*, 'after' and the matric verb *kae-ru* 'go.home').

[22]It has been argued that the verbs such as *ara(w)-u* 'wash' and *huk-u* 'wipe' do not allow a local reading of *zibun*, and to have a local reading, we need to use body-part nouns such as (*zibun-no*)-*karada* '(self-GEN)-body' instead of *zibun* (Noguchi 2013, 2014; Oshima 1979; etc.). However, Kishida (2011) proposes that the local reading of *zibun* with the verbs that normally do not allow a local identity with a subject becomes available when contrastive stress is added, inducing a meaning such as John washed himself but not anybody else (Kishida 2011:253). As we will see, our test stories always contained two characters, and one of them washes/wipes himself over the other animal or vice versa. This constitutes a contrastive meaning, and we assume that local interpretations of *zibun* should be naturally available. And as we will see in the results section, the adults in fact strongly preferred local interpretations with *ara(w)-u* 'wash' and *huk-u* 'wipe' in the no-empathy-verb condition. Hence, the main verbs we used do not pose a problem.

[23]We used different animals and events for each test sentence, but in this article, we will use the same context for each test condition for ease of explanation. See Supplementary Appendix B for the complete set of items.

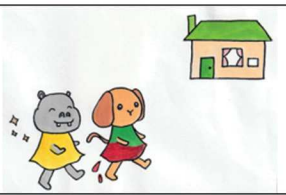
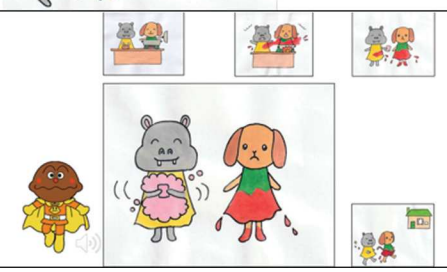
Picture number	Pictures	Narrations
1		A hippo and a dog were cooking at a school.
2		The fire became too strong, and the tomato sauce scattered on their clothes.
3		Because the hippo had soap, she was about to wash the dog first.
4		However, the dog was too dirty to wash up, so the hippo washed herself. Then the hippo ran out of soap, so she could not wash the dog.
5		After that, the dog went home, still dirty.
Final scene		This is the story that we just saw. Now, Curry-pan-man (i.e. the puppet) will tell us what happened in the story. Can he correctly tell us "what happened before the dog went home"?

Figure 6. Sample pictures (adding narrated texts) of local-true context.

and 20.4% of the time in LD-true stories, which indicates that they tended to reject the *age-ru* condition regardless of the context types. We will provide a possible explanation for the adults' unexpected behavior in the *age-ru* condition in the next subsection (6.3.2).

Now, let us focus on the *kure-ru* condition. The adults responded "yes" only 9.3% of the time in local-true stories and 85.2% of the time in LD-true stories, which means that they strongly preferred LD interpretations with *kure-ru*. Because the adults showed a considerable local preference in the no-empathy-verb condition, the strong LD preference in the *kure-ru* condition indicates that the presence of *kure-ru* has a strong effect on antecedent selection in the adult grammar, as previous theoretical studies have stated (Kuno 1987; Nishigauchi 2014; Oshima 2004, 2007 etc.). On the other hand, the

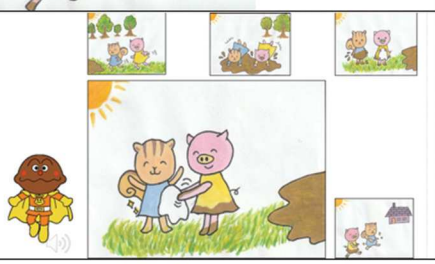
Picture number	Pictures	Narrations
1		A squirrel and a pig are playing tag in a park.
2		Both of them fell in the mud and got covered with it.
3		Because the pig had a towel, she was about to wipe herself first.
4		However, the squirrel was dirtier, the pig kindly wiped the squirrel. Because the towel got too dirty, the pig gave up wiping herself.
5		After that, the squirrel went home shiny.
Final scene		Lead-in: This is the story that we just saw. Now, Curry-pan-man (i.e. the puppet) will tell us what happened in the story. Can he correctly tell us "what happened before the squirrel went home"?

Figure 7. Sample pictures (adding narrated texts) of LD-true context.

children responded "yes" 36.5% of the time in local-true stories and 67.3% of the time in LD-true stories, which indicates that the children allowed local interpretations with *kure-ru* more than the adults.

At this point, there are at least two possible reasons for the gap between adults and children. First, most of these children might have not fully acquired the empathy-encoding property of *kure-ru* yet, and thus they sometimes could not overcome the strong local preference even with *kure-ru*. It is also possible that there are individual differences: some children might correctly allow LD interpretations with *kure-ru*, but it is concealed by the aggregated results shown above. We carried out a series of by-group statistical analyses next, starting from the adults' data.

(23) Lead-in question toward the puppet:

Inusan-wa	nani-ga	okot-ta	atoni	kaet-ta	no	ka	na?
dog-TOP	what-NOM	happen-PST	after	go.home-PST	C	Q	SFP

'What happened before the dog went home?'

(24) No-empathy-verb condition: Ambiguous: TRUE (local reading)/FALSE (LD reading)

Inusan$_i$-wa	[**kabasan$_j$-ga**	**zibun$_{i/j}$-o**	arat-ta	atoni]	kaet-ta	yo.
dog-TOP	hippo-NOM	self-ACC	wash-PST	after	go.home-PST	SFP

'The dog$_i$ went home after the hippo$_j$ washed himself$_j$/him$_i$.'

(25) *Zibun* + *age-ru* condition: TRUE

Inusan$_i$-wa	[**kabasan$_j$-ga**	**zibun$_{*i/j}$-o**	aratte **AGE**-ta	atoni]	kaet-ta	yo.
dog-TOP	hippo-NOM	self-ACC	wash GIVE-PST	after	go.home-PST	SFP

'The dog$_i$ went home after the hippo$_j$ washed himself$_j$ (for his$_j$ own sake).'

(26) *Zibun* + *kure-ru* condition: FALSE

Inusan$_i$-wa	[**kabasan$_j$**-ga	**zibun$_{i/*j}$-o**	aratte **KURE**-ta	atoni]	kaet-ta	yo.
dog-TOP	hippo-NOM	self-ACC	wash GIVE-PST	after	go.home-PST	SFP

'The dog$_i$ went home after the hippo$_j$ washed him$_i$ (for his$_i$ sake).'

(27) Lead-in question toward the puppet:

Risusan-wa	nani-ga	okot-ta	atoni	kaet-ta	no	ka	na?
squirrel-TOP	what-NOM	happen-PST	after	go.home-PST	C	Q	SFP

'What happened before the squirrel went home?'

(28) No-empathy-verb condition: Ambiguous: TRUE (LD reading)/FALSE (local reading)

Risusan$_i$-wa	[**butasan$_j$-ga**	**zibun$_{i/j}$-o**	hui-ta	atoni]	kaet-ta	yo.
squirrel-TOP	pig-NOM	self-ACC	wipe-PST	after	go.home-PST	SFP

'The squirrel$_i$ went home after the pig$_j$ wiped himself$_j$/him$_i$.'

(29) *Zibun* + *age-ru* condition: FALSE

Risusan$_i$-wa	[**butasan$_j$-ga**	**zibun$_{*i/j}$-o**	huite **AGE**-ta	atoni]	kaet-ta	yo.
squirrel-TOP	pig-NOM	self-ACC	wipe GIVE-PST	after	go.home-PST	SFP

'The squirrel$_i$ went home after the pig$_j$ wiped himself$_j$ (for his$_j$ own sake).'

(30) *Zibun* + *kure-ru* condition: TRUE

Risusan$_i$-wa	[**butasan$_j$**-ga	**zibun$_{i/*j}$-o**	huite **KURE**-ta	atoni]	kaet-ta	yo.
squirrel-TOP	pig-NOM	self-ACC	wipe GIVE-PST	after	go.home-PST	SFP

'The squirrel$_i$ went home after the pig$_j$ wiped him$_i$ (for his$_i$ sake).'

6.3.2. *Adults*

To confirm whether the adults performed as predicted, especially with *kure-ru*, we ran a mixed-effects logistic regression analysis. This model included *Verb Type* (no-empathy-verb, *age-ru*, and *kure-ru*) and *Context Type* (local-true vs. LD-true) as fixed effects, *Answer* (true ["yes"] vs. false ["no"]) as a response variable, and *Participant* as a random intercept. For the variable *Verb Type*, the no-empathy -verb condition was the reference level, and for the variable *Context Type*, the local-true context was the reference level. Table 9 shows the result of this model.

The model found that all of the variables were significant. First, the significant interaction of *Verb Type (age-ru)* and *Context Type* shows that the adults interpreted the no-empathy-verb condition and *age-ru* condition differently in local-true and LD-true stories. As we mentioned in the last subsection, this is because the adults tended to reject sentences with *age-ru* regardless of the context types, differently from the no-empathy-verb condition. Although this is unexpected, we believe that the reason for this low acceptance of the local antecedent with *age-ru* is because the benefactive uses of *age-ru* express not simple benefaction but some sense of emotion possessed by an agent argument toward a patient argument. For example, when one does something for someone's benefit, one usually feels affection or pity for that person. This emotional content does not fit well with a self-benefit context with mere action verbs (*ara(w)-u* 'wash' and *huk-u* 'wipe'). When *zibun* and *age-ru* appear in the same clause, the resulting interpretation is that the agent argument did something for the sake of themselves, and crucially, the event described by the main verb is motivated by the agent's emotion. For example, *kuma-ga zibun-o aratte age-ta* 'the bear washed self' indicates that the bear has some emotional motivation to wash himself, such that the bear "feels sorry" for himself who became dirty.

Zibun and *age-ru* in the same clause seems to be implausible with normal action verbs such as *ara(w)-u* 'wash' or *huk-u* 'wipe,' and it becomes more plausible with some verbs related to emotions, such as *home-ru* 'praise' or *nade-ru* 'stroke.' This might be because our motivations to initiate reflexive actions such as

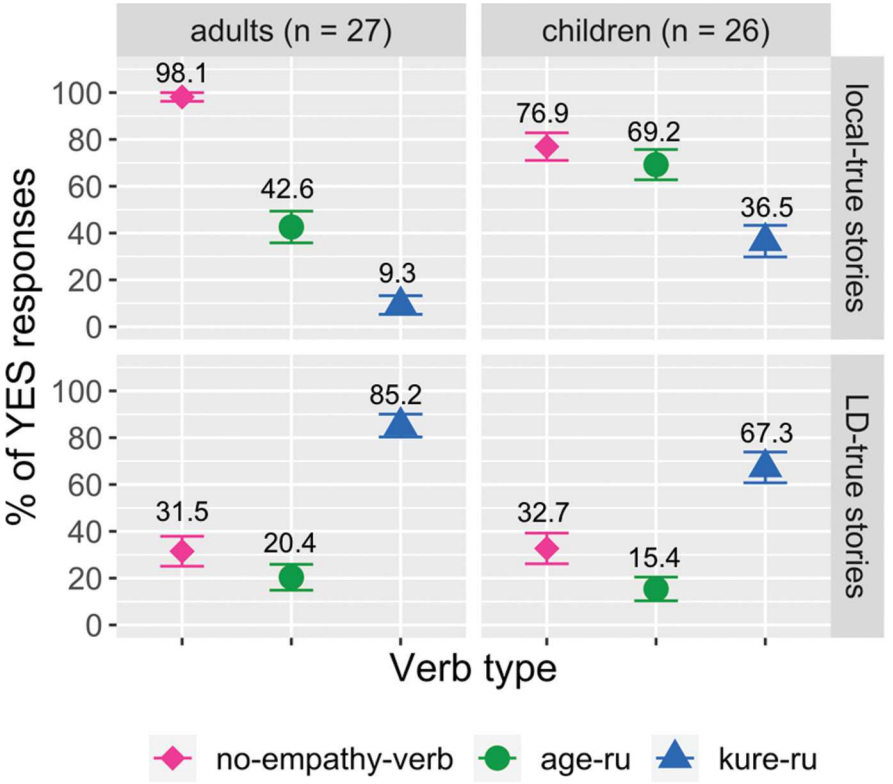


Figure 8. Mean rates (%) of YES responses by *Verb Type*, *Context*, and *Group*. The error bars show standard errors.

washing or wiping ourselves are not usually motivated by our emotions toward ourselves (e.g., we wash ourselves not because we feel sorry for ourselves being dirty). On the other hand, the verbs such as *home-ru* 'praise' and *nade-ru* 'stroke' might already have emotional content (e.g., we stroke ourselves "to comfort" ourselves), and thus they fit better with the self-benefactive uses of *age-ru*.

Because the main verbs we used were mere action verbs (i.e., *huk-u* 'wipe' and *ara(w)-u* 'wash'), most of the adults rejected the sentences containing *age-ru* and *zibun* regardless of the context types (local-true or LD-true). We asked six adults who participated in Experiment 2 what they thought about the sentences containing *age-ru* and *zibun*, and all of them answered that the local interpretations were unnatural, but the LD interpretations were impossible with *age-ru* (see Appendix for more detailed information about the justification questions). This conflict put participants in a difficult situation: unable to select the LD reading because of the empathy clash and unable to select the local reading because of the unnaturalness of assigning an emotion to the agent him/herself. This resulted in generally poor results with *age-ru* across the boards.

Table 9. Results of the mixed-effects logistic regression for the adults in Experiment 2.

	Estimate (β)	Standard Error (*SE*)	*p*
(Intercept)	4.09	1.02	< .001
Verb Type (*age-ru*)	−4.41	1.06	< .001
Verb Type (*kure-ru*)	−6.48	1.14	< .001
Context Type	−4.92	1.07	< .001
Verb Type (*age-ru*) * Context Type	3.80	1.15	< .001
Verb Type (*kure-ru*) * Context Type	9.15	1.27	< .001

Note. Model: glmer(Answer ~ 1 + Verb Type * Context Type + (1 | Participant), family = "binomial").

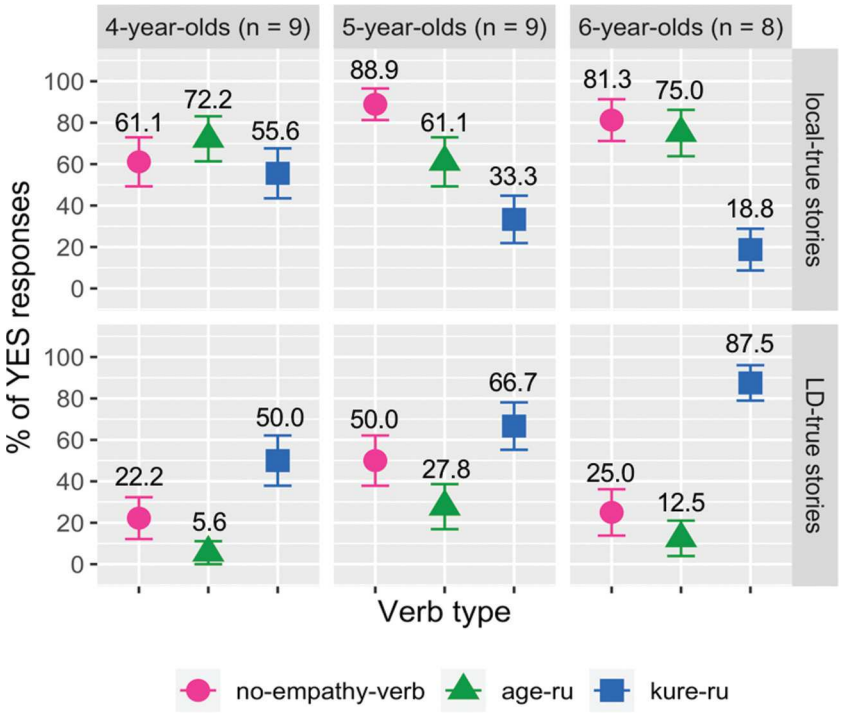


Figure 9. Mean rates (%) of YES responses by *Verb Type, Context*, and *Age Group*. The error bars show standard errors.

Next, the significant interaction of *Verb Type* (*kure-ru*) and *Context Type* shows that adults interpreted the sentences without an empathy verb and the sentences with *kure-ru* differently in local-true and LD-true stories. The adults tended to respond "yes" to no-empathy-verb sentences with local-true stories but "no" with LD-true stories, and they tended to respond "yes" to *kure-ru* sentences with LD-true stories and "no" with local-true stories. This indicates that the adults allowed local interpretations in the *kure-ru* condition significantly less than the no-empathy-verb condition but allowed LD interpretations in the *kure-ru* condition significantly more than the no-empathy-verb condition, which is consistent with the theoretical literature (Kuno 1987; Nishigauchi 2014; Oshima 2004, 2007, etc.). These results indicate that the adults exhibit knowledge of the empathy-encoding property of *kure-ru* and can apply it to reflexive binding.

6.3.3. *Children*

Recall that children showed a local preference in the no-empathy-verb condition and allowed local interpretations in 36.5% of items involving *kure-ru*. We first show children's "yes" responses in each condition by *Age Group* in Figure 9.

The crucial difference in the three age groups is found in the *kure-ru* condition: The rates of local interpretations with *kure-ru* decrease as children mature, gradually approaching adult-like levels.

To examine whether the effect of *Age* is significant, we carried out a statistical analysis adding *Age* (month of age) as a continuous variable. The data were fitted into the fixed-effects logistic regression model with *Verb Type* (no-empathy-verb, *age-ru*, and *kure-ru*), *Context Type* (local-true vs. LD-true), and *Age* (continuous) as fixed effects and *Answer* (true ["yes"] vs. false ["no"]) as a response variable. We did not add any random effect because all possible models with random effect(s) failed to converge. Table 10 indicates the result of this model.

Table 10. Results of the mixed-effects logistic regression for the children.

	Estimate (β)	Standard Error (SE)	p
(Intercept)	−.1.49	2.43	.53
Verb Type (*age-ru*)	2.49	3.25	.44
Verb Type (*kure-ru*)	6.62	3.39	.05
Context Type	.92	3.23	.77
Age	.04	.03	.27
Verb Type (*age-ru*) * Context Type	−3.91	4.77	.41
Verb Type (*kure-ru*) * Context Type	−9.64	4.61	< .05
Verb Type (*age-ru*) * Age	−.04	.05	.37
Verb Type (*kure-ru*) * Age	−.13	.05	< .05
Context Type * Age	−.04	.05	.37
Verb Type (*age-ru*) * Context Type * Age	.05	.07	.48
Verb Type (*kure-ru*) * Context Type * Age	.20	.07	< .01

Note. Model: glm(Answer ~ 1 + Verb Type * Context Type * Age, family = "binomial")

Let us discuss some of the interactions. First, the nonsignificant two-way interaction of *Verb Type* (*age-ru*) and *Context* (p = .41) indicates that children's answers between no-empathy-verb condition and *age-ru* condition were not significantly different based on context types. Together with Figure 8, it further indicates that the children generally tended to accept both types of sentences in local-true stories, and they tended to reject both types of sentences in LD-true stories, just as we originally predicted. Second, the three-way interaction of *Verb Type* (*age-ru*), *Context Type*, and *Age* was not significant (p = .48). This suggests that the nonsignificant interaction between *Verb Type* (*age-ru*) and *Context Type* was not significantly different based on children's ages. Together with Figure 9, it indicates that the children tended to interpret *zibun* locally in both no-empathy-verb condition and *age-ru* condition regardless of their ages.

It seems then that children prefer local interpretations in the *age-ru* condition differently from adults. As we mentioned in 6.3.2, adults tended to reject sentences with *age-ru* and *zibun* with mere action verbs (i.e., *ara(w)-u* 'wash' and *huk-u* 'wipe') because we do not usually possess emotions toward ourselves to initiate reflexive actions with these verbs. The fact that children tended to accept sentences with *age-ru* and *zibun* with the mere action verbs in local-true stories might indicate that, for children, even the mere action verbs can express some emotions toward the agent him/herself. It may also be that children do not yet know about this emotion-assigning property of benefaction in Japanese (3 children rejected all instances of *age-ru* and *zibun*, and they might know that self-benefaction with mere action verbs is unnatural).

Third, the significant two-way interaction of *Verb Type* (*kure-ru*) and *Context* (p < .05) suggests that children's answers between no-empathy-verb condition and *kure-ru* condition were significantly different based on the context types. Looking at Figure 8, this further indicates that children generally tended to distinguish sentences with *kure-ru* and sentences without empathy verbs. Moreover, the significant three-way interaction of *Verb Type (kure-ru), Context Type*, and *Age* together with Figure 9 indicates that the children interpreted the sentences without empathy verbs and the sentences with *kure-ru* differently in local-true and LD-true stories, but this difference is larger for older children. Children tended to prefer the local interpretations in the no-empathy-verb condition regardless of age; in the *kure-ru* condition, the younger children tended to allow both local and LD interpretations, but older children tended to prefer the LD interpretations.

Finally, we carried out an individual analysis. Figure 10 visualizes the number of accurate responses by each child (i.e., times of LD interpretations) in the *kure-ru* condition.

Although the aggregated results (Figure 9) presented earlier seem to show that younger children were uniformly at chance with *kure-ru* compared to older children, Figure 10 indicates that some younger children correctly chose LD antecedents with *kure-ru* consistently. Of the 4-year-olds, we found three children who consistently gave us long-distance responses and six that gave us local responses, and for the 5-year-olds, we found seven children who were above chance and two who gave us local responses. Most of the 6-year-olds were above chance with *kure-ru*. This suggests that some children as young as age 4 are able to overcome the local preference for the antecedent to *zibun*, thereby exhibiting knowledge of the empathy properties of *kure-ru*.

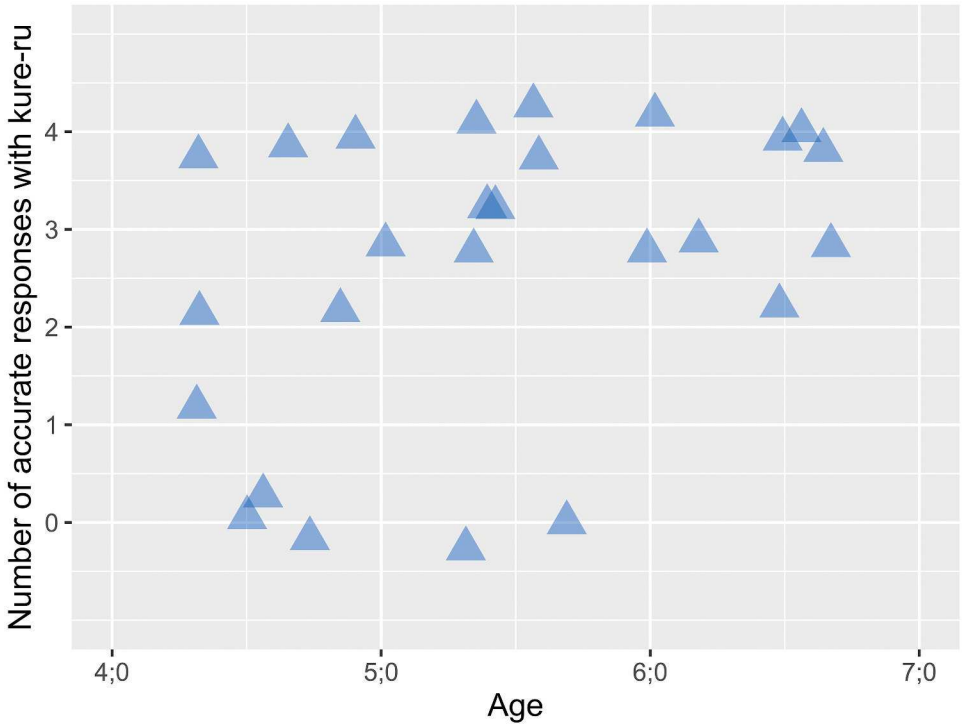


Figure 10. Number of accurate responses (long-distance interpretations) with *kure-ru* by the children ($n = 26$). Overlapping points are jittered.

Overall, Experiment 2 shows that when the empathy properties of the verb of giving favor a long-distance antecedent, at least some children are able to overcome their bias to favor the local antecedent and interpret the reflexive as being bound by the long-distance antecedent. Moreover, these results are consistent with Experiment 1, which showed that some younger children tended to have difficulty in comprehending *kure-ru*. Therefore, Experiment 2 provides additional evidence (using not just first-person arguments but third-person arguments) for children's knowledge of empathy-encoding property of *kure-ru* by showing parallel results with the third-person arguments.

Finally, an anonymous reviewer points out that for those children who fail to allow the LD reading in the *kure-ru* condition, it is possible that they are unaware that *zibun* is empathy sensitive. We thank the reviewer for this comment, and upon consideration we think there are actually several possible explanations for why young children fail on this experiment. The first is that they do not yet know the empathy properties of *kure-ru*. The second is that they do know the empathy properties of *kure-ru*, but the locality preference outpowers the empathy requirements of *zibun*. This is more a case of one force being stronger than the other in the deployment of knowledge and not really an issue of an absence of knowledge. And the third possibility (suggested by the anonymous reviewer) is that children who only give the local reading in *kure-ru*-sentences don't know that *zibun* is empathy sensitive. These children may or may not know the empathy properties of *kure-ru*, but if they are unaware that *zibun* makes reference to empathy, then their preference for the local antecedent goes unchallenged. In a sense then this last option suggests that empathy is irrelevant to *zibun*-binding, at least for these very young children. We acknowledge these three possibilities and reserve discrimination between these three for future research. But our overall point remains: Some 4- to 6-year-old children show adult-like knowledge of *kure-ru, zibun*, and *zibun*'s empathy-sensitive antecedent selection property.

7. General discussion

We initially set out to investigate whether Japanese preschool children know the empathy-encoding properties of the verbs of giving/receiving, *age-ru* 'give,' *kure-ru* 'give,' and *mora(w)-u* 'receive.' In our corpus analyses of child-directed Japanese, we found the following three things.

- The verbs of giving (*age-ru* and *kure-ru*) occur at roughly the same rate in the input to children, and *mora(w)-u* occurs relatively less frequently.
- First-person arguments tend to be distributed according to the empathy loci of each verb and fairly frequently too. No instances of first-person pronouns (overt or null) were found in non-empathy-locus positions.
- Evidence for the empathy properties of the reflexive *zibun* is extremely rare, perhaps nonexistent.

Our experiments provide the following findings. First, when provided with sentences with null arguments, all children correctly interpret such sentences containing *age-ru* and *mora(w)-u* as having first-person subjects (and not first-person indirect objects). This shows that children understand that *age-ru* and *mora(w)-u* permit first-person arguments only in the subject position —a position determined to be the empathy locus by these verbs. On the other hand, we found *kure-ru* to be challenging for some young children: Some 4- and 5-year-old children incorrectly interpret *kure-ru* sentences with null arguments to permit first-person subjects; other children correctly interpret *kure-ru* sentences to only permit first-person indirect objects. This shows that some young children fail to comprehend the empathy properties of *kure-ru*, and others comprehend this in an adult-like way.

Our results from Experiment 2 mirror those of Experiment 1. First, we find that without verbs of giving, children exhibit a strong preference for the antecedent to *zibun* being the local subject. But when *kure-ru* is included, our findings change: Older children (most 5- and 6-year-olds) are adult-like with *kure-ru* by selecting the long-distance antecedent, but some younger children are split in which antecedent to *zibun* they permit. Some of them successfully chose the long-distance antecedent with *kure-ru*, while others incorrectly prefer local antecedents for *zibun* with *kure-ru*. Both these experiments point to empathy being acquired no later than 6 years old, but with some children acquiring empathy as young as age 4.

We turn now to a broader discussion of our findings and their implications. We split this discussion into two sections: (i) possible reasons for the discrepancy with previous research (7.1), and (ii) the developmental path of empathy verbs (7.2).

7.1. *Possible reasons for the differences from previous findings*

Although our findings are consistent with previous production studies, they are not consistent with previous comprehension studies (e.g., Uyeno et al. 1978; Ishiguro 1985; Okabe 2005, 2011), the latter of which report that *mora(w)-u* 'receive' was severely challenging for children, more so than *age-ru* or *kure-ru*. Our experiment (Experiment 1) showed no such challenge with *mora(w)-u* 'receive.' Moreover, previous comprehension studies report that *kure-ru* 'give' was not challenging for children; our experiment showed children have significant difficulty with *kure-ru*. Even though the aims of the previous studies were not to test children's knowledge of the empathy-encoding properties of the verbs, it is worth considering why children behave differently in our experiments relative to previous comprehension experiments. Different factors are considered for the cases of *mora(w)-u* and *kure-ru*.

First, the contrast between the previous and the current studies in terms of *mora(w)-u* 'receive' fits well with Okabe's (2005) proposal on the difficulty in assigning an external theta-role to *ni*-phrases in benefactive sentences. Based on Hoshi (1994), Okabe (2005) argues that *mora(w)-u* benefactives such

as Example 31 are syntactically similar to passive sentences such as 32 in that both constructions involve an A-chain and theta transmission to *ni*-phrases.

(31) Kuma-ga buta-ni ringo-o nagete-morat-ta.
Bear-NOM pig-DAT apple-ACC throw-receive-PST
'The bear received the favor of the pig's throwing an apple.'

(32) Kuma-ga buta-ni ringo-o nage-rare-ta.
Bear-NOM pig-DAT apple-ACC throw-passive-PST
'The bear was thrown an apple by the pig.'
(Okabe 2005:444)

Okabe's (2005) experiment found that children (especially 4- and 5-year-olds) had difficulty in comprehending sentences like 31 and 32, but their performance much improved when *ni* 'DAT' was replaced with *kara* 'from.' *Kara* 'from' itself can assign a 'source' theta-role to its complement, thus theta transmission is not involved in this case. This shows that children's difficulty with benefactive sentences is the process of assigning an external theta-role to *ni*-phrases (akin to Fox & Grodzinsky 1998; see also Okabe & Sano 2002 for passives).

Recall that the test sentences in our experiment omitted both the subject and the indirect object (i.e., the *ni*-phrase). Because the *ni*-phrase was omitted, it is possible that children interpreted the null argument with something other than *ni*, perhaps avoiding the need for theta-transmission. If children reconstruct the null argument as being *kara*-marked, then they are using the same escape hatch that Okabe identified in her investigation of *mora(w)-u* 'receive.' Thus, the omission of *ni*-phrases in the current experiment might be the reason why even the 4-year-olds showed adult-like performance with *mora(w)-u* 'receive,' contra previous comprehension studies.

Second, the contrast between previous comprehension studies and the current study in terms of *kure-ru* 'give' can be explained by the fact that the current study tested a different aspect of *kure-ru* from previous studies. In previous studies, children could answer correctly if they knew the subcategorization frame of *kure-ru* (i.e., giver as a subject) even if they did not know the empathy-encoding property of *kure-ru*. Because the test sentences used in previous studies contained nothing but third-person arguments, children only needed to know that *kure-ru* means *giving* where the subject is the giver and the indirect object is the recipient (exactly like *age-ru*). On the other hand, in our study, children could not answer correctly if they did not know the empathy-encoding property of *kure-ru* since the test sentences contained a first-person argument or *zibun* 'self' that is empathy-sensitive. Thus the correct answers were different between *age-ru* and *kure-ru*. The different findings between the previous studies and our current study in terms of *kure-ru* indicate that, although children know the subcategorization frame of *kure-ru* already, they might not know the non-subject empathy associated with *kure-ru* yet.

7.2. *Developmental path*

Now let us turn to a bigger question: How do children learn the empathy-encoding properties of empathy verbs? And what developmental path do children go through to reach the adult-like knowledge of the empathy verbs?

First, as a prerequisite to learning the empathy-encoding properties of the empathy verbs, children need to know that other people can have different mental states from themselves (aka theory of mind). To understand the link between the use of empathy verbs and the speaker's empathy, a child as a listener needs to be able to see the world through the eyes of the speaker (e.g., caregivers). This is because the selection of empathy verbs is determined solely by the speaker's empathy, not the child's empathy. Based on previous findings that infants as young as age 2 have theory of mind (indicated by false-belief understanding, e.g., Baillargeon, Scott & He 2010; He, Bolz & Baillargeon 2012; Onishi &

Baillargeo 2005; Song et al. 2008; Surian, Caldi & Sperber 2007; cf. de Villiers & de Villiers 2000), we hypothesize that children are ready to track speaker's empathy encoded by empathy verbs from very early on, certainly before age 4, which is the youngest age group of children we tested.

But this ability really is just a prerequisite in that being able to perceive the world through the eyes of the speaker does not allow children to determine on which argument the speaker's empathy is encoded. How do children come to know that the speaker empathizes with the referent of the giver subject when they use *age-ru* 'give,' but with the referent of the recipient non-subject when they use *kure-ru* 'give,' and with the referent of the recipient subject when they use *mora(w)-u* 'receive'? Crucially, these verbs can be used in the exact same situation. Let us suppose that children hear their mother saying the following sentences containing *age-ru, kure-ru*, and *mora(w)-u* again.

(33)	Kuma-ga	inu-ni	omotya-o	**AGE**-ta.
	bear-NOM	dog-DAT	toy-ACC	give-PST
	'The bear gave a toy to the dog.' (EMPATHY LOCUS: THE BEAR)			
(34)	Kuma-ga	inu-ni	omotya-o	**KURE**-ta.
	bear-NOM	dog-DAT	toy-ACC	give-PST
	'The bear gave a toy to the dog.' (EMPATHY LOCUS: THE DOG)			
(35)	Inu-ga	kuma-ni	omotya -o	**MORAT**-ta.
	dog-NOM	bear-DAT	toy-ACC	receive-PST
	'The dog received a toy from the bear.' (EMPATHY LOCUS: THE DOG)			

When hearing these sentences, what a child observes is a single kind of event: The bear is the giver of the toy, and the dog is the recipient of the toy. If these verbs are used in the same situation, how can children acquire the difference between these empathy verbs?

As noted by numerous authors, this same learning problem seems to apply to the acquisition of other verbs that describe the same events, such as *flee* and *chase, buy* and *sell*, etc. (see, for example, Gleitman 1990; Gleitman et al. 2005; Nappa et al. 2009; among many others). When a bear is a chaser and a dog is a fleer, we can describe this event by saying either *the bear is chasing the dog* or *the dog is fleeing from the bear*. So how do children come to know the difference between *chase* and *flee* if they are used in the same situation? One solution to this problem comes from Gleitman (1990), who proposed that children can use the knowledge of the syntactic subcategorization frames of verbs to infer the meanings of the verbs, a process known as SYNTACTIC BOOTSTRAPPING.

Can this syntactic bootstrapping hypothesis account for Japanese children's acquisition of the empathy verbs? Well, the logic of syntactic bootstrapping helps children discriminate between the verbs of giving, *age-ru* and *kure-ru*, on the one hand, and the verb of receiving *mora(w)-u* on the other, since the giver is the subject with the verbs of giving, and the recipient is the subject with the verb of receiving. However, it really leaves the difference between *age-ru* and *kure-ru* quite mysterious because these two verbs share the same subcategorization frame: a giver as the subject and a recipient as the indirect object (as well as a direct object when *kure-ru* is used as a benefactive verb attached to a transitive verb). Therefore, knowing the subcategorization frame of verbs of giving is not enough to acquire the distinction in empathy between *age-ru* and *kure-ru*. But acquire it they do, despite the fact that which discourse participant the speaker empathizes with the most seems to be unobservable from the environment (unless we permit the possibility that children can read the minds of speakers).

Here, following a suggestion from an anonymous reviewer, we provide our thoughts on the developmental pathway taken by children in acquiring empathy. Noting the speculative nature of what follows, we provide some possible routes that children might take in traversing the two developmental stages indicated by the results of our experiments.

First, there is a stage where children incorrectly assume that the subject is always the empathy locus. This means that when it comes to *age-ru, kure-ru*, and *mora(w)-u*, children in this stage assume that subject empathy is the default and assign subject empathy loci for all three verbs. This

explains why some of our preschool children had difficulty with the non-subject empathy verb (*kure-ru* 'give') but performed well with the subject empathy verbs (*age-ru* 'give' and *mora(w)-u* 'receive').[24]

This straightforwardly explains the results from Experiment 1. Young children (4 years old) initially assume that all verbs of giving/receiving assign the subject as the empathy locus, and therefore all verbs permit first-person subjects. Some 4-year-olds have already transitioned out of this stage, but those who are un-adult-like are exhibiting evidence for this initial stage. As for Experiment 2, the same logic applies, but with a slight complication. In the context of sentences involving an embedded verb of giving with a clause-mate reflexive *zibun*, the reflexive takes the local antecedent subject in the case of *age-ru* and the long-distance (matrix) subject as an antecedent with *kure-ru*. Thus in this particular case, both *age-ru* and *kure-ru* seem to align with the preference for subject empathy, but one selects the local subject and the other selects the long-distance subject.

We understand this to mean that when there are two subjects (matrix and embedded subjects), either subject has the potential to be an empathy locus for children in this stage. The preference for local readings with *kure-ru* might come from a combination of this default subject-empathy stage and the well-known locality preference (Omaki & Lidz 2015:182) widely exhibited by children.[25] Indeed, we demonstrated a bias for the local antecedent in the no-empathy-verb condition in Experiment 2, in which no verb of giving was present. Thus the results from Experiment 2 are consistent with the idea that children assign empathy to the subject—it's just not clear *which* subject children are selecting as the empathy locus.[26]

The question of how children get to this default-subject-empathy stage is, at this moment, an open question. We consider two possibilities (although we acknowledge there may be others): (i) children are born with a universal preference for subject empathy, or (ii) this preference for subject empathy may be acquired from statistical properties of the input. On the former view, children are predisposed to consider events and how they are encoded from a subject's point of view and to assume the speaker empathizes most with the subject. We refer to this as the Subject Primacy Hypothesis (cf. Fox 1987).

What evidence is there that subject empathy might be universal or innate? We simply do not have enough information to make the claim that subject empathy is innate, but we might have some indications that subject empathy may be a universal preference. Unfortunately, we don't have much information on subject empathy in languages like English because empathy in English has not been investigated in the manner we do here in this article. But there is some evidence that bears on this question. First, it is possible (and indeed likely) that empathy is related to point of view (which discourse participant the speaker is talking about, discussed in the introduction of this article). Previous work on point of view (Nappa et al. 2009) shows that when 3- to 5-year-olds see a scene of an observer looking at a transitive event, and when the observer is looking at one character in that event, children tend to encode the character the observer is looking at as the grammatical subject. For example, in a scene of a rabbit chasing an elephant, and the face of an observer looking at the rabbit, when asked what the observer meant by saying "he's blicking him," English-speaking children answered that *blicking* means chasing more often than when the observer is looking at the elephant (the fleer). Our point is that English-speaking children linked eye-gaze by the speaker with their selection of grammatical subject. This suggests that English speakers initially assume that sentences encode the point-of-view center as the grammatical subject, a fact that likely extends to other languages (see, for example, Sauppe et al. 2013). Thus there may be a subject-point-of-view preference that may be universal, and although point of view

[24]The fact that children correctly assign first person reference to the recipient subject with *mora(w)-u* rules out the possibility that children's preference is "agent" empathy. Rather, the children seem to prefer to assign the speaker's empathy to subject arguments regardless of theta roles.

[25]Alternatively, children may lack understanding that *zibun* allows a long-distance antecedent (Orita et al. 2021).

[26]This subject empathy default does not need to be abandoned in the course of development because subjects are most likely to be empathy loci in general. Kuno (1987:211) argues that "it is easier for the speaker to empathize with the reference of the subject than with the referents of other NPs in the sentence," which suggests that subject empathy is a default even for adults.

and empathy are different concepts, it is most natural that who the speaker is talking about is who the speaker empathizes with the most. Therefore, it is possible that children universally have a preference toward subject empathy that may relate to a preference for subject point of view.

Second, there is a wealth of evidence suggesting that subjects are privileged in a number of ways. This is often referred to as the Subject Extraction Advantage (see, for example, Polinsky et al. 2012 and Lau & Tanaka 2021 for a review of relative clause facts). On this view, because subjects are primal for children, they assume from birth that events are encoded by the speaker from the point of view of the subject and with subject empathy. This is speculative to be sure, but remains a possibility.

An alternative is that children begin with no default at all, and they learn to favor subject empathy on the basis of the input that they are exposed to. Such an approach says that children learn the empathy properties of the verbs in question by attending to the distributional facts of first-person pronouns in the input. We refer to this approach as the Learning Empathy through Statistical Regularities (LESR) Hypothesis. There are several facts that suggest that LESR is a possibility. Matsuo, Kita, Shinya, Wood and Naigles (2012) report that in transcripts of a Japanese caregiver's speech in the CHILDES database, first- and second-person subjects occurred around 700 times out of 1,779 utterances, and first- and second-person objects are almost non-existent. Moreover, we saw in our second corpus analysis that the majority of verbs of giving/receiving (as a class) occur with first-person subjects. So it may be that Japanese children observe that first-person arguments almost always occur in subject position, and from this, they might conclude that the speaker generally empathizes with the subject argument, irrespective of the verb.[27]

There are, of course, reasons to be skeptical of LESR. First, it remains to be demonstrated that empathy can be acquired from the distribution of first-person pronouns: Just because the distributional properties are available in the input does not mean this is how children acquire empathy. It remains to be empirically shown that children can actually detect this distribution, and more importantly, children need to have a reason to make the leap to assuming that the verbs of giving/receiving encode *empathy*. There are countless other assumptions children could make (the well-known Problem of Induction), so there must be other factors that push children to interpret the distribution of first-person pronouns as indicative of empathy. This is a question (whether children do in fact use the distribution of first-person arguments to learn empathy) that we are currently actively investigating.

A second reason to be skeptical of LESR is that it is not clear why children extend the empathy properties assigned by these verbs to the binding of *zibun* 'self.' In our third corpus analysis, we showed that evidence for *zibun* is remarkably rare in child-directed speech, so there seems to be no distributional cue to learn the specific interpretations of *zibun* with the different empathy verbs. Thus there are reasons to be skeptical of LESR. However, for both hypotheses, the question of how children come to know that *zibun* is sensitive to empathy remains one for further investigation.

In the second stage of the acquisition of empathy, children come to discriminate *age-ru, kure-ru*, and *mora(w)-u* in terms of empathy-encoding properties. One way they might do this is by using evidence available in the input, that is, empathy verbs co-occurring with first-person arguments. The key piece of evidence is the distribution of first-person referents with *kure-ru* (never in subject position) and the occasional instances in which parents use *kure-ru* and *age-ru* in the same sentence with switching empathy loci (non-subject with *kure-ru* and subject with *age-ru*).[28] Such instances provide positive evidence for the fact that *kure-ru* behaves differently from *age-ru* and *mora(w)-u*. On this account, children initially have the default subject empathy

[27]The distribution of second-person subjects is relevant here because second-person arguments are high in empathy (second only to first-person arguments) due to them being a discourse interlocutor, and thus second-person subjects may help align children's preferences toward subject empathy.

[28]The following sentence is an utterance by Asato's mother containing both *age-ru* and *kure-ru*. When the mother is a giver of a benefit, she uses *age-ru* 'give'; when the mother is a recipient of a benefit, she uses *kure-ru* 'give.'

(i)

Ja:	Kakka	domburi	kaite-ageru	kara
Now	mother	bowl	draw-give	because
sono	naka-ni	raamen	kaite-kureru?	
this	inside-DAT	ramen	draw-give	

'Now, a mother (i.e., I) am going to draw a bowl (for you), so can you draw ramen (for me)?'

(the Subject Primacy Hypothesis) or acquire it via the statistic regularities of first-person arguments (LESR) and then acquire the exceptional properties of *kure-ru* on the basis of the distribution of first-person arguments and then extend this knowledge to other empathy-sensitive phenomena, such as the antecedent selection for *zibun* 'self.' As noted, we have few answers to how and why these developments happen, but we provide our thoughts on this in the hope that it might spur further research.

8. Conclusion

This study investigated whether Japanese preschool children know the empathy-encoding properties of the verbs of giving/receiving—*age-ru* 'give,' *kure-ru* 'give,' and *mora(w)-u* 'receive'—by using two types of linguistic diagnostics: (i) the distribution of first-person arguments (Experiment 1), and (ii) the binding of *zibun* (Experiment 2). Throughout our experiments, we found that children as young as age 4 showed adult-like knowledge of *age-ru* and *mora(w)-u*, whereas some young children exhibited difficulty with *kure-ru*. But we found that all children learn the empathy-encoding property of *kure-ru* by around age 6. We further argued that the distribution of first-person arguments associated with the empathy verbs constitutes evidence for the empathy properties of these verbs and that children may be able to use that evidence to acquire empathy properties of these verbs. Furthermore, we discussed two possible routes that Japanese children go through to acquire adult-like knowledge of empathy verbs. One is the Learning Empathy through Statistical Regularities Hypothesis (LESR), which predicts that Japanese children first learn subject empathy as the default through distributional cues, and then learn that *kure-ru* is exceptional. We contrast this with the Subject Primacy Hypothesis, which states that subjects are primal for a host of different things, including empathy. As such, the Subject Primacy Hypothesis predicts that children initially assume all verbs of empathy are subject-empathy verbs, only to learn from the input that *kure-ru* is exceptional. This latter development may happen when Japanese children detect the regularity with which first-person arguments occur in non-subject position with *kure-ru*. Furthermore, we showed that children can extend their knowledge of empathy verbs to the antecedent selection of *zibun* which they have never been exposed to before.

This study has provided experimental data on the acquisition of empathy in Japanese—a severely understudied and poorly understood phenomenon. Verbs of empathy encode properties that are unobservable in the real world and thus pose a serious learnability challenge. We hope that this study will inspire more research on this topic, as well as related phenomena in other languages.

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Data availability statement

The data that support the findings of this study are openly available in "figshare" at https://figshare.com/s/1a72b4cff5f747bf5f7c.

Disclosure statement

No potential competing interest was reported by the authors.

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Appendix. *Justification questions of the sentences with* age-ru *'give' and* zibun *'self'*

Out of the six adults that we asked for justifications, four of them answered "no" for *age-ru* both in the local-true and the LD-true contexts; two of them answered "yes" in the local-true contexts but answered "no" in the LD-true contexts. The first four adults explained that they would use the verb *age-ru* only when somebody does something for somebody else, not for themselves. Plus, because *age-ru* only allows a local reading of *zibun*, they could not interpret the sentences with long-distance readings. Hence, the unnaturalness of the local reading and the impossibility of the long-distance reading made them reject sentences with *age-ru* and *zibun* regardless of the context types (local-true or LD-true).

On the other hand, the latter two adults answered that they comprehended the test sentences with the local interpretation because it was the only possible interpretation with *age-ru*. They also sensed the unnaturalness of the use of *age-ru* to mean that an animal wiped or washed himself for the sake of himself, but because the long-distance reading was not available, they adjusted the context to fit better with the self-benefit implication induced by *age-ru* and *zibun*. That is, these adults imagined that the animal felt sorry for himself because their clothes got dirty, thus they wiped or washed himself for the sake of himself. With this adjustment, the self-benefit implication became more accessible. Thus for these latter two participants, adjusting the social norms of self-benefit was easier than violating the principle that *zibun* 'self' must take an empathy locus as its antecedent.