

Pragmatic Inferences Related to Sentences Containing the Focus Particle ‘Even’: Pragmatic Scales and Processing Limitations

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ABSTRACT

This paper investigates Japanese-speaking children’s knowledge of scalar implicatures (SIs) associated with the focus particle *sae* ‘even’ and tests the Processing Limitation Hypothesis (PLH, Chierchia et al., 2001, 2004). The PLH predicts that children should perform like adults in tasks that assess their knowledge of SIs, as long as they do not require the construction of alternative representations. An experiment was conducted to investigate whether the explicit presentation of alternative propositions facilitate children’s ability to evaluate pragmatic felicity. If the PLH is valid, then listing structures should allow greater ease of processing.

The results show that the explicit presentation of alternative propositions does not enable children to judge underinformative sentences as infelicitous, in line with Noveck (2001), and thus are contrary to the PLH. These results revealed that children’s insensitivity to SIs does not stem solely from children’s inability to build and maintain different propositions of a statement.

INTRODUCTION

Grice (1975, 1989) made an important distinction between CONVENTIONAL and CONVERSATIONAL IMPLICATURES. Conventional implicature arises from the conventional meaning of specific lexical elements used, such as, *even*, *therefore*, and *but*. Unlike conventional implicature, conversational implicature includes SCALAR IMPLICATURES (SI). SIs are inferences drawn when interpreting sentences containing certain logical words. Conversational maxims like the MAXIM OF QUANTITY may result in the logical words being interpreted to mean more than what is literally said.

Whether children have pragmatic knowledge associated with SIs has received considerable attention in recent years. In particular, whether or not children are

sensitive to SIs which logical words like ‘some’ and ‘or’ give rise to has been greatly investigated experimentally (Noveck, 2001; Chierchia, Crain, Guasti, Gualmini & Meroni, 2001; Gualmini, Crain, Meroni, Chierchia & Guasti, 2001; Papagragou & Musolino, 2003; Guasti, Chierchia, Crain, Foppolo, Gualmini & Meroni, 2005, among many others). The general findings from previous studies on SIs, except for Chierchia et al. (2001, Experiment 3), appear to be that children are insensitive to SIs.¹ In sentence (1) below, the disjunctive ‘or’ is contained in a non-downward entailing context (see Chierchia, 2004 for downward-entailing contexts and SI suspension). Chierchia et al. (2001, Experiment 2) found that English-speaking children accepted sentences such as (1) half of the time in the context where (2) is true, while none of the adults did (cf. also Paris, 1973; Brain & Romain, 1981; Noveck, 2001, among others).

- (1) Every boy chose a skate-board or a bike.
- (2) Every boy chose a skate-board and a bike.

Chierchia, Guasti, Gualmini, Meroni, Crain & Foppolo (2004) report that in sentences like (1), Italian children distinguish the disjunctive ‘or’ from the conjunctive ‘and.’ However, it was shown that the children accepted ‘or’ sentences in a context where a statement containing ‘and’ was appropriate much more frequently than adults did. Furthermore, Noveck (2001) shows that English and French children are insensitive to SIs which scalar terms such as ‘some’ and ‘might’ evoke. All these studies suggest that children have access to the logical(ly possible) meaning of scalar terms, but are unable to reject the logical meaning of scalar terms as frequently as adults do. This in turn suggests that children are not attuned to pragmatic anomalies or are less likely to show pragmatic knowledge associated with information strength than adults do. The delay in using pragmatic knowledge has been reported in language acquisition studies; cf. Chien & Wexler (1990), Grodzinsky &

Reinhart (1993), Reinhart (1999, 2004, 2006), among others.² Thus, it appears that pragmatic knowledge in general increases with age.

However, Chierchia et al. (2001, Exp. 3) found in their Felicity Judgment task that English-speaking children are able to choose a pragmatically felicitous statement, thus showing that they are sensitive to SIs. Chierchia et al. (2001, 2004) argue that children's apparent insensitivity to SIs reported in previous studies cannot be attributed to lack of pragmatic knowledge about information strength. The source of children's non-adult interpretation, they claim by following the basic idea of Reinhart 1999 (2004, 2006), stems from processing demands imposed on children when children "build and maintain in working memory different representations of an assertion" (Chierchia et al., 2004: 298). This Processing Limitation hypothesis (henceforth, PLH; Chierchia et al., 2004) predicts that children should perform like adults in tasks that assess their knowledge of SIs, as long as they do not require the construction of alternative representations.

This paper's main purpose is to investigate Japanese-speaking children's knowledge of pragmatic inferences associated with the focus particle *sae* 'even.' A previous study, Ito (2005, unpublished paper delivered at the Linguistic Society of Japan's annual meeting; 2008) reported that: 1) Japanese-speaking children are unable to judge as infelicitous sentences that are infelicitous with context, a finding in partial agreement with Noveck (2001);³ and 2) Japanese children are insensitive to syntactic restrictions on the scope of *sae*, as shown by their incorrectly judging as felicitous a sentence infelicitous in context because *sae* was attached to an incorrect NP. The study also states that the first result renders the second result inconclusive. The present paper extends the scope of my previous study and tests the PLH by using data from an experiment with Japanese children.⁴

For this purpose, I first argue that the interpretation of *sae* 'even' sentences involves pragmatic scales akin to linguistic quantitative scales proposed by Horn (1989, a series of his works) or those proposed by Hirschberg (1991). I argue that information strength based on such scales determines the felicity of *sae* sentences (and *EVEN* sentences crosslinguistically). After establishing that *sae* sentences give rise to pragmatic inferences akin to SIs, I experimentally examine whether or not Japanese-speaking children are sensitive to implicatures generated by *sae* sentences. The present experiment was designed to assess whether or not children are unable to detect

informational weakness when only an underinformative sentence is presented (Noveck, 2001), even when they are not required to construct alternative propositions. An appropriateness judgment task from Ito (2005) was used to test the PLH by investigating whether or not children show pragmatic knowledge about the information strength of *sae* sentences when alternative propositions of a statement were given.

If children are insensitive to SIs because of a lack or delay of pragmatic knowledge associated with the comparison and evaluation of information strength, then the expectation is that they should perform poorly in the experiment. However, if children are sensitive to SIs and to information strength, but only have difficulty with the processing component involved in the computation of SIs, as Chierchia et al. (2001, Exp. 3) argue, then the experiment should show that children perform better than they did in Ito (2005). The reason is that in the experiment, different propositions of a statement are given.

The children's performance in the experiment showed no significant improvement over that in Ito (2005); the results resembled those in Ito (2005), which is not predicted by the PLH, since the computation of SIs is expected to be easier when processing demands involved in the construction of different propositions are lightened. The results suggest that both the building and maintaining of the alternative propositions, and the computation of information strength are difficult for children, at least in the computation of sentences containing *sae*. This study aims to contribute to experimental studies on pragmatics, especially those on 'even,' conventional implicature and SI.

SIs IN CHILD LANGUAGE: THE PRAGMATICS OF 'SOME' AND 'OR,' AND THE FOCUS PARTICLE *SAE* 'EVEN'

The pragmatics of 'some' and 'or'

Acquisition studies on the computation of SIs generally focus on logical words like 'some' and 'or.' The pragmatics of 'some' and 'or' differ from that of *sae* because the former are logically ambiguous in interpretation while the latter is not. Terms like 'some' and 'or' are interpreted differently depending on the context in which they are used, while *sae* (and *even* in English) is not. The 'or' in sentence (3) may have one of two possible meanings, designated "inclusive" or "exclusive."

- (3) Yoko speaks Japanese or French.

The 'or' has "inclusive" meaning when both disjuncts (Japanese, French) are the languages Yoko speaks. It has "exclusive" meaning (the preferred meaning) when Yoko speaks either Japanese or French, but not both. The 'some' in sentence (4) is similar.

- (4) Some professors came to the party yesterday.

The sentence containing 'some' is true when all the relevant professors came to the party. However, the preferred meaning is that some professors, but not all the professors under consideration, came to the party yesterday.

The tendency to interpret the sentences in (3) and (4) as described above is explained by application of a SI in pragmatics (see Horn, 1972, 1989). A scale is an ordering among the relevant logical words based on informational strength. SIs are "inferences that result in interpreting a speaker's utterance as meaning more than what is literally said" (Chierchia et al., 2004: 284). Now compare (3) with (5).

- (5) Yoko speaks Japanese and French.

The set of circumstances that verify statement (5) is a subset of the circumstances that verify (3). Therefore, (5) and (3), which contain *and* and *or*, respectively, form the subset/superset relationship: $S(\textit{statement}) (\textit{and}) \subseteq S (\textit{or})$. This SI computation can be generalized in (6).

- (6) Suppose α and β are part of a scale such that $\alpha \subseteq \beta$. Then if the speaker utters $S(\beta)$ (i.e., the logically weaker scalar term), such a statement is interpreted as $S(\beta)$ and not $S(\alpha)$.

(Gualmini et al., 2001: 232)

Based on (6), $S(\textit{or})$ (cf. (3)) is interpreted as $S(\textit{or})$ and not $S(\textit{and})$. This process leads to an informative interpretation. In particular, sentence (5) is more informative than (3) because (3)'s meaning is ambiguous without context: the semantics of 'or' allows the listener to assign the disjunctive both the "inclusive" meaning and the "exclusive" meaning. However, knowledge of pragmatics, SIs (cf. (6)), enables the hearer to conclude that (3) has the "exclusive" meaning. The hearer's inferences are based on the assumption that the speaker is cooperative in ordinary conversational contexts

and obeying the Maxim of Quantity (cf. Grice, 1975, 1989). This inference is made by comparing (3), which contains an informationally ambiguous, and therefore, underinformative term 'or,' with (5), which contains the informationally strong term 'and' and then by selecting the informationally stronger representation in (5) for conveying an "inclusive" meaning of 'or,' hence the preference for the "exclusive" meaning in (3).

Pragmatic scales of 'even' sentences

If EVEN sentences are considered in terms of a pragmatic scale of informativeness, it can be shown that the implicatures to which EVEN gives rise are involved with information strength akin to that involved in SI.⁵ In standard practice, EVEN sentences give rise to conventional implicature because of the specific term 'even' (Grice, 1975, 1989; Horn, 1969; Karttunen & Peters, 1979; Potts, 2005, among others; cf. Bach, 1999). However, there is debate as to whether the relevant meaning generated by the focus particle is presupposition or implicature, and--if it is presuppositional-- whether it is semantic or pragmatic. I first consider the basic meanings, following Karttunen & Peters's seminal work on 'even,' and then argue that because the relevant term is scalar in nature, the felicitous use of EVEN sentences requires the speaker and the hearer to compute and evaluate alternative representations of EVEN statements. I further argue that the computation of information strength is involved, whether the relevant implicature is scalar (in the sense of Horn, 1972) or conventional. This idea of pragmatic scales draws heavily on Fauconnier (1975), Kay (1990) and Rullmann (2007). I show that the inference EVEN sentences give rise to concerns informativeness based on the Quantity Maxim.

Consider sentence (7a):

- (7) a. Even Bill likes Mary.
(Karttunen & Peters, 1979: 12)
b. Bill likes Mary. (target proposition)

According to Karttunen & Peters (1979), *even* is a focus particle that does not affect the truth condition of the clause in which it appears, but only serves to introduce two implicatures. (For a summary of *even* in English, see also Rooth, 1985; Kay, 1990; Wilkinson, 1996, among others.) The target proposition of (7a) is (7b), (7a) but without the focus particle *even*. The semantics of *even* requires that the context in which it is interpreted evokes a set of alternative propositions for a contextually-defined

specific set. This is shown in (8):

- (8) x likes Mary. (alternative proposition):
 {Ken likes Mary, Ben likes Mary, Mark likes
 Mary, etc.}

Sentences such as (7a) evoke the two implicatures in (9) below with respect to the relationship between the target proposition in (7b) and the alternative proposition(s) in (8):⁶

- (9) a. There are other x under consideration besides
 Bill such that x likes Mary.
 (existential implicature; cf. Karttunen & Peters,
 1979, (37))
 b. For all x under consideration besides Bill, the
 likelihood that x likes Mary is greater than the
 likelihood that Bill likes Mary.
 (scalar implicature; cf. Karttunen & Peters,
 1979, (40))

The implicatures above, which *even* is supposed to carry, also apply to *sae* ‘even’ in Japanese.⁷ The Japanese counterpart of (7a), (10) below, a conventional example of *sae*, evokes both existential implicature and scalar implicature in (9). (See Numata, 1986; Teramura, 1991, among others, for the semantics of *sae*.)

- (10) Bill-sae Mary-o kiniitteiru.⁸
 Bill-EVEN Mary-ACC like
 ‘Even Bill likes Mary.’

The difference between the semantic and pragmatic uses of the term SI is important. The SI in (9b) concerns the scale of individuals in the relevant set of boys, in terms of the semantic meaning of the (less) likelihood that x likes Mary, while SIs mentioned in the Introduction are concerned with pragmatics associated with information strength. In this study, the term SI will be used in the latter sense; SIs will be assumed to stem from pragmatic inferences about the information strength of a specific statement and its different representations.⁹ The interpretation of sentences containing a focus particle resembles the computation of SIs (Gualmini et al., 2001; Chierchia, 2004). In both cases, “the interpretation of a sentence *S* requires the comparison of *S* against a set of alternative propositions, *ALT*, which have been introduced in the conversational background (e.g., Rooth, 1992; Krifka, 1995). The choice of a sentence *S* from

ALT implicates the negation of all stronger propositions in *ALT*” (Gualmini et al, 2001: 232). Consider (6). This process applies to sentences containing the focus particle *only*, for instance. In a context where only Yoko, among all the girls under consideration, went to a certain party, *S* (*only Yoko*) is interpreted as *S* (*only Yoko*) and not *S* (*only Mary*).

Let us consider the way in which SI is computed in sentences containing *sae*. If sentence (10) were presented in a context where the alternative propositions in (8) hold, the semantics of *sae* provides the alternative representations in (11) below.

- (11) a. Even Ken likes Mary. ↑ big
 b. Even Ben likes Mary. (informative scale: less
 likely to like Mary)
 c. Even Mark likes Mary. | small
 (The likelihood that x likes Mary is the biggest
 in (11c).)

In the context where all the boys under consideration (including Bill, cf. (10)) like Mary, and the likelihood that Bill likes Mary is smaller than the likelihood that any other boy in the relevant set of boys likes her, (10) is more informative than any statement in (11). That (10) is the most informative statement is explained by the informative strength of the SI.

Thus, whether it is conventional or conversational, the informativeness in the SI generated by *EVEN* can be defined as in (12), following the idea of Kay (1990):

- (12) For any two distinct statements *p* and *q* with a scalar model, *p* is more informative (or “stronger”) than *q* if *p* unilaterally entails *q*.

That the inferences vary with context seems to indicate that the relevant implicature is conversational by virtue of fulfilling the calculability requirement of conversational implicature. The inferences made in choosing (10) over any statement in (11) concern the information strength of *sae* sentences, strength which is thus associated with the Quantity Maxim. The relevant informativeness seems to stem not only from what Karttunen and Peters call conventional implicature based on the conventional meaning of *EVEN* but from the pragmatics of *EVEN*.

The implicature in question is not only context-dependent, but passes another diagnostic test for conversational implicature: cancelability, as shown in

(13):

- (13) Even Ken visited Mary, and in fact even Bill visited Mary.

(13) shows that we can say (11a) while denying the implicatures by adding (10) without a contradiction. The fact that the implicatures can be cancelled stems from the peculiar properties of implicatures generated by EVEN: implicatures conveyed by EVEN are ‘informativeness’ rather than “least likelihood” (see also Francescotti, 1995).^{10 11}

Scales such as (11) and their representations shown in (10) and (11) satisfy the informativeness requirement associated with pragmatic inferences, although the aspects of meaning evoked by EVEN (cf. (9)) are classified as instances of conventional implicatures akin to (pragmatic) presuppositions (Karttunen, 1977; Stalnaker, (1974) 1998), as mentioned above. This accords with the claims made in Fauconnier (1975), Kay (1990), and Rullmann (2007), and establishes that the interpretation of sentences containing the focus particle EVEN involves the computation of information strength in a set of alternative representations of a statement, whether the implicature in question is called conventional or conversational.

Child Japanese and sae sentences

Ito (2005, Exp. 1) tested whether Japanese children are sensitive to SIs and to grammatical restrictions on the scope of *sae*, that is, to which syntactic NP constituent *sae* attaches. In a typical trial, children were told a story and at the end of the story, were asked to judge the felicity of a test sentence the puppet produced. The results are summarized in Table 1.

TABLE 1. *Frequency of correct responses: adapted from Ito (2005: Table 1)*

	SUBJ (Felicitous)	SUBJ (Infelicitous)	OBJ (Felicitous)	OBJ (Infelicitous)	%
4-year-olds	100 (6/6)	16.7 (1/6)	66.7 (4/6)	50 (3/6)	
5-year-olds	88.8 (8/9)	11.1 (1/9)	88.8 (8/9)	11.1 (1/9)	
6-year-olds	100 (9/9)	0 (0/9)	100 (9/9)	11.1 (1/9)	
Total	95.8 (23/24)	8.3 (2/24)	87.5 (21/24)	20.8 (5/24)	

The numbers in parentheses are the number of items judged correctly vs. the total number of test items.

As shown in Table 1, the Japanese children aged four to six correctly interpreted sentences that were felicitous with context when *sae* was attached to either the subject or object, but made errors when the sentences were

infelicitous with context. The results, especially those from the infelicitous sentences, seem to show that the children are not sensitive to the information strength of sentences containing *sae* and to syntactic restrictions on the scope of *sae*. A finding in partial agreement with Noveck (2001) is that Japanese children were not able to judge pragmatically infelicitous sentences as infelicitous. However, the data do not give clear proof as to whether these results stem from the children’s insensitivity to SIs or the children’s responding to the truth value of propositions. There are several possible explanations. The test sentences which were incorrectly judged as felicitous were true as propositions; that is, they referred to one of the events which actually happened in the context of the story.¹² The children were asked to judge whether test sentences were *ii kotae* ‘an appropriate/good answer’ or *hen’na kotae* ‘a weird answer.’ It might have been unclear to the children what the task required of them was, and the children might have not calculated the (in)appropriateness of the test sentences. It is also possible that infelicitous sentences might have increased processing cost and therefore led to confusion.¹³ For example, ‘Even the squirrel touched Mama Rabbit,’ because it was designed to assess children’s sensitivity to the syntactic scope of *sae*, was presented in a context which gave no alternatives for the squirrel. Ito (2005) predicted that children who are sensitive to the scope of *sae* would judge the relevant sentences as infelicitous. However, in the absence of an appropriate context, the children who were unable to successfully process a sentence may have turned to a strategy which is irrelevant to the knowledge which the experiment aimed to assess. Therefore, the children’s judging of infelicitous statements as felicitous does not necessarily demonstrate that the children were unable to compute SIs.

Contrary to these observations (and those mentioned in Introduction), Chierchia et al. (2001, Exp. 3) found that English children do show pragmatic knowledge about information strength when asked to choose a felicitous statement out of two statements by rewarding the puppet who produced a felicitous statement. This finding suggests that children’s apparent lack of pragmatic knowledge and their insensitivity to SIs do not stem from any difficulty in comparing the relevant representations or from computation of SIs. Instead, it suggests that SIs are accessible to children, when alternative representation(s) of a statement is (are) given in the task.

THE EXPERIMENT

Background

The experiment was conducted to test the PLH by investigating whether the explicit presentation of alternative propositions facilitates children's ability to evaluate pragmatic felicity, and assessing whether children are able to judge underinformative sentences as infelicitous when alternative propositions are explicitly given. Because an appropriateness judgment task was used, only one statement (either felicitous, or underinformative, and thus, infelicitous) was presented. The PLH predicts that if alternative representations of a statement are explicitly provided, children should show pragmatic knowledge including information strength. If the PLH is valid, then sentences like (14) should be easier to process than (15):

- (14) Mark, Ken, and even Bill like Mary.
(15) Even Bill likes Mary.

In (14), the alternative propositions of the target proposition 'Ken likes Mary' allow greater ease of processing, although their predicates are phonologically deleted. Because children do not have to build and maintain alternative propositions of an 'even' statement, processing should be easier. It is assumed that the explicit presentation of alternative propositions, though not alternative representations, lightens the processing demands on children.

To ensure that nothing other than the *sae* sentences in question affected the children's interpretation, the same scenarios used in Ito (2005) were used in the experiment. However, the listed *sae* structures, such as (14), were used as test sentences. The children were asked to judge a given statement as felicitous or infelicitous.

The method

Before the main session, each child received two pre-test trials (one True, one False) which were intended to determine whether or not the child had a basic understanding of listing structures, as shown in (16).

- (16) The dog, the cat, and the elephant ate apples.

Children who did not respond to the two pre-test items correctly were excluded from the main-test trails. One four-year-old child was eliminated. Each child then went through four main experimental trials (2 felicitous and 2 infelicitous) and two fillers. For each trial, two

experimenters told one story by using props and puppets. After each story was presented, the main puppet, which did not see or hear the story, asked a second puppet what happened in his absence. After the second puppet briefly told what happened, the main puppet said a stimulus sentence which contained *sae*. The children's task was to judge whether the main puppet's response was 'an appropriate/good answer' or 'a weird answer' by feeding the main puppet either 'a piece of cake' or a 'green pepper,' respectively. When the children made errors by judging underinformative sentences as felicitous, the main puppet asked 'Why so?' (See Appendix for all the stimulus sentences used in the main session.)

The scenario for one of the test trials is given in (17).¹⁴ This was followed by the dialog in (18).

- (17) A squirrel which really loves animals went to a park. There he met Mama Rabbit, Brother Rabbit and Sister Rabbit. Their fur looked so soft and fluffy that the squirrel wanted to touch them. (The squirrel touches Brother Rabbit and then Sister Rabbit.)

Squirrel: Wow, so soft and fluffy. But look at Mama Rabbit. Her fur must be fluffier. It will be so comfy. (Mama Rabbit runs away. After that, Anpan-man goes to bed because he has a cold. After he goes to bed, Mama Rabbit returns.) Well, I decided to touch her. (The squirrel touches her.) Wow, it's so fluffy.¹⁵ (The main puppet, Anpan-man, who was sick in bed, gets up while yawning.)

- (18) Main Puppet. I slept so well. Hey, Monkey [another puppet], what happened?
Monkey. Let me tell you. The squirrel touched all the rabbits.

After hearing the story, the main puppet presented a test sentence such as (19):

- (19) Risu-kun-ga okaasan-usagi to squirrel-NOM Mama Rabbit and oniityan usagi to, soreto imooto usagi-sae Brother Rabbit and Sister Rabbit-EVEN sawatta yo touched Particle
'The squirrel touched Mama Rabbit, Brother Rabbit, and even Sister Rabbit.' (infelicitous)

In this context, the stimulus sentence in (19) is infelicitous. The inference made in (19) is that the likelihood that the squirrel touched Sister Rabbit is smaller than that of the squirrel touching Mama Rabbit or Brother Rabbit, contrary to the given context, hence pragmatic infelicity. When a felicitous stimulus sentence was needed, sentences like (20) were used.

- (20) Risu-kun-ga oniityan usagi to imooto usagi to, soreto okaasan-usagi-sae sawatta yo
'The squirrel touched Brother Rabbit, Sister Rabbit and even Mama Rabbit.' (felicitous)

(20) is felicitous, since the likelihood that the squirrel touched Mama Rabbit was less than that of the squirrel's touching Brother Rabbit or Sister Rabbit. This experiment assessed whether children are able to detect underinformativeness in cases such as (19). The experiment took approximately 20 minutes. A warm-up session preceded the experiment to familiarize children with the tasks, toys, and puppets. Each child was interviewed individually in a quiet room in their nursery school. Children could hear the stories again if they were not sure what happened in the story.

The subjects

Twenty-nine Japanese mono-lingual children, consisting of seven four-year-olds (4;4-4;11, mean 4;8), eight five-year-olds (5;0-5;11, mean 5;7), and fourteen six-year-olds (6;0-6;11, mean 6;5), participated in this experiment. Twenty-one adults (all undergraduate students) served as a control group. All the subjects were different from those of Ito (2005).

The results

The results are summarized in Table 2. The 'Felicitous' or 'Infelicitous' notations in parentheses denote whether a given sentence is intended to be felicitous or infelicitous. The numbers in parentheses are the number of items judged correctly vs. the total number of test items.

TABLE 2. *The frequency of correct responses for the main experiment*

	SUBJ (Felicitous)	SUBJ (Infelicitous)	OBJ (Felicitous)	OBJ (Infelicitous) %
4-year-olds	57.1 (4/7)	14.3 (1/7)	85.7 (6/7)	14.3 (1/7)
5-year-olds	87.5 (7/8)	25 (2/8)	87.5 (7/8)	0 (0/8)
6-year-olds	85.7 (12/14)	7.1 (1/14)	92.9 (13/14)	14.3 (2/14)
Total	79.3 (23/29)	13.8 (4/29)	89.7 (26/29)	3.7 (3/29)
adults	85.7 (18/21)	95.2 (20/21)	90.5 (19/21)	71.4 (15/21)

The adults generally responded correctly, showing that the stories and test sentences were appropriate.¹⁶

The overall percentage correct is 48.3% (56 items

correct out of 116 items). The percentages correct for the subject *sae* and object *sae* sentences are 46.6% (27 items correct out of 58 items) and 50% (29 items correct out of 58 items), respectively. There was no significant difference found in terms of the syntactic position involved ($p=0.470$ for felicitous sentences; $p=1.000$ for infelicitous sentences: Fisher's exact probability test). The difference in the frequency of correct responses was significant between felicitous and infelicitous sentences ($p < 0.001$ for both subject and object *sae* sentences).

A comparison of the results in Table 2 with the results of Ito (2005) (cf. Table 1) reveals no significant improvement in the children's sensitivity to the SIs of *sae* (SUBJ (Felicitous), $p=0.111$; SUBJ (Infelicitous), $p=0.677$; OBJ (Felicitous), $p=1.000$; OBJ (Infelicitous), $p=0.444$). This shows that the children's performance is not affected by explicit presentation of the alternative propositions, since they incorrectly judged *sae*-infelicitous sentences as felicitous, but judged *sae*-felicitous sentences as felicitous, as revealed in Figure 1.

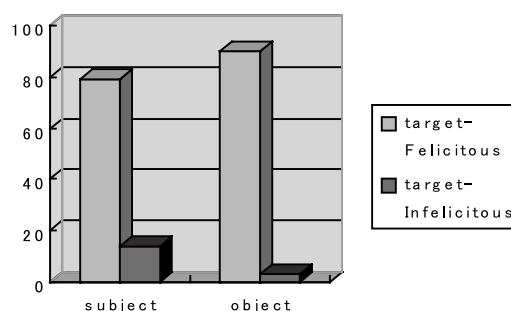


Figure 1

The frequency of correct responses (all children)

These findings correspond to those of Ito (2005). Table 2 and Figure 1 show that the children's poor performance is caused by their failure to detect underinformativeness.

DISCUSSION

The experiment in this study were done to investigate Japanese-speaking children's knowledge of pragmatic inferences akin to SIs and thus test the PLH, which predicts that children should perform like adults in tasks that assess their knowledge of SIs, as long as they do not require the construction of alternative representations. The results provide no specific evidence to support the PLH; on the contrary, they suggest that with regard to *sae*, Japanese children are insensitive to pragmatic knowledge associated with information strength.

The results, which were on a par with those of Ito

(2005), seem to show that when interpreting sentences containing *sae*, the children were not sensitive to information strength, although the evidence for this is only slight. In the experiment, contrary to predictions based on the PLH, the children did not show pragmatic knowledge about information strength even when alternative propositions of a target statement were given. The results, on a par with those in Ito (2005) (and Noveck, 2001), showed the children were unable to judge underinformative sentences as infelicitous, but were able to judge correctly informationally felicitous sentences as felicitous. Explicit presentation of alternative propositions of a target statement does not appear to facilitate the children's ability to judge underinformative sentences as infelicitous, which contradicts the PLH. Instead, the results suggest that when judging *sae* sentences, children are insensitive to pragmatic knowledge associated with information strength.

It has been shown that Japanese children seem to be insensitive to implicatures which *sae* gives rise to, on a par with previous experimental results (except Chierchia et al., 2001, Exp. 3). This delay in acquiring pragmatic knowledge has been reported in acquisition research (Chien & Wexler, 1990; cf. Grodzinsky & Reinhart, 1993; Reinhart, 1999, 2004, 2006). The pragmatic knowledge studied involves two components needed for the computation of SIs: the first is building and maintaining alternative representations of a statement; and the second is the comparison and evaluation of the pragmatic felicity (Chierchia et al., 2001, 2004). Previous studies, including Ito (2005), have not found which of the two components causes children to have difficulty computing SIs. Chierchia et al. (2001, Exp. 3) have shown that children have access to the second component and therefore can show pragmatic knowledge associated with SI. In the present study, however, it was shown that there are also cases in which only the second component, i.e., the comparison and evaluation of information strength, can be a problem in a task which does not impose on children a full processing load for the first component required to compute the SI.

The results from the present experiment clearly show that the explicit presentation of alternative propositions of a target *sae* sentence does not enable children to judge underinformative sentences as infelicitous, in line with Noveck's observation and thus are contrary to the PLH.

CONCLUSION

The experiment of this study revealed that children's

insensitivity to SIs does not stem solely from children's inability to build and maintain different propositions of a statement. No specific evidence was found that supports the PLH. It was found that there are cases in which only the comparison and evaluation of information strength can be a problem in a task which does not impose on children the construction of alternative propositions.

The main result, that no evidence was found to support the PLH, is tentative. It is possible that the present study did not make a conclusive test of the PLH. If the PLH predicts that children should reveal pragmatic knowledge about SIs only when alternative representations (not propositions) of a statement are presented, then further research will be needed to truly test the PLH.

That line of research requires investigating whether or not children's performance improves in a Felicity Judgment task which gives alternative representations of a *sae* statement as an infelicitous statement, as shown in (21).

- (21) a. Cat: Risu-kun-ga okaasan-usagi-sae sawatta n'da ne. (felicitous, cf. (20))
 'The squirrel touched even Mama Rabbit.'
 b. Dog: Risu-kun-ga imooto-usagi-sae sawatta n'da ne. (infelicitous)
 'The squirrel touched even Sister Rabbit.'

Consider (21) in the context of the scenario in (17). The presentation of the representations in (21) will unambiguously test the PLH. Children's preferring (21a) over (21b) would be evidence supporting the PLH, and suggests that the results of Ito (2005) (and the present experiment) stem from the complexity of the task. This confounding factor can be eliminated in (21). This is part of my on-going study.

APPENDIX

The main-test stimulus sentences used in the main experiment (in English translation)

- (1) Sister Bear, Brother Bear, and even Mama Bear patted the dog. (felicitous)
- (2) The squirrel touched Mama Rabbit, Brother Rabbit, and even Sister Rabbit. (infelicitous)
- (3) The tiger bought an orange, an apple, and even a banana. (felicitous)
- (4) The tiger, the rabbit, and even the giraffe ate lunch. (infelicitous)

Notes

¹ Some researchers, Papafragou & Musolino (2003, Experiment 2) and Guasti et al. (2005, Experiments 2 and 4) report elevated performance in experiments conducted under conditions in which children are trained to be aware of pragmatic anomalies or the stories are designed to highlight the contrast between the underinformative sentence and the felicitous sentence. (See also Pouscoulous, Noveck, Politzer & Bastide 2007). However, in Papafragou & Musolino (2003), the children's performance seemed to be still around chance level. My study is limited to less elaborate scenarios where children are not especially encouraged to increase their awareness of pragmatic anomalies.

² Specifically, Grodzinsky & Reinhart (1993) and Reinhart (1999, 2004, 2006) depart from Chien & Wexer (1990) and others. According to (Grodzinsky and) Reinhart, the difficulty children have (with the interpretation of pronouns) lies in the capacity of using their pragmatic knowledge due to limitation of working memory.

³ The reason why "partial agreement" is used here is that the infelicitous sentence used is not one of a set of alternative representations of a felicitous sentence, in a strict sense. Noveck (2001) reports that the children fail to judge underinformative sentences as infelicitous.

⁴ Another experiment was done with another type of 'even,' *datte*. The follow-up experiment employed the Felicity Judgment task (Chierchia et al., 2001) and was designed to assess whether or not children are able to distinguish an informationally felicitous statement from an infelicitous one. In the task, children are required to evaluate the relative felicity of given two statements with respect to context without responding to the truth value of statements. The results are reported in Ito (2009, unpublished Kaken report).

⁵ EVEN in capitals is used to refer to the focus particle 'even' as the crosslinguistic equivalent of 'even.'

⁶ According to Karttunen & Peters (1979), *even* expresses the relation that holds between the focus element 'Bill' and the property of being an individual that likes Mary. The relation is captured by the comparison of two sets. The set of 'boys who like Mary' exhausts the contextually defined set of 'boys,' and 'Bill' is peripherally present in terms of the property of 'liking Mary.' In the text, I reformulate the relation between two sets as a relation that holds between the target proposition (7b) and the alternative proposition(s) (8). In this section will be seen the way in which the target representation

containing *sae* is placed against a set of the alternative representations.

⁷ This study is strictly limited to cases in which only NPs are the focus of *sae*, as in Karttunen & Peters (1979). I also exclude cases in which *sae* takes scope over an entire proposition that represents an event. The reason for the exclusion is that in such cases *sae* can be attached to any constituent: the subject NP, the object NP, and the entire VP. See Aoyagi (1999) for details.

Even in English can also take scope over an entire sentence representing an event, as shown in

(i):

- (i) (What happened in 1969 that was so exciting? Brady was finally located! Men landed on the moon! Tiny Tim got married!) Why, Harvard even held a pep rally.

(Fraser, 1971: 166)

⁸ Case markers of *sae*-attached NP, such as *ga* (NOM) and *o* (ACC), can be phonologically null. When the relevant NP is overtly case-marked, *sae* can either follow or precede the case marker.

⁹ The computation of SIs involved in the interpretation of *sae* sentences is derived from the SI (in the semantic sense) in (9b). In this paper, the important analysis of the semantics of *even*, which is made in (7) to (9) (cf. Karttunen & Peters, 1979), is reformulated in terms of pragmatics of information strength.

¹⁰ Cancelability does not apply to focus particles across the board. For truth-conditional focus particles such as 'only,' this is not an option.

¹¹ Besides, nondetachability, a diagnostic test which differentiates conversational implicature from conventional implicature also seems to show that the implicatures in question are part of conversational implicature. This is so since *sae/datte/made* 'even' sentences (in Japanese; cf. next subsection) as well as those expressing surprise and noteworthiness give rise to the relevant implicatures across the board. However, the definition of nondetachability needs to be clarified (see Grice, 1989, pp. 43-44; Hirschberg, 1991).

¹² Furthermore, even though some of the warm-up and filler items were rejected, it is possible that the children had a bias for producing "yes" responses when they were not certain about their answers.

Another possibility suggested to me by an anonymous reviewer of the previous version of this paper is that where *sae* is attached to an incorrect syntactic constituent, the children strive to reach an interpretation of the sentence which makes it cohere with the context.

This may lead to their responding to the truth value of the propositions.

¹³ I owe this suggestion to an anonymous reviewer of the previous version of this paper.

¹⁴ In (17), some portion of the actual dialogue has been written in narrative form, so the example dialogue is somewhat shorter than that used in the experiment.

¹⁵ Notice that the squirrel does not seem to be able to touch Mama Rabbit at first, but touches her in the end. This twist in the story is intended to satisfy the “plausible dissent” condition of yes/no questions (see Crain, Thornton, Boster, Conway, Lillo-Martin & Woodams, 1996; Crain & Thornton, 1998).

¹⁶ There is no apparent explanation for the six adults incorrectly judging only one object *sae* sentence, especially since their performance with the other three test items in the present experiment was as expected. Another group of adults’ performance with the same item in Ito (to appear) was almost perfect, where the same story was used.

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