Metalinguistic awareness and theory of mind: A study from Japan.

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Abstract

Japanese 3- and 4-year-old children were tested on a test of metalinguistic awareness and offalse belief understanding. Work with English children has found an association between these two tasks, arguably because both require an understanding of representation. However, Japanese children were far worse than their western counterparts on the false belief task, and at least as good on the metalinguistic task, and thus there was no association between the tasks. Furthermore, children were no better on a colour naming task designed to control for the general information processing demands of the synonym task. Although further data is needed to make strong conclusions, the cross-cultural theoretical implications of this replication failure are discussed.

The aim of this research is to examine evidence in Japanese children for a common development underlying the ability to reflect on language (metalinguistic awareness) and the ability to understand the representational nature of mind. Work with English children (Doherty and Permer, 1995) strongly suggests the two abilities are very closely related. Since there is controversy about what is meant by "metalinguistic awareness" in the psychological literature (Bowey, 1988; Gombert, 1992) , we mean by it the ability to reflect on language, i.e., the ability to mentally represent linguistic expressions as linguistic.

This emphasis on representing linguistic expressions as linguistic serves as precaution to rule out the possibility of someone thinking about linguistic expressions (identified as such by us observers) without any understanding that these expressions serve a linguistic function. An example used by Perner (1988, p. 162) illustrates this point. Imagine 2 illiterate workers putting up the sign to a bar. The workers, have been told that the set of heavy objects they have to erect are "letters" to be arranged into "words". Comments such as "this word was easy, it only has three letters" are not metalinguistic in any interesting sense. Even though the illiterate

workers are thinking about linguistic expressions, they do not think of them as linguistic expressions.

To understand linguistic expressions as such requires understanding of the essential functions and properties of language. Two of them are particularly salient:

Linguistic expressions are tokens in a medium which have
(1) meaning (serve some representational function) , and
(2) some formal structure.

The above definition thus rules out the following kind of data as evidence for metalinguistic awareness. For instance, children's ability to identify ungrammatical utterances as odd or silly (Gleitman, et al., 1972; Smith & Tager-Flusberg, 1982) is inconclusive since success on such tasks may be based only on difficulties understanding the meaning of what was said.

This definition also excludes tasks that can be solved purely on the basis of the formal structure of linguistic expressions, ignoring their principal linguistic function of being meaningful. For instance, tasks where children have to distinguish meaningless speech sounds (e.g., [ne] , [ba] , etc.) from non-speech sounds (pop,hum,etc.) (Smith and Tager-Flusberg, 1982) fail to be metalinguistic since the discrimination can be made purely at the level of sounds without concern that the speech sounds are speech sounds because they are constituents of a meaning carrying system.

The metalinguistic awareness task developed by Doherty and Perner (1995) was modelled after the, for children highly familiar, naming task. Children are shown items in a picture, e.g., a rabbit and are asked to name them with a proper noun, i.e., "rabbit". Another person (or hand puppet) then names the same item by using either the same noun as the child ("This is a rabbit") , a synonym ("This is a bunny") , or a wrong label ("This is an elephant") . The child is told that the puppet's task is to name the item correctly (same meaning) but use a different name (different form) than the child. Hence, when asked whether the puppet had done what it was supposed to do the child should say "yes" only when the puppet had used the synonym.

This task satisfies both sets of specifications for detecting early metalinguistic competence. On the one hand it assesses metalinguistic awareness because it requires,
(1) monitoring of the representational function of the puppet's linguistic production to ensure sameness of meaning, and
(2) monitoring of the formal aspects of the puppet's statement to ensure difference of expression used.

On the other hand, this task minimizes metalinguistic demands beyond the basic competence on the following grounds:

(1) Judging sameness or difference of words is one of the most basic and simplest formal aspects of language,
(2) naming objects is a most familiar task-for young children and one that puts the meaning relation into focus, and
(3) reflection on word differences and on the meaning relationship between common nouns and objects are well within the repertory of every adult.

One danger is that the extraneous non-linguistic demands of the task may mask metalinguistic competence. In the English study a structurally identical control task was used to test for this possibility in which children had to monitor which kind of item the puppet selects. They had to ensure that the puppet selects a different item but of the same kind. If the younger children who had difficulty with the metalinguistic task had no or only minor problems with this control task then their difficulties with the metalinguistic task could not be attributed to its non-linguistic complexity. In the current, Japanese study, a linguistic control was developed to more closely match the information processing demands of the metalinguistic task. Children had to name either the object or its colour, then ensure that the puppet selects a different property (name of colour) that is true of the same object.

Of central interest is the fact that predictions of how children might fare on the metalinguistic task can be derived from theoretical considerations about the development of a "theory of mind", in particular how children develop an understanding of false belief. In the typical false belief task (Wimmer & Perner, 1983) a protagonist puts an object into one of two locations. In his absence the object is unexpectedly moved to the other location. On the protagonist's return children are asked where the protagonist will look for the object. A typical finding is that most 3-year olds answer wrongly that he will look in the location where the object really is, while after 4 most children answer correctly that the protagonist will look in the original, now empty location.

Perner (1991) argued that the source of young children's difficulty cannot be failure to understand how the protagonist would act if the object were still in its original location, since much younger children of 2 or 2 1/2 years are very proficient in that, as evidenced in their pretend play with siblings (Dunn & Dale, 1984) and even with experimenters (Harris and Kavanaugh, 1993) . Children can understand these reality inappropriate activities in that they see people as conceiving of fictitious state of affairs (situations) and as acting as if these states of affairs were true. Being a "situation theorist" of this kind, Perner argued, is not enough for understanding the protagonist's reality-inappropriate action in the false belief task, since the protagonist has all intentions to act in a reality-appropriate way. What needs to be understood in the false belief task is that the protagonist conceives of the ofject's real location as being different from what it really is. Or in other words, children need to be "representation theorists" who understand the protagonist's belief as mental state that represents something (the real

location) as being a certain way, namely in this case, as being different from what it really is.

This characterisation of the cognitive changes underlying falure and success on the false belief task can also be applied to the metalinguistic task. The prediction for the young "situation theorists" is that they can make sense of the semantic requirement of the task that the puppet must name the item correctly as meaning that the situation given in puppet's statement must match the real situation. In other words, they can understand that the statement "This is an elephant" (said of the rabbit) does not match the real situation and they can reject it correctly as not adequate for the puppet's task. The situation theorist, however, cannot make adequate sense of the formal requirement in our task, namely to name the item correctly but in a different way than the child him or herself did. This is beyond the situation theorist because the statements, "This is a rabbit" and "This is a bunny" do not describe different states of affairs but present the same state of affairs in different ways. Only the "representation theorist" can grasp this correctly. The situation theorists will, therefore, either be confused by the instructions, or focus on the semantic criterion. In this case children will admit incorrectly as adequate the use of their own choice of name ("rabbit") as well as the use of the synonym ("bunny") .

The results of Doherty and Perner (1995) are particularly clear. The metalinguistic and false belief tasks were of roughly equal difficulty, and the object pointing control was relatively easy. In Experiment 1, the association between metalinguistic and false belief tasks was $r=.76$ ($F(1,22) = 30.9$, $p < .001$) . When the results of the object pointing control, false belief control questions, vocabulary test, and even age were partialled out the association remained $r=.70$ ($F(1,17) = 16.22$, $p < .001$) . In Experiment 2 this association was $r=.84$ ($F(1,20) = 49.3$, $p < .001$) falling to $r=.71$ ($F(1,18) = 24.3$, $p < .001$) when performance on the British Picture Vocabulary Scale and on the object pointing control were partialled out.

The present experiment was an attempt to see if this highly specific association would hold in a different culture, that of Japan. If the metalinguistic task and the false belief task do indeed require a common representational understanding then performance on the two tasks should be similar even in a different culture.

Method

Subjects

Thirty-three children participated in this study. Their ages ranged from 3 years 1 month (3;1) to 4 years 5 months (4;5) with a mean age of 3;11 and a standard deviation of 5 months. For the analysis of results children were divided into three groups: a youngest group (11 children from 3;1 to 3;10, mean age 3;5, SD = 3 months) , a middle group (11 children from 3;10 to 4;3, mean age 4;1, SD = 2 months) , and an oldest group (11 children from 4;3 to 4;5, mean age 4;4, SD = 1 month) .

Design

Each child was tested on all three conditions: Metalinguistic, False Belief, and Colour Naming Control. The order of administration was cunterbalanced in a 3 × 3 sequence balanced Latin square design.

The Metalinguistic condition consisted of 4 component tasks. In two of the tasks the puppet correctly used a synonym, in one of the tasks the pupped incorrectly used the same word as the child, and in the fourth task the puppet misnamed the item. Order of presentation was such that the first and last pair of tasks each required one 'yes' judgement and one 'no' judgement from the child. Otherwise order of presentation and item were fully counterbalanced.

The Colour Naming control consisted of four analogous component tasks. In two of the tasks the puppet correctly named the item or the colour (if the child had named the colour or the item, respectively) , in one of the tasks the puppet incorrectly used the same word as the child, and in one of the tasks the puppet misnamed the item or the colour (counterbalanced) . The order of these tasks and items was counterbalanced in the same way as the 4 metalinguistic tasks.

Procedure and Materials

Each child was seen in a quiet and familiar room adjacent to the nursery area. The following 3 conditions were administered in the order discussed in the Desigh section above.

Metalinguistic Condition

The metalinguistic condition consisted of three phases: vocabulary-check, modeling and test phase.

Vocabulary Check. In this phase children were given a vocabulary test checking on their knowledge of the synonyms used later in the actual test. It also served to alert the child to the distinctions which had to be made in the experiment. Four A4 sheets were used. Each of them had 4 pictures on it. Two of the pictures were experimental items used later spoon and sweets/candy on two of the sheets; road and table on the other two. The other two items on each sheet were chosen from among a bag, the sun, a house, and a dog. The first sheet with a truck, a woman, a bird and a daisy on it was shown with the words:

> "Did you know something? Some things have two names. Let's see, shall we? Now, can you show me the saji? [Child points] . And which one is the supun? (If child points correctly, experimenter continues) Hey, you pointed to the same thing! So, this can be called a saji, and it could be called a supun. It got 2 names."

Children were often reluctant to point to the same item a second time, so they were given en-

couragement if they hesitated, and the question was repeated if they pointed to the wrong item. If, after repetition, they still pointed to the wrong item, the next item was presented and the experimenter substituted an extra item into the procedure (ie/ouchi) which was also used in the experimental phase instead of the failed item. Then the other 3 sheets with 4 pictures each were presented. For the third and fourth sheets the first item to identify was not one of the experimental items. For example, on the fourth sheet the child was asked to identify the bag first. This was to prevent children from thinking that the same item was required for both questions on each sheet, and then point to the same item regardless of what word is used. Then the experimental item was asked about once with each synonym, as before.

Modeling Phase. The objective of this part of the procedure was to model the actual test procedure. A glove puppet kitten, and 3 hand drawn colour pictures (each on a 10 x 15 cm index card) were used showing a dog, a bag, and the sun. The child was shown the first picture and the experimenter announced:

> "Here are some more things with two names. We can play a game with them. What's going to happen is this: You say one name, and puppet has to say the other name. NOT the one that you said. Now, this could be called inu or wan-wan. Which one do you want to say? Now, Puppet, you say the other name. [puppet uses the same name as child, e/g., "inu"] . Is that what he should have said? [Pause for child to answer] . No, cause you said 'inu' didn't you? Puppet, you say the other name. [Puppet now gives synonym, e.g., 'wan-wan'] . Is that what he should have said? [Wait for child's answer] . Yes, because 'wan-wan' is the other name for inu, isn't it?

This was repeated for the other two warm-up items: kaban/bagu, and taio/ohisama. The third trial was the same as the first, but on the second trial puppet first gave the wrong name twice before saying the correct word. This gave children two trials with repetition of their answer, which work in England suggested was the hardest response type to judge.

Test Phase. For the actual test the modelling phase was simply continued with four new pictures but no feedback was given. Puppet named each item only once and then the test question: "Is that what he should have said?" was asked (in Japanese, "kore wa nan te iu ka na?") . The four items were always presented in fixed order as listed but the assignment of conditions was counterbalanced as explained in the Design paragraph. Depending on condition (same, synonym, different-meaning) the puppet used one of the following words for each of the following 4 items:

1. spoon: "saji", "supun", "inu".
2. sweets: "ame", "candi", "kaban".
3. road: "michi", "doro", "taio".
4. table: "teburu", "tsukue", "saji".

If the child had failed an item in the vocabulary test, one of teses imtems was replaced by:

5. house: "ie", "ouchi", "teburu".

Colour Naming Control

The procedure in this condition was designed to parallel the modelling and test phases of the metalinguistic condition.

Vocabulary Check. From the same set of A4 sheets used in the metalinguistic vocabulary phase the child was required to identify items of the following 5 colours: white, black, brown, red, and yellow. These had been chosen from pilot tests as the best known colours for Japanese preschoolers.

Modelling Phase. Eight cards were used, identical to those used in the metalinguistic condition but for the fact that each was coloured with one of the five colours from the vocabulary check. Each card had a duplicate in another colour in case the original colour was not known[1], and again there was a replacement item in case both original and backup colours for one item were not known. The cards with their two colours were as follows:

Modelling:

dog	(brown, yellow)
bag	(red, black)
sun	(yellow)

Test:

spoon	(red, white)
sweets	(yellow, red)
road	(black, yellow)
table	(white, brown)

Replacement:

house	(brown, black)

The experimenter said:

> "Here are some coloured pictures. We can play a game with them. What's going to happen is this: You say what its called or what colour it is, and puppet has to say the other thing. NOT the one that you said. Now, you can say this is a dog or you can say this is brown. Which one do you want to say? Now, Puppet, you say the other thing. [puppet uses the same word as child, e.g., "dog"] . Is that what he should have said? [Pause for child to answer] . No, cause you said 'dog' didn't you? Puppet, you say the other thing. [Puppet now gives the colour, e.g., 'brown'] . Is that what he should have said? [Wait for child's answer] . Yes, because you said what it was called, so puppet should say what colour it is, shouldnd't he?"

[1] Except for the sun, where being yellow is a defining characteristic.

Similar to the metalinguistic condition, the third modelling item was like the first, but for the second item puppet first used the wrong name, then the wrong colour, before finally saying the correct word.

Test Phase. The modelling phase was continued without feedback. The test question was "Is that what he should have said?" (in Japanese, "kore wa nan te iu ka na?") . order of presentation of items and questions was counterbalanced as explained in the design section.

False Belief Test

For this test two dolls (6cm) , a wooden ball (2.5 cm diameter) , an round pink box (5.5 cm high × 5.5 cm wide) and a square blue box (6 cm high x 6 cm wide) were used. Children were introduced to the dolls and their memory for the dolls' names was checked. Then the following story was told:

> "Here's Hanako, and here's Jiro... and here's a pink box and here's blue box.
> Now, Hanako has a ball, and she puts her ball into this box, like that, and then she goes out to play. But, while she's away, what's happening here? Jiro goes to the box, and he takes Hanako's ball, and he puts it into this box, like that. And then he goes out to play too [Jiro leaves in the opposite direction to Hanako] . A bit later, Hanako comes back."

Belief Question:	Where will she look first for her ball?
Reality Question:	Where is the ball really?
Memory Question:	Where did Hanako put the ball in the beginning?

Results

False Belief

The most striking finding of the study was that all the children failed the false belief task. Seven children also failed the false belief memory control question.

Metalinguistic Task

Twenty-five of the 33 children passed all four conditions of the metalinguistic task, 5 children passed three of the conditions and the remaining 3 children only passed two of the conditions. There was a slight non-significant improvement in the number of successful trials over the three age groups (chisquare = 6.62, df = 4) .

Colour control task.

The overall success levels of the colour control task were identical to the metalinguistic task - 25 children passed 4, 5 children passed 3, and 3 children passed 2 trials. There was a significant age difference with the older two groups and particularly the middle group passing more trials than the youngest group (chisquare = 12.38, df = 4, $p < .05$) .

Comparison of Conditions

Performance on the metalinguistic and colour control conditions were significantly associated (chisquare = 11.45, df = 4, $p < .05$) with the majority of children passing all four conditions of each task.

Clearly, since no child passed the false belief task, there is no association between false belief and the other tasks.

Discussion

The strong association between the false belief and metalinguistic tasks found with English children was not seen with Japanese children in this study. On the contrary, although all the children were incapable of passing the false belief task, most were completely successful on the metalinguistic task. There are several possible explanations for this pattern of results:

Japanese children are selectively impaired on the false belief task

The data do in fact show very poor performance on the false belief task. Given the mean age of the children (3yrs 11m) one would expect about half the children to pass based on studies done in America, Austria, and Britain. The oldest children in this study were still within the age range where it is not unusual for children to fail the task; what is unusual is that all of them failed. During the pilot work for the colour control task, with the same population of children, similarly poor performance on the false belief task was found with even older children, and it would appear that this population is delayed in false belief understanding compared to western children. The only published study of Japanese children's performance on false belief tasks is also suggestive of some delay. Naito et al (1994) found roughly half their sample of 4-year-olds (mean age 4;8) failed a different version of the false belief task (the deceptive container task) . Subsequent results also suggest that Japanese children are slightly delayed on the false belief task (Naito, 1995, personal communication) . The possibility of delay has not, however, been suggested before; Naito et al's results remain within the range of success found in western studies. Our results, are slightly poorer than Naito et al's, and taken together, suggest that the average Japanese child passes the false belief task slightly older than the average Western child.

This possibility certainly warrants investigation, though no doubt the truth will become apparent if more studies are conducted on Japanese children's understanding of false belief. The mere fact of poorer performance however would not explain the lack of association of the false belief task and the metalinguistic task. The factors causing this relatively poor performance

would have to be identified first, and this would not be easy to do. Little is known about the contributing factors to the development of children's theory of mind.

Japanese children are selectively enhanced on the metalinguistic task

It is not clear why this would be, and the results of this study do not necessarily show better performance than one might expect from English children of this age on the metalinguistic task. Nevertheless, Japanese children might have some special facility with metalinguistic tasks. This could be demonstrated by the use of a wider range of metalinguistic tasks and comparison with western children, relative to standard measures of verbal mental age.

The two tasks do not tap a common understanding of representation

If this were so it would have to be shown why the association held over two studies in England (and over two further studies using a different metalinguistic methodology - see Doherty, 1994) . Further, it would have to be shown why the association did not neverthless hold in Japan. That this possibility is worth taking seriously is indicated by the association between the metalinguistic condition and colour control condition, which does not require a representational understanding of language.

Caution must be taken however. Since two thirds of subjects passed both colour control and metalinguistic tasks, the association may be more due to the ceiling effect rather than any fundamental similarity between the tasks. Younger children need to be tested to ensure that by and large if children fail one task they also fail the other.

Possible theoretical changes

If the association did remain, the theoretical analysis would have to be changed to accomodate this, although the assumption of an underlying common understanding of representation need not be relinquished. The information processing demands of the task are unlikely to be the source of difficulty, since the object pointing task used in England was so easy for preschool children despite the difficulty of the structurally analagous metalinguistic task.

One possible explanation is that before children understand representation they cannot distinguish between different true descriptions of the same situation. That is, if a verbal representation correctly picks out a situation, children may be capable of judging its truth, but be incapable of analysing the way in which it truthfully represents its referent (e.g. as white or as a rabbit) . Once they understand something of the relationship between linguistic form and meaning, they can solve the problem. This would mean that hierarchically related terms, such as animal-dog-spaniel, would cause children the same problems as synonyms, and this provides a means of testing the hypothesis.

This does not of course explain why the metalinguistic and colour control tasks were passed so much earlier than false belief, and it remains in doubt whether Japanese children have a simi-

lar age profile in their performance one the metalinguistic task to English children. Clearly futher research is required, over a wider age range of children, and modifying the synonym task to also include hierarchical term comparisons.

Conclusion

The strong association between the metalinguistic and false belief tasks found with English children was not found with the Japanese children of this study. Furthermore, the colour control condition used to control for the general demands of the metalinguistic task appears to be no easier. This latter finding suggests that children have difficult distinguishing different true statements before they understand the representational nature of language. The reason for the lack of association can only be uncovered by further work.

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