YOUNG CHILDREN’S UNDERSTANDING OF ANOTHER’S APPARENT CRYING AND ITS RELATIONSHIP TO THEORY OF MIND

Ai MIZOKAWA and Masuo KOYASU

Kyoto University, Japan

This study examined young children’s understanding of apparent crying and its potentially misleading consequences. Gross and Harris (1988) showed that 6-year-olds can understand that one can simulate an emotion while feeling another, and that such a display can mislead others. In this study, 69 children aged 4, 5, and 6 were given “crying tasks” and “Standard and Second-order False Belief tasks”. In “crying tasks”, participants were asked to identify whether the protagonist was actually crying, and whether the other character believed that the protagonist was actually crying. The results indicate that children’s understanding of apparent crying develops between the ages of 4 and 6. However, most of the children did not understand its misleading consequences. Furthermore, relationships were found between the understanding of apparent crying and the False Belief tasks. This finding suggests that the development of young children’s understanding of apparent crying relates to the development of theory of mind.

Key words: apparent crying, theory of mind, young children

Although emotions are natural, people sometimes express different emotions from the emotions they are actually experiencing. Young children do not understand this at first. Imagine that someone receives a disappointing gift and experiences negative emotion yet expresses happiness (Saarni, 1979). Previous research has shown that most 4-year-olds cannot understand that one can simulate an emotion while feeling another; 6-year-olds on the other hand, were able to distinguish between real emotion and apparent emotion (Harris, Donnelly, Guz, & Pitt-Watson, 1986; Gross & Harris, 1988; Josephs, 1994; Joshi & MacLean, 1994; Mizokawa, in press). There were no differences in age in regards to understanding the incongruence between apparent and real emotions between American, British, and Japanese children (Gardner, Harris, Ohmoto, & Hamazaki, 1988).
Gross and Harris (1988) also explored children’s understanding of how apparent emotion can lead to another’s false belief about that person’s real emotion. They found that children’s understanding of this misleading consequence develops between the ages of 4 to 6 (Gross & Harris, 1988).

There are few developmental studies that have examined children’s awareness of another’s apparent crying when he or she is actually not crying. Such a topic is, however, pertinent to developmental psychology because the activity of crying is innate in children; emotions which cause crying are basic (e.g., sadness, discomfort, and pain); and other children’s pretended crying is often observed in a child’s daily life. Crying sometimes contains a massage for others. Children’s crying catches the attention of their caregivers and elicits their caring behaviors. Reddy (1991) reported that an 8-month-old infant pretended to cry with no tears when she wanted to get her mother’s attention. This kind of crying in infancy may be done without conscious appreciation of the effect of crying. After numerous experiences of getting others’ attention by crying, children gradually appreciate that crying behavior is useful to elicit caring behaviors and use it more effectively. In this study, we examined young children’s understanding of apparent crying and its misleading consequence from the perspective of cognitive development.

Children’s Understanding of Apparent Crying

Although it is known that the understanding of situations which provoke sadness starts from around the age of 4 (Denham & Couchoud, 1990), there are few studies that have examined children’s understanding of situations involving apparent crying. However, important data have been gathered by Mizokawa (in press), who examined whether young children can understand another’s ability to express sadness when one does not actually feel sad, as well as their understanding of apparent happiness where this is not actually felt. In Mizokawa (in press), 40 four- and six-year-old children listened to 8 stories in which it was appropriate for the protagonist to hide his/her real emotions (negative or positive). Hiding of emotions was based on either pro-social or self-protective motivation (after Gnepp & Hess, 1986), and the protagonist instead expressed another emotion (happiness or sadness). Children were asked questions about the protagonist’s real and expressed emotions, and the emotions the other story character inferred that the protagonist was feeling. As a result, Mizokawa found that six year-old children understood apparent sadness which was motivated by a desire to avoid negative consequences and to preserve self-esteem, that is, self-protective motivation. Mizokawa did not deal with crying as a form of sadness expression, but apparent crying is also understood by children who are around 6 years old, because crying is arguably one of the strongest forms of expressing sadness.

Children’s Understanding of the Misleading Consequences of Crying

In research on appearance and reality of emotions, some studies investigated children’s understanding of false belief regarding emotion which was portrayed by apparent emotion. It was found that the understanding of the misleading consequences of emotion develops between the ages 4 and 6 (Gross & Harris, 1988; Mizokawa, in press).
With regards to apparent crying, although Mizokawa did not investigate apparent crying, the data produced can be used to predict the likely results if apparent crying were tested. The percentages of correct answers on the false belief questions were low even for 6-year-olds. It seems that in particular, there was a lower performance in apparent sadness tasks. Hence in this study, the expectation was that the understanding of another’s false belief about crying partially develops in young children, with scores being relatively low in 6-year-olds.

Relationships to Theory of Mind

The acquisition of theory of mind is ascertained by children’s ability to pass the False Belief task. Children pass the standard (first-order) False Belief task between the ages of 4 and 6 (Perner, 1991; Wimmer & Perner, 1983). Children then pass the second-order False Belief task between the ages of 6 and 9 (Perner & Wimmer, 1985). Recently, a less demanding second-order False Belief tasks has been created, making it easier to understand for young children (Birthday task: Sullivan, Zaitchik, & Tager-Flusberg, 1994; Applied version of unexpected displacement task: Hayashi, 2002).

Recall the earlier scene in which someone received a disappointing gift and experienced negative emotions but expressed pleasure instead (Saarni, 1979). To distinguish between apparent and real emotions, it is necessary to identify the real emotion and to keep it distinct from the apparent emotion. This ability is required in the False Belief task. For example, in the unexpected displacement task, which is one of the most popular False Belief tasks, participants have to retain the original placement of an object in their mind as well as its present location. In this light, the understanding of incongruence between apparent and real emotions relates to the acquisition of theory of mind, which is the understanding of others’ mind (Perner, 1991; Wimmer & Perner, 1983). It follows, then, that in order to understand another’s false belief about an individual’s emotion created by the display of a differing apparent emotion, one needs to have acquired theory of mind. This is because it involves understanding false beliefs of another, which essentially requires understanding another’s mind. These relationships between the false belief about an object’s place and apparent emotion, as well as between the false belief about an object’s place and the false belief about an emotion have not previously been explored in depth.

In this study, we decided to use the standard False Belief task and the modified second-order False Belief task (Hayashi, 2002) that improved understanding in young children. We then evaluated the relationship between children’s performance in False Belief tasks and children’s understanding of apparent crying, as well as the relationship between children’s performance in False Belief tasks and its misleading consequences.

Understanding of Apparent Crying and Theory of Mind

There are some studies which investigated the links between understanding of apparent emotions and theory of mind (Banerjee & Yuill, 1999; Miyamoto, 1998). Miyamoto (1998) examined young children’s understandings of masked facial expression from the perspective of theory of mind. Miyamoto used a story in which a protagonist had
motivation to express positive or neutral emotion while feeling negative emotion. She found that the degree of understanding in regards to masked facial expressions related to performance in the standard False Belief task (Smarteries task: Perner, Leekam, & Wimmer, 1987). Banerjee & Yuill (1999) examined young children’s understanding of expression of false emotion (positive and neutral) while feeling another emotion and its association with the appreciation of second-order mental representation. They found that children who passed the second-order False Belief task (Birthday task: Sullivan et al., 1994) performed better when it came to recognising the expressions of self-presentational false emotion. Still, there are no studies that have examined links between the understanding of apparent crying and performance in the False Belief tasks (standard and second-order). Thus, we intended to examine this relationship in this study.

We used two kinds of apparent crying tasks (with and without deception) as we suppose that there are different cognitive processes used in understanding apparent crying depending on the presence of deception intention. Apparent sadness tasks which were used in Mizokawa (in press) all included the intention of deception. For example, the protagonist shows a sad face on purpose because he or she wants Dad to carry him or her on his back for soothing. We define apparent crying without deception as an action which has a form of crying but indeed comes from another reason (e.g., one’s eyes are itchy). Children were able to understand apparent crying which did not involve deception if they could distinguish between ‘appearance’ (crying) and ‘reality’ (not crying) in their mind. This corresponds to the need to pass the standard False Belief task, which involves retaining the original placement of the object separate from the place where the object is now. Therefore, we assumed that it is necessary to pass the standard False Belief task in order to understand apparent crying without deception.

Apparent crying involving deception is more complicated than understanding apparent crying without deception. Children were asked to have a recursive thought such as “the protagonist thinks that another character thinks he is actually crying”, as well as retaining ‘appearance’ (crying) and ‘reality’ (not crying) separate in their mind. As a result, we believe that the performance in both standard and second-order False Belief tasks relate to the understanding of apparent crying with deception.

Understanding of the Misleading Consequences of Crying and Theory of Mind

Banerjee and Yuill (1999) examined the relationship between the understanding of another’s belief about emotion by using the apparent emotion on one’s face (i.e., misleading consequences) and theory of mind. They found that children can appreciate another’s false belief about the protagonist’s real emotion without acquiring second-order false belief (Birthday task: Sullivan et al., 1994). However, no research has been carried out which investigates the relationship between children’s understanding of another’s false belief generated by apparent crying and performance of standard and second-order False Belief tasks. To understand the misleading consequences of apparent crying, it is necessary to have recursive (second-order) thoughts, such as “another character thinks the protagonist thinks that he has lost his toy and is crying”, as well as having an understanding of apparent crying. Therefore, we think that there are relationships
between understanding the misleading consequences of apparent crying and performance in standard and second-order False Belief tasks, regardless of the presence of intention to deceive.

**Goals**

We examined 4-, 5-, and 6-year-olds’ understanding of three different stories in which the protagonist looked like he or she was crying. The three different conditions were (1) apparent crying without deception, (2) apparent crying with deception, that is, pretending to cry, and (3) real crying. The goal of this study was to investigate five hypotheses below.

1. The understanding of apparent crying develops between 4 and 6 years old.
2. The understanding of how apparent crying can lead to another’s false belief about reality develops between 4 and 6 years old.
3. Children’s understanding of apparent crying that does not involve deception and its misleading consequences develops earlier than where an intention to deceive is involved.
4. There are three relationships between the understanding of crying and the understanding of false beliefs:
   4-a. The understanding of apparent crying which does not involve the intention to deceive relates to the understanding of the first-order false belief.
   4-b. The understanding of apparent crying which involves the intention to deceive relates to the understanding of both the first- and second-order false beliefs.
   4-c. The understanding of real crying, which has no conflict between appearance and reality, is acquired before the understanding of first-order false belief.
5. An understanding of the misleading consequences of apparent crying relates to the understanding of first- and second-order false beliefs, regardless of their involvement of deception; but there are no relationships between understanding one’s true belief about crying and understanding both false beliefs.

**Method**

**Participants**

Three classes at a kindergarten situated in the central area of Osaka city in Japan were sampled. These classes were age-based and comprised of a total of 69 children. However, we excluded children’s data if they did not finish all the tasks, did not answer all the questions, or gave answers which were not part of the choice given. In the remaining data, there were 61 children including 16 younger children (6 boys and 10 girls, mean age 4 yrs 2 m, range 3;9–4;8), 20 middle aged children (13 boys and 7 girls, 5 yrs 2m, 4;8–5;8), and 25 older children (13 boys and 19 girls, 6 yrs 1m, 5;8–6;6). These three groups will be referred to as the 4-year-old, the 5-year-old, and the 6-year-old group.

**Materials**

A Notebook computer was used to show three kinds of tasks on the screen. These are outlined below.

‘WPPSI Receptive Vocabulary task.’

The first 22 pages of the WPPSI Receptive Vocabulary task were used to control for children’s
language ability. Each page showed four pictures, which the child would use in order to identify an object. For example, the experimenter would ask the child to show him or her a foot, and the child would be expected to point to the picture of the foot.

‘Crying Tasks’

Three “crying tasks” which consisted of two apparent crying tasks and one real crying task were created. Each “crying tasks” has a male and a female version. The protagonists and another character of the stories were male for male participants and female for female participants.

One of the apparent crying tasks involved a scene in which the protagonist looked like he or she was crying without deception although he or she was not really crying, and another character has a false belief that the protagonist was crying (Task A).

Another apparent crying task involved a scene in which the protagonist looked like he or she was crying with deception although he or she was not really crying, and another character had a false belief that the protagonist was crying (Task B).

The real crying task involved a scene in which the protagonist was really crying and another character had a true belief that the protagonist was crying (Task C).

We prepared these three tasks by modifying only the middle part of the story. In these tasks, there was a protagonist and another character. We ran a pilot test for the crying tasks before the experiment. Four 5- or 6-year-olds participated in the pilot test, and we fixed some wording to make it more easily understandable for young children. (See Appendices 1 and 2.)

‘False Belief Tasks’

The standard false belief task and the second-order false belief task used in the experiment involved an animated scene. We used the unexpected displacement task (Wimmer & Perner, 1983) as the standard false belief task, and the applied version of unexpected displacement task (Hayashi, 2002) as the second-order false belief task (See the Appendix 3). The second-order false belief task used in this study (Hayashi, 2002) was easier for young children to understand than other second-order false belief tasks (e.g., Ice cream task: Perner & Wimmer, 1985; Birthday task: Sullivan et al., 1994).

Procedure

Children were observed individually in a separate and quiet room in the kindergarten. Each child sat on a sofa and the experimenter sat on his or her left side. This allowed both the child and the experimenter to see the screen of the notebook computer. The experimenter started the experiment after having established rapport with the child.

The WPPSI Receptive Vocabulary task took place first, followed by the crying tasks, and finally the False Belief tasks. These tasks were presented on the screen of the notebook computer.

The WPPSI Receptive Vocabulary task was shown using Acrobat Reader, and followed the procedure as specified in the manual.

The crying tasks were shown by using PowerPoint. Before listening to the three crying tasks, children were instructed that they were going to be told some stories about a naughty character, and his or her friends (protagonists). They were then told that they would be asked some questions after each story, and that they were to listen to stories carefully. Once instructions were given, the crying tasks were read to the children, and the slides were shown. Each story was constructed using four slides. These three tasks had the same construction except for the third slide.

This is one example of the crying task. [Task A, male version] (See Appendix 1.)

(1) Saburou (protagonist) and Gonta (naughty character) were playing in the room.
(2) Gonta hid Saburou’s toy because he wanted to tease Saburou, and then he went outside.
(3) After a while, Saburou rubbed his eyes because they felt itchy. Saburou appeared to be crying.
(4) Then, Gonta came back.

2 We administered a fourth crying task in this experiment. This task involved a scene where the protagonist was really crying because of one reason, and another character had a false belief that the protagonist was crying because of another different reason. However, this was not an apparent crying task, and was therefore not relevant. We have therefore removed the description of this task from the paper.
After showing the story to the children, they were asked two main questions (Question a, c), and two justifications (Question b, d) after each main question. (See Appendix 2.)

[Belief questions]

(a) Does Gonta think that [%...% or %...%]?  
   — ‘Saburou is crying’ or ‘Saburou is not crying’?
(b) Why does Gonta think Saburou is doing like this? (pointing to the protagonist on the fourth slide) Is it because [%...% or %...%]?
   — ‘his eyes were itchy’ or ‘he lost his toy’

[Reality questions]

(c) Saburou looks like he is crying, doesn’t he? So is he [%...% or %...%]?  
   — ‘really crying’ or ‘not crying’
(d) Why is Saburou doing like this? (pointing to the protagonist on the fourth slide) Is it because [%...% or %...%]?
   — ‘his eyes were itchy’ or ‘he lost his toy’

The order of the three tasks and the order of the choices for each of the 4 questions were counterbalanced.

Finally, the animation of the standard False Belief task and the second-order False Belief task were shown. All children started with the standard False Belief task and then progressed to the second order.

RESULTS

As there were no differences between boys and girls in any of the analyses below, we used the combined data hereafter.

Performance on WPPSI Receptive Vocabulary Task

The mean scores for each age group in this task were 16.50 (SD = 2.50) for 4-year-olds, 17.15 (SD = 2.83) for 5-year-olds, and 19.88 (SD = 1.45) for 6-year-olds. The score range was 0 to 22. A one way analysis of variance (by age) was carried out on subject’s scores. The analysis revealed that the main effect of age (F (2, 58) = 12.80, p < .001). The multiple comparison tests on this main effect revealed significant differences between 4- and 6-year-olds (p < .001), and 5- and 6-year-olds (p < .001), indicating that 6-year-olds performed better than 4-year-olds and 5-year-olds.

We intended to exclude outliers which were not within the mean ± 3SD, but all data were within this range.

Performance on Crying Tasks

Understanding of Apparent Crying

The children’s performances in the three crying tasks are shown in Table 1. Task A was the apparent crying task without deception. A chi-square test was carried out with age (4-, 5-, and 6-year-olds) and the percentage of correct answers on the

---

3 If children did not choose from the choices in question (b) and answered “Because Saburou is crying”, children were asked again in this way: “Why does Gonta think Saburou is crying?”

4 If children did not choose from the choices in question (d) and answered “Because Saburou is crying”, children were asked again in this way: “Why is Saburou crying?”
The distribution of correct answers varied with the children’s age ($\chi^2 (2) = 24.00, p < .01$). Further chi-square tests comparing the performances between each age group revealed that there were significant differences between 4 and 5-year-olds ($\chi^2 (1) = 6.65, p < .01$), 5- and 6-year-olds ($\chi^2 (1) = 7.61, p < .01$), and 4 and 6-year-olds ($\chi^2 (1) = 23.71, p < .001$). 6-year-olds performed better than 4- and 5-year-olds, and 5-year-olds performed better than 4-year-olds in Task A. In Task B, which was the apparent crying task with deception, a chi-square test revealed that the distribution of correct/incorrect answers on the Reality Questions varied with the children’s age ($\chi^2 (2) = 29.81, p < .01$). Further chi-square tests comparing the performances between each age group revealed significant differences between 4- and 5-year-olds ($\chi^2 (1) = 24.00, p < .001$), and 4- and 6-year-olds ($\chi^2 (1) = 26.47, p < .001$). 6-year-olds performed better than 4-year-olds, and 5-year-olds performed better than 4-year-olds in Task B. In Task C, which was the real crying task, the percentage of correct answers on the Reality Questions were quite high in all age groups, and a chi-square test revealed that there were no significant differences between any of the age groups.

**Understanding of the Misleading Consequences of Crying**

The children’s performances in the three crying tasks are shown in Table 2. Apparently, their performances in Task A and B were low, in contrast to their performance in Task C. Chi-square tests were carried out with age (4-, 5-, and 6-year-olds) and percentage of correct answers on the Belief Questions to evaluate any significant differences in performance according to age. It is important to note that where children

---

5 A correct answer means that children passed both Reality Questions.
correctly answered the Belief Questions but had incorrectly answered the Reality Questions, their answers were recorded as incorrect for both. This is because if a child was unable to grasp the logic behind the Reality Questions, it was impossible for them to understand the logic behind the Belief Questions. A chi-square test revealed that there were no significant differences in the distribution of the three age groups in any of the three tasks.

**Effect of the Existence of Intention to Deceive**

Children’s performances in Task A and B were compared to examine whether there was any effect of intention to deceive on understanding apparent crying and its misleading consequences. McNemar’s tests were carried out, with task (Task A, Task B) and percentage of correct/incorrect answers on the Reality Questions (correct, incorrect) as factors, in order to examine the influence of deception intention on apparent crying. It was revealed that there were no significant differences between tasks A and B in each age group.

McNemar’s test was also carried out with task and percentage of correct answers on the Belief Questions, to examine the influence of deception intention on understanding the misleading consequences of apparent crying. This revealed that there was no significant difference between Task A and B in each age group.

**Understanding of First- and Second-Order False Beliefs**

Children’s performances on standard and second-order False Belief tasks are shown in Table 3. In each of the three tasks, chi-square tests were carried out by age (4-, 5-, and 6-year-olds) and percentage of correct answers on standard False Belief task, as well as by age (4-, 5-, and 6-year-olds) and percentage of correct answers on second-order False Belief task in order to test the influence of age on performance in the False Belief tasks. Chi-square tests revealed that the distribution of correct answers varied with children’s age: standard False Belief task, $\chi^2 (2) = 12.70, p < .01$; second-order False Belief task, $\chi^2 (2) = 17.73, p < .01$. Further chi-square tests to compare the performances between each age group in standard False Belief task revealed that there were significant differences between 4- and 5-year-olds ($\chi^2 (1) = 4.25, p < .05$), and 4- and 6-year-olds ($\chi^2 (1) = 27.25, p < .001$). There was also significant difference between 4- and 6-year-olds ($\chi^2 (1) = 5.46, p < .01$) in second-order False Belief task. 6-year-olds performed better than 4-year-olds, and 5-year-olds performed better than 4-year-olds in standard False Belief task. 6-year-olds were better than 4-year-olds in second-order False Belief task.

Table 3. Number and Percentage of Correct Answers on Standard and Second-Order False Belief Tasks

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Standard</th>
<th>Second-order</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 years old ($n = 16$)</td>
<td>1 (6.25%)</td>
<td>2 (12.50%)</td>
</tr>
<tr>
<td>5 years old ($n = 20$)</td>
<td>6 (30.00%)</td>
<td>6 (30.00%)</td>
</tr>
<tr>
<td>6 years old ($n = 25$)</td>
<td>15 (60.00%)</td>
<td>12 (48.00%)</td>
</tr>
</tbody>
</table>
Relationships between Understanding Crying and False Belief Tasks

Understanding Apparent Crying and False Belief Tasks

We calculated partial correlations between children’s performances on standard and second-order False Belief tasks and correct answers in the Reality Questions with children’s age being partialled out in order to determine whether there were any relationships. The partial correlation matrices obtained (shown in Table 4) revealed that children’s understanding of apparent crying were significantly correlated with the performance on the False Belief tasks. There was no significant correlation between the understanding of real crying and performance on the False Belief tasks.

Understanding the Misleading Consequences of Crying and False Belief Tasks

We calculated partial correlations between children’s performance on standard and second-order False Belief tasks and correct answers in the Belief Questions with children’s age being partialled out in order to determine whether there were any relationships. The partial correlation matrices obtained (shown in Table 5) revealed that there was no significant correlation between the understanding of false beliefs about crying (misleading consequences) and performances on the False Belief tasks, as well as between the understanding of true belief about real crying and performances on the False Belief tasks.
DISCUSSION

Children’s Understanding of Apparent Crying

The results of this study support the first hypothesis that the understanding of apparent crying develops between 4 and 6 years old. The results are also consistent with the findings of previous studies which examined children’s ability to distinguish real emotion from apparent emotion (Harris et al., 1986; Gross & Harris, 1988; Josephs, 1994; Joshi & MacLean, 1994; Mizokawa, in press). We found that the understanding of apparent crying develops in young children. This is important as it forms the basis for future study on children’s development of the understanding of apparent crying.

We postulate three possible causes of a relatively low performance in understanding apparent crying among 4-year-olds. One reason is that 4-year-olds are not aware that people can express an emotion while feeling another, since they, for example, answered the Reality questions with “He or She is really crying because he or she looks like they are crying.” Secondly, perhaps 4-year-olds have this knowledge to a degree, but answered that “He or She is really crying” because they were misled by the appearance (crying) of the protagonist. Lastly, low performance may relate to the children’s inability to understand the story. In Task A, 4-year-olds may not have understood that the protagonist did not notice that he or she had lost his or her toy. In Task B, 4-year-olds might not have understood that the protagonist was not actually crying when he or she was trying to elicit an apology from the naughty character. Based on the results of the study, it is difficult to ascertain which, if any, of these reasons are true. It is necessary to do research on this aspect of development in more detail. There is also a need to improve the tasks used. For example, it may be necessary to make certain aspects of the story more explicit, such as whether or not the protagonist notices that his or her toy is missing.

One might argue that our results could be explained by a responsiveness-bias, particularly with regards to the Reality Questions. It has been found that young children have a yes bias: this is a tendency to answer ‘yes’ to yes-no questions, and this tendency has been observed in 2- and 3-year-olds in particular (Fritzley & Lee, 2003). The youngest age group in this study included some 3-year-olds. In this study, children were shown a picture of the protagonist who looked like they were crying in all tasks, and were asked about reality of crying. This involved asking the child “Saburou looks like he is crying, doesn’t he? So is he ‘really crying’ or ‘not crying’?” However, a yes bias is unlikely to be present in this study. This is because the first part (Saburou looks like he is crying, doesn’t he?) of the Reality Questions included asking for confirmation regarding the protagonist’s appearance, which had already been shown to the children. Furthermore the next part (So is he ‘really crying’ or ‘not crying’) requested the child to choose one of the options. As mentioned earlier, the order of the choices were counterbalanced. If children only answered yes to the question, they were asked again to choose one of the two choices.

Children’s Understanding of the Misleading Consequences of Apparent Crying

The results do not support the second hypothesis that understanding how apparent
crying can lead to another’s false belief about reality develops between 4 and 6 years old. It is difficult to understand the misleading consequences of apparent crying even for 6-year-olds. In the apparent crying tasks (Task A and B), most 4-year-olds were inclined to assume that the protagonist was really crying, and that another character also thought that protagonist was really crying in Belief Questions. Most 6-year-olds were inclined to judge the protagonist as not crying, and that the other character also thought that the protagonist was not crying.

Perhaps understanding of false beliefs created by apparent crying develops after the age of 6, in their elementary school ages. However, it is risky to assume that 6-year-olds cannot understand another’s false beliefs about crying at all. Some studies have shown that 6 year old children understand another’s false beliefs about emotion. For example, they guessed that another character in a story thought that the protagonist was happy because they were smiling while they were actually disappointed (Banerjee & Yuill, 1999; Gross & Harris, 1988; Mizokawa, in press). Previous studies had not used a scene in which one revealed a negative expression (e.g., crying) when one does not actually have that negative emotion. This apparent crying is rarely ‘taught’ in society, whereas children are sometimes told to express positive emotions even when they do not feel that way. Indeed, children sometimes receive a disappointing gift in their daily life, and they suppress their real emotion and express positive emotion instead. This is because their parents hope and tell them to do so. Such a view that we should mask our real emotion and express positive emotion to protect another’s feeling in a situation like this would be internalized through children’s socialization processes. However, parents ask their children not to cry easily as they grow older. Crying itself does not seem to be positive though crying sometimes brings the crying person something good (e.g., their demands being met). Children would understand the effect of crying through their own crying experience. Moreover, we do not have a lot of experience seeing another’s apparent crying and noticing that it is not real crying, because we are likely to assume that when someone looks like he or she is crying, there are reasons for their crying. As a result, our focus on crying, as opposed to more positive emotions, may have made it difficult for children to understand false beliefs about emotion. More precisely, the results of this study only examined children’s understanding of crying in a story. Thus, there is a possibility that children have a better understanding of the misleading effects of apparent crying in their daily life. Crying (whether genuine or apparent) in real life has not only the appearance of unhappiness but also the sound of crying. In this study, we mainly examined children’s understanding of a situation. Future research examining children’s understanding of both genuine and apparent crying may want to consider using more realistic representations of crying or real crying itself.

---

6 As we described in Results, where children answered the question about another’s belief correctly but the question about reality incorrectly, their answer to the Belief Questions was considered incorrect. This was because their inability to correctly answer the Reality Questions indicated a lack of understanding of apparent crying, and hence a lack of understanding of other’s belief about crying.
The Effect of Deception Intention

The results of this study did not support the third hypothesis, that children’s understanding of apparent crying which does not have an intention to deceive, and its misleading consequences, develops earlier than where an intention to deceive is involved. Contrary to our expectations, deception intention did not have an influence on the understanding of apparent crying and its misleading consequences. Children’s understanding of apparent crying increased between the ages of 4 and 6, regardless of the presence of intention of deception. We could not, however, examine all the effects of deception intention on understanding another’s false belief about crying. That is because it is hard for young children to understand it. It is possible that such an understanding develops later in life. We expect that the understanding of its misleading consequences develops during their elementary school ages (6–12 years in Japan). It is therefore necessary to examine the influence of deception intention in future research using a sample of older children.

Relationships to Theory of Mind

Apparent Crying and Theory of Mind

The results of this study partly support hypothesis 4-a, that the understanding of apparent crying not involving the intention to deceive relates to the first-order false belief. Children’s understanding of apparent crying without deception significantly related not only to their performance on the standard False Belief task, but also to their performance on the second-order False Belief task. The result of this study fully supported both hypothesis 4-b, that the understanding of apparent crying involving the intention to deceive relates to the understanding of the first- and the second-order false beliefs, and 4-c, that the understanding of real crying which has no conflict between appearance and reality is acquired before the understanding of first-order false belief.

As we expected, there are relationships between the understanding of apparent crying and theory of mind. However there was an unexpected finding. The results of this study revealed that an understanding of apparent crying relates to both False Belief tasks (standard and second-order), regardless of intention to deceive.

We initially assumed that only the understanding of apparent crying with intention of deception related to the understanding of the second-order false belief, and that the understanding of apparent crying without intention of deception did not relate to the understanding of the second-order false belief. This was because apparent crying without deception is not intended to mislead others (e.g., a person looks like he is crying but in reality he is only rubbing his eyes.), while apparent crying with deception intended to mislead others deliberately. We believed that the understanding of intention to mislead others needed the acquisition of recursive thought. This would allow the child to understand that the protagonist believes that another character thinks that the protagonist is crying.

Why is there a link between the understanding of apparent crying without intention to deceive and the performance on second-order false belief tasks? On the surface, it seems that the understanding of apparent crying without intention to deceive needs only...
the ability to distinguish between appearance and reality. However, in the present study, the apparent crying situation without intention to deceive included the potential that the other character who looked at the protagonist’s apparent crying would be deceived as well as in the apparent crying situation with intention to deceive. If children consciously understood apparent crying as a behavior which includes the potential to mislead others, they could correctly answer the Belief Questions. The relationship between the understanding of apparent crying without intention to deceive (performance on the Reality Questions in Task A) and their performance on the second-order False Belief task suggests that it might be necessary to implicitly understand this potential in order to understand apparent crying. That is to say, we think that the results of this study suggest that at least the unconscious awareness of the misleading consequences of apparent crying were required to understand apparent crying regardless of the presence of the intention to deceive.

The Misleading Consequences of Crying and Theory of Mind

The results of this study do not support the last hypothesis that an understanding of the misleading consequences of apparent crying relates to the understanding of first- and second-order false beliefs, regardless of their involvement of deception; but there are no relationships between understanding of true beliefs about crying and understanding both false beliefs. As we expected, there was no significant relationship between understanding the true belief about crying in Task C and performance on the standard False Belief task. However, there were no significant relationships between children’s understanding of the misleading consequences (false belief) of apparent crying and their performance on both False Belief tasks (standard and second-order). We attribute this result to children’s low performance on the Belief Questions in the apparent crying tasks as indicated by Table 2.

CONCLUSION

The findings from this study are important because this is the first time young children’s ability to understand apparent crying and its misleading consequences from the perspective of theory of mind have been explored. Crying is often observed in children’s daily life, and it is an everyday experience for them. Though caregivers sometimes ask their children to express pleasure, they rarely teach apparent crying to children. Children may learn about the effects which result from crying through personal experience, such as when adults comfort them when they are crying. They may gradually learn about the existence of apparent crying by themselves. As we found in this study, most children around 6 years old are able to understand apparent crying, and this understanding relate to the understanding of others’ mind. They also have developed knowledge about how someone can look like they are crying when they are not actually crying by developing the ability to stand in and think from another’s viewpoint. As we discussed earlier, there are few studies which investigate children’s understanding of apparent emotion from the perspective of theory of mind. Banerjee & Yuill (1999) pointed out that there was a need
to have a cognitive ability to think recursively to understand that people could express a false emotion to deceive another person. The result of our study revealed that there was also a need to understand second-order recursive thought to understand apparent emotion which was expressed without intention to deceive. Young children probably start to notice the consequences of apparent crying, as illustrated by the relationship found between their performance in the second-order False Belief task and their performance on the apparent crying tasks. We thought that this relationship came from the children’s potential ability to be aware of the consequences of apparent crying. Yet, there is room to further explore children’s appreciation of others’ emotion and mind. We did not find a relationship between the understanding of the misleading consequences of apparent crying and theory of mind, as children’s performances on the Belief Questions in the apparent crying tasks were low. In future studies, this needs to be examined through research in older children above 6 years of age, which will allow for the understanding of misleading consequences of apparent crying.

REFERENCES


APPENDIX 1  Pictures and stories of the “crying tasks”: male version

Task A: Apparent crying, without deception
(1) Saburou and Gonta were playing in the room.
(2) Gonta hid Saburou’s toy because he wanted to tease Saburou, and then he went outside.
(3) After a while, Saburou rubbed his eyes because they felt itchy. Saburou appeared to be crying.
(4) Then, Gonta came back.

Task B: Apparent crying, with deception (pretend crying)
[Only the third part of the story]

(Task A: Apparent crying, without deception)>  
(1) Saburou and Gonta were playing in the room.  
(2) Gonta hid Saburou’s toy because he wanted to do tease Saburou, and then he went outside.  
(3) After a while, Saburou rubbed his eyes because they felt itchy. Saburou appeared to be crying.  
(4) Then, Gonta came back.

(Task B: Apparent crying, with deception (pretend crying)>  
[Only the third part of the story]
After a while, Junji found his toy. Junji wanted Gonta to apologize, so Junji decided to pretend to cry.

<Task C: Real crying>

After a while, Kanao was aware that his toy was lost. Kanao was sad and started to cry.

(*note 1) The first, second, and fourth part of the story were the same in all three tasks except for the names of protagonists.

(*note 2) The names of protagonists were Saburou (Humika) in Task A, Junji (Hiroe) in Task B, Kanao (Tomiko) in Task C, and the name of another character is Gonta (Goromi) in all tasks.

APPENDIX 2 Questions and choices in “crying tasks”: male version

[Belief Questions]
(a) Does Gonta think that [‘...’ or ‘...’]?  
— ‘Saburou is crying’ or ‘Saburou is not crying’
(b) Why does Gonta think Saburou is doing like this? (pointing to the protagonist on the fourth slide)  
Is it because [‘...’ or ‘...’]?
[Task A] — ‘his eyes were itchy’ or ‘he lost his toy’
[Task B] — ‘he wanted Gonta to apologize’ or ‘he lost his toy’
[Task C] — ‘Gonta came into the room’ or ‘he lost his toy’

[Reality Questions]
(c) Saburou looks like crying, doesn’t he? So is he [‘...’ or ‘...’]?  
— ‘really crying’ or ‘not crying’
(d) Why is Saburou doing like this? (pointing to the protagonist on the fourth slide)  
Is it because [‘...’ or ‘...’]?
[Task A] — ‘his eyes were itchy’ or ‘he lost his toy’
[Task B] — ‘he wanted Gonta to apologize’ or ‘he lost his toy’
[Task C] — ‘Gonta came into the room’ or ‘he lost his toy’

APPENDIX 3 The story and the questions in False Belief tasks

(1) Standard (first-order) false belief task

[Story]
This is a bear’s house. The bear took a ball from the shelf and played with it. The bear put the ball back onto the shelf and went out. A monkey came to play when the bear was not home. The monkey took the ball from the shelf and played with it. The monkey put the ball into the basket and left. The bear came back to play with the ball.

[Questions]
Belief question: Where does the bear think the ball is?
Reality question: Where is the ball now?
Memory question: Where did the bear put the ball at first?

(2) Second-order false belief task

[Story]
This is a dog’s house. The dog took a drum from the box and played with it. The dog put the drum into the box and went out. A cat came to play. The cat took the drum from the box and played. The cat put the drum into the bag. The dog saw this from the window, but the cat did not notice him watching. The dog came back into the room to play with the drum.

[Questions]
Belief question: Where does the cat think the dog looks for?
Reality question: Where is the drum now?
Memory question: Where did the dog put the drum?