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The Development of False Belief Understanding in Japanese Children: Delay and Difference?

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Abstract

Three experiments investigated the development of Japanese children's false belief understanding. In Experiment 1, children's mastery of two standard false belief tasks was considerably later and slower than typically reported, with the full development between 6 and 7 years. Experiments 2 and 3 tested Japanese 6- to 8-year-olds on interpersonal transfer tasks where a relocated item was a person who changed locations with and without their own intention. Children's judgments on the main character's belief about this person's whereabouts were not influenced by the protagonists' different mental states included in the tasks; children's justifications referred not to the people's belief or desire but primarily to their behaviors and social rules. Results suggest that Japanese children show not only a delay in false belief understanding but a cultural difference in reasoning about human action as attributing it to behavioral and situational cues, rather than to individuals' mental states.

Keywords: Japanese children; False belief; Interpersonal transfer tasks; Mental states; Behavioral and situational explanations; Interdependent and independent cultures

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The Development of False Belief Understanding in Japanese Children: Delay and Difference?

This study was designed to explore the possibility of different pathways to competent social cognition focusing especially on Japanese children's theory of mind, an ability to attribute people's behavior to their mental states. In theory of mind research, the most widely used tasks that measure this ability have been traditional false belief tasks, such as the unexpected transfer (e.g., Baron-Cohen, Leslie, & Frith, 1985) and unexpected contents tasks (e.g., Perner, Leekam, & Wimmer, 1987). Apart from socially or sensory impaired populations (e.g., Baron-Cohen, 1989; Baron-Cohen *et al.*, 1985; Peterson, 2004), it has broadly been accepted that children understand the false beliefs of others and of themselves by the ages of 4 to 5 years, with a dramatic improvement between 3 and 4 years (Happé, 1995). A recent comprehensive meta-analysis by Wellman, Cross, and Watson (2001) showed that false belief performance of children from different countries similarly increased from below- to above-chance during the preschool years. Wellman *et al.* concluded that false belief understanding develops between 2.5 and 5 years across cultures and that this understanding reflects children's universal conception of belief states that guide human action.

Children's robust tendencies to consider mental states in their inferences about human action have also been demonstrated by Symons, McLaughlin, Moore, and Morine (1997), who manipulated the intentionality of relocated items in unexpected transfer tasks. In their study, 3- to 5-year-olds were asked to predict where the story protagonist would search for an object transferred without the protagonist noticing (the standard task), a person who was asked to transfer by an external agent, and a person who transferred through his/her own intention. While performing reliably better than younger children in the object and person external conditions, in the person condition 5-year-olds performed as poorly as 3-year-olds (see Nguyen & Frye, 1999, for similar results). Symons *et al.* interpreted the results as indicating that 5-year-olds were more sensitive to, and thus were more distracted by, the extra intention included solely in the person condition than younger children. In this condition, although considering the protagonist's false belief about the person's location alone was sufficient to predict the protagonist's behavior, the extra consideration of the relocated person's mental state (i.e., desire and/or intention to move) interfered with 5-year-olds. By

contrast, such consideration was unnecessary in the person external condition, because this condition involved no conflicting mental state other than the protagonist's and hence was essentially the same as the standard object condition. The 5-year-olds' difficulty in the person condition suggests their developing conception that mental states underlie people's behavior.

Just as Wellman *et al.* (2001) postulated, existing theories that explain theory of mind development have started from the Western, or what Lillard (1998) called European-American, premise that the conception of mental states is a universal human capacity observed across cultures. However, the premise has not necessarily been corroborated by all evidence. In particular, non-Western evidence has been mixed, with some findings supporting the universal development of false belief understanding (Avis & Harris, 1991; Callaghan *et al.*, in press; Goetz, 2003; Lee, Olson, & Torrance, 1999; Naito, Komatsu, & Fuke, 1994), and others suggesting cultural variations in theory of mind (Chen & Lin, 1994; Naito, 2003; Vinden, 1996, 1999; Wahi & Johri, 1994). Even within the Western literature, false belief performance often differs between countries (Bradmetz, 1998) and between demographics (e.g., Cutting & Dunn, 1999; Holmes, Black, & Miller, 1996). Indeed in the Wellman *et al.* meta-analysis too, one of the factors that had significant impact on the performance was the country: Japanese children lagged behind children from other countries. In contrast, Japanese research has paid no attention to the possibility that children's false belief understanding would differ from typical development (Goushiki, 1999; Kinoshita, 1991; Koyasu, 1997; Miyamoto, 1998; Naito *et al.*, 1994; Saito, 2000). Close inspection of the research has revealed, however, that evidence of when Japanese children understand false beliefs remains inconclusive. Some found much delayed performance, with fewer than 70% of 5- to 6-year-olds passing a traditional task (e.g., Goushiki, 1999; Koyasu, 1997); others reported performance comparable to that in the literature, with approximately 80% of 5-year-olds passing a task (Kinoshita, 1991; Naito *et al.*, 1994). Moreover, because of their different purposes most of the studies had a relatively small sample of children using tasks and belief questions different from one another.

The first aim of this study was to determine precisely when Japanese children

understand false beliefs, using data from more than 300 children who had been tested on both the unexpected transfer and contents tasks. Three studies (Goetz, 2003; Happé, 1995; Holmes *et al.*, 1996) were chosen to make direct comparisons between the Japanese and both Western and non-Western populations because they used standard transfer and contents tasks comparable in number of tasks and conventional procedures (e.g., real objects presented) to those used in this study. Happé (1995) and Goetz (2003) described typical development reported predominantly in the literature with middle class children; Goetz also included Chinese children from the same East Asian culture as Japan. Holmes *et al.* (1996) showed performance specific to a sample of unprivileged children. Experiment 1 examined whether Japanese children show any delay in standard false belief understanding as compared with these studies.

The study also investigated the developmental trajectory of false belief understanding using socially situated transfer tasks where the intentionality of the relocated item was varied. Although some non-Western studies have suggested late development (e.g., Naito, 2003; Vinden, 1996, 1999), they did not necessarily clarify how and why the development differs from that observed in Western cultures. To provide an answer to this issue, we focused on the findings that Western 5-year-olds, who otherwise perform well on standard tasks concerning a single false belief, were distracted by the other, extra intention involved in the interpersonal tasks and temporarily showed less understanding of the same false belief (Nguyen & Frye, 1999; Symons *et al.*, 1997). Experiments 2 and 3 determined whether Japanese children were, like Westerners, negatively affected by the extra mental state.

In conducting such experiments, one should be particularly careful about linguistic differences between Japanese and other languages (e.g., Naito & Nagayama, 2004). For example, in Chinese there are several belief verbs that vary in their connotations between "think correctly" and "think incorrectly". Lee *et al.* (1999) found that Chinese children's false belief understanding was facilitated by the use of verbs that mean to think incorrectly in the false belief questions. Syntax should also influence children's performance as the acquisition of grammatical *that* complements determined false belief understanding in English-speaking children (de Villiers & de Villiers, 2000). In Japanese, *omou* is a belief

verb that corresponds to the English verb *think*, and unlike Chinese verbs, it has no varying connotation in characterizing beliefs as true or false. Moreover, Japanese verbs, behavioral [e.g., *iu* (say)] or mental ones, have no grammatical difference in whether they take complementational *that* clauses, *to*-infinitives, or prepositional phrases as English. Thus, in the unexpected contents task the verb "*omou* (think)" was used because it was found that using the verbs "think" or "say" for the false belief questions produced no significant difference in children's performance (Wellman *et al.*, 2001). In the traditional and interpersonal transfer tasks, the false belief questions were asked using behavioral verbs such as "look for" and "go to see."

Experiment 1

In Experiment 1, the performance of Japanese 3- to 7-year-olds on traditional false belief tasks was compared with that of children reported by Happé (1995), Goetz (2003), and Holmes *et al.* (1996). Happé predicted 70 British children's passing two (a transfer and a contents) tasks with logistic regression using their age and verbal mental age as predictors. Goetz tested 32 each of American and Chinese 3- and 4-year-olds on two transfer and two contents tasks, as well as other theory of mind tasks. Holmes *et al.* (Experiment 1) tested fifty 4- and 5-year-olds from a Florida Head Start population on two transfer and two contents tasks presented either only verbally or in a standard way; for a direct comparison, their results from a standard version of the tasks were used. We first estimated probabilities of passing the tasks as did Happé in the Japanese sample using logistic regression and then compared observed performance on the tasks between Goetz and Holmes *et al.*'s samples and our Japanese sample. Although its scoring method appeared unreasonably strict, Happé's study was referred to especially because all the present data without age-range restriction could be included for analyses and because the performance change with month by month provided us visually with an overall picture of how and when children's performance changes; yet, to provide more lenient estimation than Happé's, probabilities of passing the transfer task alone were also predicted. Finally, we examined differences within the Japanese sample that consisted of Tokyo suburban populations and a provincial city population in Niigata. Sociology of Japanese family has revealed that since 1980s suburban

areas have had more nuclear families isolated from kin whereas provincial areas are more likely to keep extended families (Ochiai, 1997). Previous research has shown that a demographic factor of extended family involvement affected false belief performance (Lewis, Freeman, Kyriakidou, Maridaki-Kassotaki, & Berridge, 1996). The demographic difference between the two subpopulations may influence children's performance.

Method

Participants. The data were collected, originally for other purposes, over 7 years and were from 327 children (163 girls); portions of the data have been reported elsewhere (Naito, 2003; Ruffman, Perner, Naito, Parkin & Clements, 1998). The sample consisted of 59 three-year-olds ($M = 42$ months; range = 35 to 47 months; 26 girls), 96 four-year-olds ($M = 53$; range = 48 to 59; 46 girls), 117 five-year-olds ($M = 66$; range = 60 to 71; 64 girls), 45 six-year-olds ($M = 76$; range = 72 to 83; 24 girls), and 10 seven-year-olds ($M = 87$; range = 84 to 91; 3 girls). Children's verbal mental ages were measured by their receptive vocabulary using the Picture Vocabulary Test (Ueno, Nadeo, & Inaga, 1991), a Japanese equivalent to the British Picture Vocabulary Scale (Dunn, Dunn, Whetton, & Pintillie, 1982) that has often been used as a measure of verbal ability (e.g., Happé, 1995). As in the BPVS, children were shown four pictures and asked to choose the one that matched the referent of a particular word. Their mean verbal mental age was 43 ($SD = 10.3$), 54 ($SD = 10.2$), 67 ($SD = 12.3$), 80 ($SD = 14.6$) months for 3-, 4-, 5-, and 6- to 7-year-olds, respectively.

Of 327 children, 235 were from nurseries in Tama-ku, Kawasaki, Sagami-hara-shi, and Hachioji-shi of Tokyo suburban residential areas with each municipality's population of more than 500 thousand; and 92 were from a nursery and a primary school in a residential area of Joetsu-shi, with a population of 134 thousand, 210 km northwest from Tokyo. The nurseries and the school in Hachioji and Joetsu were within university towns; all children's ethnicity and native language was Japanese. Detailed information of each child's family background could not be obtained because of school policy. However, reports of the 1995 and 2000 Population Censuses of Japan, each of which was conducted at the time closest to the experiments, indicated that the children's demographic background was a mixture of middle and lower middle class. In particular, the present sample was generally from areas with

fairly well-educated residents, with on average 44% of secondary (i.e., a high school) and 38% of higher (i.e., a degree or a quasi-degree and higher) education.¹ In the area most children lived in, single-parent families and unemployment rates were fewer than 3.4% and 5.4 %, respectively. Yet, suburban and provincial cities somewhat differed in residents' family size: Of families with children within the areas, 93% and 72% were nuclear families for the suburban cities and the provincial city, respectively.

Materials and procedure. All children first received an unexpected transfer task (Baron-Cohen *et al.*, 1985), an unexpected contents task (Perner *et al.*, 1987), and a similar unexpected identity task in systematically varied order; for the analyses, performance on the transfer and the contents tasks was considered. Each child was tested individually in a quiet room of their schools. The false belief tasks were first translated into Japanese with reference to their published Japanese translations (Frith, 1991; Naito *et al.*, 1994) and were back translated into English by an author. English back-translations were then checked on the task appropriateness by a native English-speaking developmental psychologist and on their equivalence to Japanese translations by a bilingual Japanese-English speaker. The scripts and procedures were identical across testing over 7 years. For the transfer task, a doll first put a marble in a blue box and during her absence the marble was moved from the blue box to a yellow box. The child who observed the whole event was asked the doll's false belief about the marble's whereabouts, its real location, and his/her own memory of its previous location. For the unexpected contents task, a chocolate box with a toothbrush inside was presented to the child, and after s/he identified it as containing sweets, the box was opened to reveal its real contents (i.e., a toothbrush). The child was then asked his/her own and the other's false belief about the contents of the box and its real identity. The English translations of the two tasks are presented in Appendix A. For the transfer task, children were scored correct when they answered the location where the doll first put the marble to the false belief question and answered the reality and memory questions correctly; for the contents task, children's response to each of the *own* and *other* questions was scored correct if they indicated the apparent contents of the box and answered the reality question correctly.

Results

Young children's performance on control questions, especially in the transfer task, was poor. Thirty-two of 59 three-year-olds failed the memory question, and three failed the reality question on the transfer task; one child failed both questions. Twelve of 96 four-year-olds failed the memory question, and one child failed the reality question. In the contents task, two 3-year-olds and four 4-year-olds failed the reality control question. In contrast, the older children performed well on these questions, with only five of 117 five-year-olds and one of 55 six- and seven-year-olds failing any one of the control questions in both tasks. The total number of children who failed any of control questions was 60; yet, the present study included all 327 children's data in the interest of random sampling.²

First, we analyzed the data using logistic regression analyses, where performance on the false belief tasks was the dependent variable taking the values of 0 and 1. Two scoring methods were used: stringent and lenient. In the stringent method (Happé, 1995), children were given a score of 1 ("pass") when they succeeded on both the transfer task and the *other* question in the contents task; otherwise, they were scored 0 ("fail"). In the lenient method, solely the transfer task was considered for passing (1) or failing (0). The model included age, verbal mental age, and sex as predictors. To decide the best predictors of the model, a Wald statistic (the ratio of the coefficient to its standard error) and an R statistic (the partial correlation between the dependent variable and each of predictors) were calculated. For stringent scoring, age (Wald = 11.75, $p < .001$, $R = .15$) and verbal mental age (Wald = 12.54, $p < .001$, $R = .16$) were the significant predictors, with a significant improvement, $\chi^2 = 95.74$, $p < .001$; sex was not a significant predictor. Similarly for lenient scoring, age (Wald = 16.01, $p < .001$, $R = .18$) and verbal mental age (Wald = 9.60, $p < .001$, $R = .13$) were the significant predictors, with a significant improvement, $\chi^2 = 103.31$, $p < .001$; sex was not.

The predicted probability of passing both transfer and contents *other* tasks and that of passing the transfer task at each age were then calculated and are plotted in Figure 1. As a comparison, Figure 1 also shows performance of Happé's British sample at ages of 42, 48, and 54 months. Figure 1 illustrates considerable differences in performance between Japanese and British samples. British children showed a rapid change in performance with age: During just one year between 42 and 54 months, their predicted probability of passing

two tasks dramatically increased from .23 to .80. In contrast, increase in the performance of the Japanese sample was considerably slower, as the predicted probability of passing both tasks increased only from .09 to .24 during the same one year range; an 80% chance of the passing was at the age of 80 months. The lenient estimation of passing the transfer task alone also revealed Japanese children's relatively late onset (25% passing at 47 months) and slow improvement (81% passing at 72 months) (Figure 1 about here).

Next, to compare with Goetz (2003), each child was given one point when s/he passed each false belief question. This resulted in 0-2 points for the contents task (one *own* and one *other* question) and 0-3 points for all questions in both the transfer and contents tasks. The top four rows of Table 1 show the performance of Goetz's samples on two transfer tasks and on two contents *other* questions; the bottom three rows of Table 1 show Japanese 3- to 5-year-olds' performance on the contents task and on the transfer and contents tasks combined. Performance of Japanese 3-year-olds (e.g., 19% of two questions) was not particularly poorer than that of Goetz's 3-year-olds (on average, 11% and 19% of two questions for Chinese and American children, respectively). However, performance of Japanese 4-year-olds (e.g., 42% of three questions) appeared lower than that of Goetz's 4-year-olds (on average, 61% and 63% for Chinese and American children, respectively); Japanese 5-year-olds passed about 70% of the tasks. The third comparison was between our Japanese sample and Holmes *et al.*'s (1996, Experiment 1) Head Start children. For this comparison, Japanese 4- and 5-year-olds who had the same age ranges as the American children were selected. The observed probability of passing each of the transfer task and the *own* and *other* questions of the contents task for American children and age-range matched Japanese children is shown, respectively, in the top part and in the first two lines of the bottom part of Table 2.³ Performance of Japanese children on different versions of false belief tasks was similar to that of the Head Start children, with no statistically significant difference between cultures, χ^2 s (1, $N = 145$) < .10 for 4-year-olds, χ^2 s (1, $N = 116$) < 2.73 for 5-year-olds (Tables 1 and 2 about here).

Finally, a comparison within the Japanese sample was made first on predicted probabilities of passing both transfer and contents *other* tasks, using logistic regression

conducted separately for the suburban and the provincial populations, and then on observed probabilities of passing each task using age-range matched comparisons with the Holmes *et al.* (1996) sample. The regression analyses revealed that changes in performance of the provincial sample were approximately one year later than those of the suburban sample. For example, the probabilities of passing both tasks increased from about .25 to .81 between ages of 52 and 72 months for the suburban sample and between 66 and 84 months for the provincial sample. The observed probability of passing each task for each sample is shown in the lower bottom part of Table 2. Particularly for the transfer task, significantly more children passed than expected in the suburban sample and significantly fewer in the provincial sample, $\chi^2(1, N = 120) = 5.28, p < .05$, for 4-year-olds; $\chi^2(1, N = 91) = 11.39, p < .01$ for 5-year-olds.

Discussion

In general, Japanese children's performance on both false belief tasks consistently increased during preschool years and was primarily predicted by their age and verbal age; in particular, the results supported the previous findings that language was an important correlate of the theory of mind performance (e.g., Cutting & Dunn, 1999; Happé, 1995). However, the performance of Japanese children differed from that of British, American, and Chinese children in Happé (1995) and Goetz (2003). Japanese children's onset of false belief understanding was around the ages of 47 to 54 months, at least half a year later than that of Happé's British children. The change in performance of Japanese children was slower and more prolonged than that of children from other countries. The British children mastered false belief tasks by 54 months whereas Japanese children did not do so until 72 to 80 months, a year and a half later and a longer duration than observed in British children. Goetz's American and Chinese 4-year-olds passed about 60% of the tasks whereas Japanese 4- and 5-year-olds passed about 40% and 70% of them, respectively. Furthermore, although Japanese children were not considered particularly underprivileged, performance on each false belief question of the 4- and 5-year-olds was comparable to that of Holmes *et al.*'s (1996) counterparts who qualified for Head Start.

The results showed that the level of success in Japanese children fell short of that

expected for both Western and non-Western, predominantly middle class children. Rather, Japanese children's performance was more similar to the impoverished children's that was lower than typically reported. Moreover, Japanese 3-year-olds often failed the control questions, though inclusion of these children for the analyses was not a serious problem: It was clear from the older children's data that the 3-year-olds would not succeed even if they had a better grasp of the tasks (see also Footnote 2). It is difficult to fathom the cause of their poor performance; yet, young Japanese children might have been unaccustomed to a situation where test questions were formally asked by an adult stranger, and thus especially when uncertain about what were the correct responses, they may have answered the adult's expectation wrongly. Gardiner, Harris, Ohmoto, and Hamazaki (1988) reported a similar difficulty in eliciting responses from Japanese preschoolers in formal questioning. We will return to this issue in the General Discussion.

There were locality-related differences in false belief performance within the Japanese population. The change in predicted performance of the provincial children was about one year later than that of the central suburban children; the observed performance of provincial children on the transfer task was significantly poorer than that of suburban children. The census data revealed that the provincial city tended to have more extended families. However, Lewis *et al.* (1996) found that extended families facilitated Greek children's false belief understanding. Thus, contrary to Lewis *et al.*'s study, provincial children performed false belief tasks more poorly than children who likely had less extended family involvement. The inconsistency in family size effects between the studies may stem in part from the family structure. In contemporary Japan, extended families are just three generations families where children have few siblings and interact primarily with their parents and grand parents (Ochiai, 1997), whereas in Greece, extended families comprise a variety of relatives including older children and adults other than parents (Lewis *et al.*, 1996). Demographic variables often affect theory of mind development (Cutting & Dunn, 1999; Ruffman *et al.*, 1998; see for a review, Pears & Moses, 2003); future research needs to disentangle the intertwined demographics such as locality, family structure, and parenting circumstances.

However, apart from the lag in the rate of achieving false belief understanding and

from young children's difficulty in answering control questions, there was nothing in children's performance to suggest a developmental pattern crucially deviating from that reported in the literature. In addition, different versions of tasks or questions did not show any difference in performance (see Footnote 3), observations that accord with Wellman *et al.*'s (2001) meta-analysis. The Japanese sample clearly moved towards the understanding of false beliefs, but it is only completed at around 6 and 7 years when tested on the multiple traditional tasks. It should also be noted that the present comparison was made only with one Chinese and three Western samples, though the selection of the Goetz (2003), Happé (1995), and Holmes *et al.* (1996) studies was based on reasons of task equivalence in number and procedures. The studies do not represent Western and Asian samples in general that vary in culture and the degree of maintaining a traditional orientation, residential and parenting circumstances, opportunities for schooling, and other opportunities affected by race or socio-economic background. Similar variations should be found among populations in Japan as well as other Western and non-Western countries. Thus, the present comparison between the Japanese and the three studies was just an example of the various comparisons possible, among diverse samples across and within cultures.

Experiment 2

To see whether Japanese children's belief inference differs, if at all, from that of Western children, Experiment 2 investigated it further using interpersonal transfer tasks. Symons *et al.* (1997) tested Canadian 3- to 5-year-olds on their understanding of the protagonist's false belief about the other person's location. The 5-year-olds showed a specific difficulty in the person condition where the object of false belief was a person who transferred because of his/her own intention, as compared with the conditions where an object or a person was transferred externally. However, although Symons *et al.* attributed 5-year-olds' difficulty to the extra intention in the person condition, this was not clearly confirmed because children were not directly asked to justify their responses; they instead asked children about the child protagonist's emotions. Moreover, their comparison between the transfer conditions appeared incomplete because the conditions varied in the number of tasks and some ways other than the intentionality of the relocated item (e.g., only the person

condition included an implicit reason for the protagonist's searching behavior).

Controlling for the number of tasks and the factors other than intentionality across conditions, we examined whether Japanese children show a difficulty especially in the condition where the relocated item's intention was involved. Children received a total of six tasks consisting of the three transfer conditions: (a) the object condition where an object was transferred externally from one location to another; (b) the person external condition where a person was asked to change location by an external agent; and (c) the person condition where a person changed location because of his/her own intention. Children were then asked to judge the main protagonist's belief about the relocated item's whereabouts and, instead of the protagonist's feelings, to justify their response. Because of the results of Experiment 1, children's ages ranged from 6 to 8 years, at which ages they just or nearly understand standard false beliefs. If the relocated person's intention in the person condition interferes with Japanese children as well as Western 5-year-olds, performance of any or all of the age groups would decrease in this condition but not in the other conditions. Rarely has the literature considered justifications; however, on the basis of a few attempts (Kinoshita, 1991; Wimmer & Mayringer, 1998), children's justifications were examined to explore how children were led to their responses. In particular, if children are distracted by the extra intention, justifications especially for their incorrect responses would refer to this mental state.

Method

Design. The study was a 3 x 2 x 3 factorial design where age and sex were between-subject factors and the transfer condition was a within-subject factor.

Participants. Eighty-nine Japanese children were from a primary school in Itoigawa-shi, a small city near Joetsu, with a population of 34 thousand. Children's family background was unavailable because of school policy. Data from the 2000 Population Census of Japan revealed, however, that the rates of unemployment and single-parent families of the area where children lived were 3.4% and 4.5%, respectively. Of residents aged 15 years and over, 47% were secondary and 18% were higher education graduates; the rate of nuclear families was 56%. Children were divided into three age groups: 28 six-year-olds ($M = 6;07$; range = 6;02 to 6;11;14 girls); 25 seven-year-olds ($M = 7;06$; range = 7;01 to 7;11;13

girls); and 36 eight-year-olds ($M = 8;07$; range = 8;00 to 9;02;18 girls). Their average verbal ages, measured by the PVT, were 6;07 ($SD = 1;02$), 7;10 ($SD = 1;07$), and 9;09 ($SD = 1;06$) for 6-, 7-, and 8-year-olds, respectively.

Materials. In a total of six different stories, two story versions were each assigned to each of the three transfer conditions. The stories were constructed in Japanese with reference to those of Symons *et al.* (1997) without changing the main plots for the three transfer conditions but making the storylines highly natural to Japanese culture. Unlike Symons *et al.*'s scripts however, the scripts equated with each other as to factors other than intentionality (e.g., in all conditions, a child protagonist equally had a reason to find or meet the object/person) and included a standard false belief question instead of an indirect false belief question (i.e., "What does the child do next?"); a justification question instead of emotion questions (i.e., "How does she feel right now?"); and a memory and a reality control questions. The Japanese scripts were then translated into English by one author and the comparability of English translations to Japanese was reviewed by a Japanese-English bilingual psychologist. The English translation of a version of each of the three conditions is presented in Appendix B; the remaining stories were a room version where a marble was transferred by a sibling from a drawer to a toy box, a school version where a teacher was asked to move from a staff room to a library by an electrical engineer, and a shop version where a father moved from a do-it-yourself shop to a supermarket, respectively, for the object, person external, and person conditions. Each task was presented with a miniature doll of the child and two panels, on each of which was a picture of the scene where the object/person moves. For the object condition, the marble and the snack bag were used; for the two person conditions, dolls of the adult persons were used. For the person external condition, dolls of the external agents were also used.

Procedure. Children were tested individually in a room of their school and were told that they were going to watch puppet shows and that after each story they would be asked questions about it. After the instructions, each of six stories was presented to children with the experimenter acting out with the protagonist dolls and other necessary materials. Procedures were modeled after those of Symons *et al.* (1997) except for questions given to

children as explained above and shown in Appendix B. The object condition was similar to the standard transfer tasks as described in Experiment 1, except including the justification question. Procedures for the person external condition were practically the same as those for the object condition, except that the relocated item was not an object but a person. The child protagonist and the adult person were first in an original location, and while the protagonist was away, the adult person was asked to move to another location by an external agent. Procedures for the person condition were similar to the person external condition except that the adult person transferred with his/her own intention. After parting from the child protagonist, the person went first to an original location but then changed his/her mind and moved to another location. In both person conditions, children were asked where the protagonist would look for the person and justified their response; they were also asked their memory of the person's original location and the reality of his/her current location. Children were presented with two sets of the three tasks. The assignment of one of the two versions from each transfer condition to each set, the presentation order of two sets, and the order of three conditions within a set were counterbalanced across participants, with the constraint that one version was not followed by the other version from the same condition when the first set was switched to the second. Children's responses were scored correct on the belief questions if they indicated where the child protagonist put the object first or where the adult person was first and they answered the memory and reality control questions correctly.

Results and Discussion

All children correctly answered both memory and reality control questions in all six tasks. Children's performance in each of the three transfer conditions is shown in the upper part of Table 3.⁴ Performance generally improved with age, and especially in the 6- and 7-year-olds, girls' performance appeared better than boys'; yet, there appeared no difference between the three transfer conditions across age or sex. These observations were confirmed by a 3 (age) x 2 (sex) x 3 (transfer condition) mixed analysis of variance (ANOVA).⁵ There were significant main effects of age, $F(2, 83) = 10.61$, $MSE = 1.80$, $p < .01$, and sex, $F(1, 83) = 4.52$, $MSE = 1.80$, $p < .05$, but no significant main effect of transfer condition, $F < 1$, and no significant interaction between any two of the three factors, $F_s < 1.63$, $MSEs = 1.80$

and .08. A three-way interaction between age, sex, and transfer condition approached significance, $F(4, 166) = 2.13$, $MSE = .08$, $p < .10$. However, this interaction was due not to the differences in transfer condition across age or sex but to the significant sex differences in all conditions for 6-year-olds and in the object condition for 7-year-olds. The results indicated no evidence that children's performance on the person condition was lower than that on either the object or the person external condition (Table 3 about here).

According to Kinoshita's (1991) and Wimmer and Mayringer's (1998) classification, children's justifications for their false belief responses were classified independently by two raters, with interrater agreements of 99%. More than 63% of the justifications for the correct responses across conditions referred to the initial location of the object or the adult (e.g., "because Mom went there first"), whereas 20% or fewer of them were classified as epistemic answers (e.g., "as he was playing outside, he doesn't know," "he doesn't see," and "he thinks it/she's there"). In addition, especially in the two person conditions, some answers (on average, 17%) included the adult protagonist's utterances (e.g., "Dad said he's going there"). In contrast to our earlier expectation, children made no reference to the adult person's mental state to explain their incorrect responses especially in the person condition. On average 74% of the justifications across conditions referred to the object/person's move (e.g., "because it was blown by winds" and "Mom went there"), reality (i.e., the current location of the object/person, e.g., "because she's there"), and other story facts (e.g., "because the maid is cleaning"). Wimmer and Mayringer reported that one third of their children's incorrect responses were explained in terms of the protagonist's desire. By contrast, in the present experiment just three justifications, given by a 7-year-old boy, of all 176 incorrect responses ever referred to the protagonist's desire to find the object or the person.

Although preliminary analyses revealed no significant sex difference in children's verbal ages or their variance ($F_s < 1.14$; see also Footnote 5), the unexpectedly large sex differences for 6- and 7-year-olds could be explained in part by the differential pattern of correlations of verbal age to the false belief performance between sexes. Boys' verbal age reflected in receptive vocabulary was correlated significantly with their performance on the object condition, $r(44) = .46$, $p < .01$, whereas girls' verbal age was not, $r(45) = .14$, *ns*.

The small literature on sex differences found that girls outperformed boys in false belief understanding (Cutting & Dunn, 1999; Naito, 2003); one cause of the gender difference came from differential effects of language. Cutting and Dunn (1999) reported that all aspects of language including receptive vocabulary were linked with boys' performance, whereas only a part of expressive language was related to girls'. The present finding replicated Cutting and Dunn's study and suggests that effects of language ability on false belief understanding differ between sexes. In Experiment 1 however, the large sample showed the effect of verbal age but no sex effect; the effect of sex will be further examined in Experiment 3.

Apart from the sex differences, Japanese 6- to 8-year-olds' performance did not differ between conditions where an object or a person was transferred externally and where a person moved on his/her own. This pattern of results did not accord with Symons *et al.*'s (1997) findings that Canadian 5-year-olds showed a decline in the person condition (see also Nguyen & Frye, 1999). As pointed out earlier, Symons *et al.* examined children's ability to infer the protagonist's emotion, which might have caused unexpected effects of emotion salience. Yet, they verified no performance difference between the standard contents task and the modified object transfer task that used the emotion questions and the indirect false belief question, thereby claiming that these modifications in the transfer task did not affect the performance. Thus, the exclusion of emotion questions may not have strongly influenced the discrepancy between the Symons *et al.* and present results. However, we also included justification probes and manipulated carefully the relocated person's intentionality by making potentially confounding factors, such as the number of tasks and the reason for searching behavior, equivalent across conditions. These differences may have contributed to the discrepancy.

However, given the careful manipulation of intentionality, the lack of difference between transfer conditions also implies Japanese children's indifference to the intentionality of other people. This indifference exhibited a contrast to the literature that children show growing sensitivity to people's internal states (Symons *et al.*, 1997; Wellman *et al.*, 2001). It could be interpreted that Japanese children may have paid more attention to situational cues similarly available across conditions, rather than the relocated person's intention, and thus

were not affected by how many mental states were involved. No effect of transfer condition was also confirmed by the pattern of justifications. Regardless of condition, children primarily explained their correct and incorrect responses in terms of observable story facts in a simple, skeletal fashion. Contrary to our previous expectation particularly for incorrect responses, children never mentioned the relocated person's mental state in the person condition. Japanese children's scant reference to the protagonist's desire also offered an interesting contrast to Austrian preschoolers' frequent references to desire (Wimmer & Mayringer, 1998). Results suggest that despite the salience of intentionality in the person condition, Japanese children are not affected by it, being less likely to consider people's mental states.

Experiment 3

Experiment 2 showed no decrease in the person transfer condition. However, although care was taken to equate the three conditions, there are, as yet, other possibilities that inadequate stories might have affected the result. Particularly in the two person conditions, the main protagonist was always a child whereas the relocated person was always an adult. This casting procedure might have prevented Japanese children from attending to any mental state, as suggested by the similarity in their justifications between conditions (e.g., children sometimes explained their correct responses by referring to the adult person's utterances). As the Japanese study has revealed, in this culture a *good child* is considered to be sensitive and obedient to what is required in a given situation (Clancy, 1986; Hendry, 1986; White & LeVine, 1986; see also Shweder *et al.*, 1998). Thus, our children may have reasoned that the child protagonist should be compliant and has to follow the elder person's speech and action as a norm of what should be done in these social situations. Experiment 3 further examined interpersonal false beliefs by changing the relocated person from an adult to a child. It is very natural to people that a child changes his/her mind unexpectedly, and even under Japanese culture, one would not expect that people should follow a child's whimsical speech and action as a social norm without considering what the child actually wants or intends. In such a situation where the constraint of social norms is removed as far as possible, Japanese children should pay more attention to the other (child)'s mental state and

be negatively influenced by the person condition.

There were other minor changes in procedure. First, Experiment 2 assigned different stories uniquely to the two person conditions; hence, we could not rule out the possibility that stories used in the person condition were simply too easy for the children to show any difficulty. To eliminate the effect of story specificity, the stories were counterbalanced across both person conditions. Second, we asked children the protagonist's belief about not only the relocated child's whereabouts but also his/her activity. The activity questions were introduced because Nguyen and Frye (1999) asked children to infer the protagonist's belief about his/her playmate's activity and found that 5-year-olds' performance declined when the playmate changed the activity through their own desire. Finally, Western children were distracted by the extra mental state regardless of whether it was explicitly expressed in the stories (Nguyen & Frye, 1999) or not (Symons *et al.*, 1997). However, our children may have not been affected by the mental state because it was not clearly described in the Experiment 2 stories. Experiment 3 solved this problem by making the person stories distinct from each other in the cause of the relocated child's transfer. For the person external condition, the child is just moved by outside pressure; for the person condition, the child moves on his/her own because of explicit dislike of or boredom with the original activity at the initial location.

Method

Participants. One hundred children from a primary school and a nursery in Joetsu, Niigata were divided into three age groups: thirty 6-year-olds ($M = 6;06$; range = 6;00 to 6;11); thirty 7-year-olds ($M = 7;07$; range = 7;00 to 7;11); and forty 8-year-olds ($M = 8;07$; range = 8;01 to 9;01). Each age group consisted of the same number of boys and girls. School policy made children's family background inaccessible; yet, the sample was from the same area as the Joetsu subpopulation of Experiment 1.

Design and materials. The design of the study was the same as that of Experiment 2, with three (i.e., the object, person external, and person) transfer conditions. The two stories and materials used in the object condition were identical to those used in the same condition of Experiment 2. For the person and the person external conditions, four novel stories were

constructed in Japanese because of the casting change, the inclusion of the activity questions, and other story improvements. Of the four stories, two were about two child protagonists (a girl and her sibling and a boy and his friend for house and field versions, respectively); the remaining two were about an adult and a child protagonist (a teacher and her student and a father and his son for school and shop versions, respectively). When presented for the person external condition, each story additionally involved a third person who asks the relocated child to transfer. The Japanese scripts were translated into English by an author and were reviewed for their equivalence to the English translations by a Japanese-English bilingual psychologist. The English translation of the field version for the two person conditions is presented in Appendix C. Out of the four stories, two stories, one from the child-child versions and the other from the adult-child versions, were assigned to one of the two person conditions. The combination of a child-child and an adult-child version out of the four stories and the assignment of each set (i.e., two versions) to each of the two person conditions were counterbalanced across participants. The miniature dolls for the protagonists and the pictured scene panels were prepared for each story in the person conditions.

Procedure. Procedures were similar to those used in Experiment 2, except that in the two person conditions, children were asked the main character's beliefs about the relocated child's both location and activity and that the justification question for correct responses was slightly changed as described below. Children individually received two sessions, each of which included three stories consisting of the object, person external, and person conditions. After giving children the instruction similar to that in Experiment 2, the experimenter presented each of the six stories acting out with the dolls and a pair of location panels arranged on a table. The procedures and scoring for the object condition were identical to those in Experiment 2 except the justification question for correct responses. For the person and the person external conditions, stories differed at the part where the relocated child moved from one location to another during the adult or child main character's absence. In the person external condition, the relocated child was asked by a third person to move from an initial location where s/he was first doing an original activity to another location where

s/he had to change the activity to another. In the person condition, the child got bored with or did not like an original activity at an initial location and moved to another location to change the activity on his/her own. After being presented each story, children were first asked the main character's false belief about the child's location. Children were then asked to justify their response to the false belief question and to answer the control questions about their memory of the child's initial location and about the reality of the child's current location.

The justification question and its presentation order differed between correct and incorrect false belief responses. For the incorrect response, the rest of the justification and control questions and their presentation order were identical to those presented in Experiment 2: Children were first asked a justification question followed by memory and reality questions. For the correct response, the reality control question was first asked. Then, while corroborating children's correct reality monitoring (i.e., "yes, actually the relocated item is in another location"), the experimenter asked the justification question, which was followed by the memory control question. Given the perfect performance on the reality question in Experiment 2, we made these changes for the correct response to facilitate children's reasoning especially about the main character's mental state (i.e., ignorance about the relocated item's transfer and its reason). For a story in the two person conditions, children were then asked a series of questions about the relocated child's activity in the same order as those about his/her location as described above. The questions and their presentation order in the story for the two person conditions are also given in Appendix C. Children were scored separately in the location and activity questions: They were correct if they answered the memory and reality questions correctly and indicated for the location questions, the location where the relocated child was first and for the activity questions, the activity the child was doing first.

Results and Discussion

All children answered all control questions correctly across conditions and across the location and activity questions. Children's scores in the three transfer conditions are presented in the lower part of Table 3, which shows performance on the two person conditions separately for the location question in the middle and for the activity question at

the bottom. As seen in Table 3, 7- and 8-year-olds' scores were at ceiling with no difference between sexes or the transfer conditions and were excluded from the analyses. In either location or activity question, 6-year-olds' performance appeared not to differ between sexes or the transfer conditions either.⁶ Separate 2 (sex) x 3 (transfer condition) mixed ANOVAs, which were conducted on scores from the object condition and the two person conditions for the location questions and scores from the object condition and the person conditions for the activity questions, revealed no significant main effect of sex or transfer condition nor significant interaction between the two factors, $F_s < 1$.

Children's justifications for incorrect responses were classified into the same categories as in Experiment 2: the relocated child's mental state; the object/child's move; reality and other story facts; and others and no response. Children's justifications for the correct responses were classified into five categories: (a) the main character's ignorance or perceptual experiences (e.g., "he doesn't know that Hanako went to the park"); (b) the main character's fact inference (e.g., "he thinks she's still catching insects," see Kinoshita, 1991; Wimmer & Mayringer, 1999); (c) the object/child's initial location (e.g., "she was there first"); (d) social rules including both the protagonists' speech described in the story (e.g., "he said he'd be back soon") and their utterances or promises that were not actually described in the story (e.g., "he said to wait there" and "she promised to wait"); and (e) others and no response. Two raters independently classified all incorrect and correct responses, with interrater agreements of 97%; disagreements were solved by discussion.

Preliminary analyses revealed no sex differences in children's justifications, and thus the factor of sex was not considered further. Across age and across the location and activity questions, just 4 of the 42 justifications for incorrect responses in the person condition included the relocated child's mental states (e.g., getting bored with the original activity or liking the second activity) as previously expected. None of the children referred to the main character's desire to find the object or to meet the child. Especially for 6-year-olds who did not show ceiling effects, on average 33% of the incorrect responses in the two person conditions were justified with the fact descriptions about the relocated child's behavior, reality, and other story facts; approximately 60% of them were followed by no explanation.

Table 4 shows the proportions of justifications for correct responses classified into four categories for the object condition and into five categories for the location questions in the two person conditions. In the object condition, expected frequencies of the fact inference were too small and were collapsed with the ignorance category as epistemic answers. In the two person conditions, the pattern of results for the activity questions was similar to that for the location questions in the person external condition and hence is not reported in detail. It was revealed that the initial location justifications were significantly fewer than expected in 6-year-olds for the person and the object conditions but significantly more than expected in 8-year-olds for all three conditions; for the person and the person external conditions, the ignorance justifications were significantly more in 6-year-olds but significantly fewer in 8-year-olds, $\chi^2(4, N = 181) = 18.43$, $\chi^2(8, N = 180) = 24.15$, and $\chi^2(8, N = 181) = 23.91$, respectively, for the object, the person external, and the person conditions, all $ps < .01$. For the total number of responses, children gave significantly more initial location justifications than any other across conditions; especially for the person external condition, social rules justifications were significantly more than the ignorance justifications, $\chi^2(3) = 209.16$ and $\chi^2s(4) > 96.60$, respectively, for the object and the two person conditions, all $ps < .01$ (Table 4 about here).

In Experiment 3, children's performance showed no sex difference and 7- and 8-year-olds' performance showed ceiling effects in all transfer conditions; their high performance was in contrast to non-ceiling performance of their counterparts in Experiment 2. The differences in performance levels and in sex effects between the two experiments will be addressed in the General Discussion. Irrespective of the location and activity questions, 6-year-olds' performance that was not at ceiling did not differ between the conditions. In this experiment, the interpersonal stories were changed to transfer a child, not an adult, so that children could be free from a strict constraint that the main character has to follow an older person. The stories in the person condition included explicit information about the relocated child's mental state driving him/her to transfer; and across the two person conditions the stories were counterbalanced to eliminate the story specificity that may unduly have facilitated the performance on the person condition. Despite these efforts to distract

children in this condition, they kept a performance level comparable to that in the object and person external conditions.

Children's justifications also exhibited a similar pattern of results across conditions. As discussed above, even in the person condition that included an obvious cause (i.e., mental state of dislike or boredom) of the child's transfer, children scarcely utilized this epistemic information to explain their incorrect responses. Instead, they mentioned the child's behavior and other story facts just as they did in the other conditions. Similarly for correct responses, the most frequent justifications were straightforward fact descriptions concerning protagonists' initial location or behavior. Children did not give more ignorance explanations than in Experiment 2, despite the confirmation "actually the child is in another location" provided in the two person conditions to induce such epistemic reasoning. Moreover, they often referred to what we labeled social rules such as "they promised" that were not necessarily described in the actual stories. Social rules justifications defeated our aforementioned intention to remove the constraint of social norms in the person stories by means of the relocated person's casting change. This change made virtually no difference to our children; rather, they relied even more on social norms not clearly expressed in the stories.

General Discussion

Experiment 1 demonstrated that Japanese children's performance on traditional false belief tasks was considerably lower and improved more slowly than that reported by Happé (1995) and Goetz (2003). This late and prolonged development of Japanese children was more similar to that of the Head Start children (Holmes *et al.*, 1996). Similarly in subsequent experiments, children's performance on the standard object condition was not complete even at 6 years. These results were consistent with those of Wellman *et al.*'s (2001) meta-analysis that Japanese children largely lagged behind Western counterparts on false belief performance. However, the exact age range of the development did not accord with the Wellman *et al.* claim of 2.5 to 5 years. According to results from the present sample at least, we conclude that typically Japanese children's understanding emerges around 4 years and is complete sometime between 6 and 7 years.

It should be pointed out, however, that this conclusion derives only from a limited

sample, although the relatively large sample comprised subpopulations with different localities. On the basis of Head Start children's late development, Holmes *et al.* (1996) have argued that false belief understanding develops gradually during a fairly extended transitional period depending on different groups of children and individual children. An examination with a different sample of Japanese children would hence result in a different onset and mastery of the same false belief tasks (see Kinoshita, 1991; Naito *et al.*, 1994). Indeed, children's performance was not consistent across the present experiments. In Experiment 1, performance differed between the subpopulations from Tokyo suburbs and the provincial city in Niigata. In the object condition of the subsequent experiments with provincial city samples, 7- and 8-year-olds' performance was perfect in Experiment 3 but was far from perfect in Experiment 2. Despite no sex difference in Experiments 1 and 3, Experiment 2 revealed significant sex differences in 6- and 7-year-olds, which were in part accounted for by the effect of language ability. As Holmes *et al.* argued, the differences in performance between Experiment 1 subpopulations, those between Experiments 2 and 3, and the sex difference obtained in Experiment 2 may be a manifestation of extended development in different groups of children. However, effects of language other than vocabulary, as well as those of locality-related factors such as extended family involvement, remain undetermined in the present study and await further examination.

As far as the standard tasks are concerned, Japanese children's false belief understanding, albeit delayed, exhibited a consistent increase, following a trajectory similar to Westerners' development. However, the present study offered a new finding that one aspect of the trajectory may differ between Japanese and Western children. In the Western literature (Nguyen & Frye, 1999; Symons *et al.*, 1997), children around age 5 who had performed well on standard false belief tasks showed temporary interference from the extra intention included in interpersonal tasks. Results have been interpreted as indicating children's growing understanding of, and sensitivity to, different mental states. In contrast, results of both Experiments 2 and 3 showed no evidence that Japanese children who had nearly mastered standard tasks were distracted by the extra intention. In Experiment 2, 6- to 8-year-olds' performance did not differ between the transfer conditions in which the intention

of the relocated item/person was varied. This was replicated with 6-year-olds in Experiment 3, where we carefully improved task procedures by using a child, rather than an adult, as the relocated person, and by counterbalancing the stories across the two person conditions. In both experiments, children could infer the main character's false belief in the person condition with the extra intention, as well as they could in the object and person external conditions that lacked such intention. The difference from the Western trajectory of false belief understanding casts doubt on the universal view of theory of mind development, namely that across cultures, children become similarly and increasingly aware of the mental states that guide human action (e.g., Wellman *et al.*, 2001).

This cultural difference also appears to be corroborated by the consistent finding that irrespective of the transfer conditions, many children based their explanations for false belief responses primarily on the bare bones of story facts. It was previously predicted that, had children been distracted by the extra intention (Symons *et al.*, 1997), their justifications particularly for the incorrect responses in the person condition would have mentioned this intention. However, regardless of the two person conditions in both experiments, most of the interpretable justifications for incorrect responses were descriptions of the relocated person's behavior and other story facts. Despite the explicit information about this person's mental states provided in the person condition of Experiment 3, Japanese children hardly mentioned them, nor even the main character's desire to find relocated items. For the correct responses as well, children justified most of them by mentioning simply the protagonists' behavior. The children's behavioral explanations contrasted with the mental state explanations often given by Western children (e.g., Bartsch & Wellman, 1989; Wimmer & Mayringer; 1998; but see also, Bradmetz, 1998).

Furthermore, in the two person conditions of Experiment 3, some children referred to interpersonal rules such as "they promised" and "he said to wait there" that were not actually uttered by the protagonists but could only be inferred from contextual cues embedded in the stories. This finding is particularly consistent with arguments from cultural studies. Hendry (1986) who observed Japanese child-rearing has pointed out that Japanese *shitsuke* or early training is a process of putting into the body, including heart, of a child the arts of living,

ways of conduct in daily life, and a mastery of manners and correct behaviors. She maintained that one of the personal characteristics thought to be important to develop in this society was honesty, or *not to tell lies* and *to keep promises*. Shweder *et al.* (1998) have also argued that "in many East Asian contexts, one's sense of well-being is... more tied to the general understanding that one is doing what is required in a given situation (p. 906)." Our children's social rules justifications may reflect Japanese ways of conduct or behavioral code that must be followed in the present interpersonal situation where people are to unite after a brief separation.

Both delay and difference in Japanese children's false belief understanding could in part be explained by cultural variations in folk psychology (e.g., Lillard, 1998; Miller, 1984); one such variation is the independent-interdependent distinction. It is well documented that whereas Western societies give more weight to internal causes for human action and expect people to be autonomous and independent, Japanese society is a type of collectivist or interdependent cultures where the self is defined variously in relation to others, and ingroup norms are tacitly but tightly imposed to keep ingroup conformity (e.g., Markus & Kitayama, 1991; Shweder *et al.*, 1998; Triandis, 1989). In such a community, the interpersonal situations and social norms are considered to be an important determinant of human action; and the Japanese cultural conventions may have led children to attribute people's behavior not to internal states but to contextual and interpersonal cues, such as observable behaviors, utterances, and social rules inferred from the situation. Japanese children may therefore find it more difficult to solve standard false belief and other theory of mind tasks (Naito, 2003; Ruffman *et al.*, 1998), as these tasks chiefly concern how the mind works without much help of situational cues. In contrast, regardless of how many different mental states are involved, Japanese children may similarly solve socially situated transfer tasks relying primarily on behavioral and contextual cues (see for their good understanding of physical representations, Koyasu, 1997). Yet, of course, the independent-interdependent distinction is not an all-or-none framework; there should be gradations even within East Asian collectivist cultures as well as within Western cultures. This may reflect the fact that children from some East Asian cultures such as China, which is a more heterogeneous society than Japan (Triandis,

1989), perform well on false belief tasks (Goetz, 2003; Lee *et al.*, 1999). Similarly, children in the Western societies also show variations in, for example, the spontaneous use of mental verbs. Bradmetz (1998) demonstrated that unlike their Anglo-American counterparts (Bartsch & Wellman, 1989), French 3- to 5-year-olds rarely used belief terms (i.e., *believe* and *think*) in explaining behaviors caused by false belief.

It appears speculative that Japanese children's difficulty, as well as competence, in social cognition stems from their culture's collectivist/interdependent view of human action. However, researchers have also emphasized that learning cultural conventions has crucial impact on cognitive development (e.g., Astington, 1996; Nelson, 1996; Nelson, Henseler, & Plesa, 2000; Shigaki, 1987). Nelson *et al.* (2000) have argued that theory of mind is built on the sense-making processes of experience between the child and peers, parent(s), and other adults within a community and that key among them is experiences with language such as collaborative narratives and discourse about social events in sociocultural contexts. Moreover, de Villiers and de Villiers (2000) showed that acquiring syntax induced English-speaking children's theory of mind. Given the great syntactic differences between Japanese and English or other languages (Naito & Nagayama, 2004), language characteristics as well as ways of talking about the world may surely affect theory of mind development. Particularly in Japanese, things and situations are expressed to *become* (i.e., be born/transformed/completed) naturally as they are and the subject, even the person, is not clearly identified but rather suppressed and fuses with the context (e.g., Ikegami, 1991; Kanaya, 2002; see also Maruyama, 1992). Similarly, the speaker's mental states in Japanese are often not clearly expressed by mental verbs but inferred only from context, the speaker's facial expression or intonation, and other nonverbal cues. By contrast, in English the subject or the agent is inevitably expressed as the source of action that causes a change in the situation; following the agent, his/her particular mental state is declared and articulated clearly and distinctly by a mental verb. In fact, our children's justifications exemplified earlier were, in most cases, very skeletal behavioral explanations using few mental verbs; and most of the person subjects (and objects) were not actually spoken by the children but supplemented in the process of English translation. Japanese language structure and the

way of talking about events may hence influence the social reasoning of children in this community.

One weakness especially of Experiments 2 and 3 was a lack of direct comparison with Western children using exactly the same procedures, such as introducing justification probes. As discussed in Experiment 2, Symons *et al.*'s (1997) manipulation of intentionality might have been confounded by other factors, which rendered the interfering effect of the person condition somewhat clouded. In contrast, our experimental manipulation carefully excluded the confounding factors, thereby making the results more reliable. Moreover, the sample characteristics also differed between the present and previous studies. For example, our children were older and hence more experienced with schooling than children in Symons *et al.* and Nguyen and Frye (1999). Future research should compare the effects of the person condition in different cultures using the same procedures and sample characteristics as in this study.

We should also be cautious about the interpretation of children's justifications, in that not spontaneously or overtly mentioning mental states in formal testing does not necessarily mean that children are unaware of them. Furthermore, as we addressed 3-year-olds' poor performance on control questions in Experiment 1, Japanese children may have particular attitudes towards a scholar-like questioning made by an adult. They may be unfamiliar with laboratory settings and thus be reluctant to respond to such questioning (e.g., Gardiner *et al.*, 1986) or may think that the adult expects a *correct* (and thus realistic) response. In this respect, Japanese children's difficulty in theory of mind tasks may generally reflect their attitudes rather than their competence. With the present results alone, it is hence impossible to determine whether an explicit consideration of mental states was unavailable to the child or simply not a preferred way to talk about the situation. The children's spontaneous language, use of mental verbs, and more ecological (e.g., familial or between peers) everyday reasoning about mental states merits further study. Examining children's learning capacities (e.g., effects of training on theory of mind tasks) could also prove that their competence is not diminished but rather that the concepts measured by the traditional tasks are not in their relevant mental categories.

Finally, no interfering effect of the extra mental state in the present tasks does not warrant null finding of such effect or mental state reasoning in different tasks. Thus, an appropriate conservative conclusion of Experiments 2 and 3 is that Japanese children were unaffected by multiple mental states and mentioned contextual cues as far as the present tasks were used. Moreover, in Experiment 3 justifications referring to the protagonist's ignorance were reliably more in 6-year-olds but fewer in 8-year-olds, whereas behavioral explanations were fewer in 6-year-olds but more in 8-year-olds. This finding leaves open the possibility that with age, children's reasoning about human action may show a greater cultural variation and that a particular pattern of reasoning preferred within each cultural milieu may gradually be shaped during development. In fact, cultural differences in social attribution were found to increase with age when tasks included more complicated interpersonal situations (Miller, 1984, 1986). Miller (1986) demonstrated that whereas Indian adults placed greater weight on contextual factors than did Americans, a large portion of 8-year-olds' attributions from both cultures not only had commonalities but included situationally-specific psychological states such as intentions and feelings. Further research is needed to explore the development and trajectory of theory of mind abilities in children from various non-Western countries using a broad range of tasks.

References

- Astington, J. W. (1996). What is theoretical about the child's theory of mind: A Vygotskian view of its development. In P. Carruthers & P. K. Smith (Eds.), *Theories of theory of mind* (pp. 184-199). Cambridge, England: Cambridge University Press.
- Avis, J., & Harris, P. L. (1991). Belief-desire reasoning among Baka children: Evidence for a universal conception of mind. *Child Development*, *62*, 460-467.
- Bartsch, K., & Wellman, H. (1989). Young children's attribution of action to beliefs and desires. *Child Development*, *60*, 946-964.
- Baron-Cohen, S. (1990). The development of a theory of mind in autism: Deviance and delay? *Psychiatric Clinics of North America*, *14*, 33-51.
- Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a "theory of mind"? *Cognition*, *21*, 37-46.
- Bradmetz, J. (1998). Acquisition of a theory of mind and intellectual development in the child aged 3 to 5. *Current Psychology of Cognition*, *17*, 95-113.
- Callaghan, T., Rochat, P., Lillard, A., Claux, M. L., Odden, H., Itakura, S., *et al.* (in press). Synchrony in the onset of mental state reasoning: Evidence from 5 cultures. *Psychological Science*.
- Chen, M. J., & Lin, Z. X. (1994). Chinese preschooler's difficulty with theory-of-mind tests. *Bulletin of the Hong Kong Psychological Society*, *32*, 34-46.
- Clancy, P. M. (1986). The acquisition of communicative style in Japanese. In B. B. Scheffelin & E. Ochs (Eds.), *Language socialization across cultures* (pp. 213-250). New York: Cambridge University Press.
- Cutting, A. L. & Dunn, J. (1999). Theory of mind, emotion understanding, language, and family background: Individual differences and interrelations. *Child Development*, *70*, 853-865.
- de Villiers, J. G., & de Villiers, P. A. (2000). Linguistic determinism and the understanding of false beliefs. In P. Mitchell & K. J. Riggs (Eds.), *Children's reasoning and the mind*, (pp. 191-228). Hove, UK: Psychology Press.
- Dunn, L. M., Dunn, L., Whetton, C., & Pintillie, D. (1982). *British picture vocabulary*

scale. London: NEFER-NELSON.

Frith, U. (1991). *Jiheisho no nazo wo tokiakasu* [Autism: Explaining the enigma] (M. Tominta, & Y. Shimizu, Trans.). Tokyo: Tokyo Shoseki. (Original work published 1989)

Gardiner, D., Harris, P. L., Ohmoto, M., & Hamazaki, T. (1988). Japanese children's understanding of the distinction between real and apparent emotion. *International Journal of Behavioral Development*, 203-218.

Goetz, P. J. (2003). The effects of bilingualism on theory of mind development. *Bilingualism: Language and Cognition*, 6, 1-15.

Goushiki, T. (1999). Preschool children's understanding of self-mind and other-mind using "theory of mind" tasks. *Japanese Journal of Educational Psychology*, 47, 354-363.

Happé, F. G. (1995). The role of age and verbal ability in the theory of mind task performance of subjects with autism. *Child Development*, 66, 843-855.

Hendry, J. (1986). *Becoming Japanese: The world of the pre-school child*. Manchester, UK: Manchester University Press.

Holmes, H. A., Black, C., & Miller, S. A. (1996). A cross-task comparison of false belief understanding in a Head Start population. *Journal of Experimental Child Psychology*, 63, 263-285.

Ikegami, Y. (1991). 'DO-language' and 'BECOME-language': Two contrasting types of linguistic representation. In Y. Ikegami (Ed.), *The empire of signs: Semiotic essays on Japanese culture* (Vol. 8, pp. 285-327). Philadelphia: John Benjamins.

Kanaya, T. (2002). *Nihon-go ni shugo wa iranai* [Japanese language does not need the subject]. Tokyo: Kodansha.

Kinoshita, T. (1991). Preschooler's understanding of other's "false belief" and "the change of his/her cognitive content." *Japanese Journal of Educational Psychology*, 39, 47-56.

Koyasu, M. (1997). The development of "theory of mind" in young children: A comparison between mental representation and photographic representation. *Japanese Psychological Review*, 40, 97-109.

Lee, K., Olson, D. R., & Torrance, N. (1999). Chinese children's understanding of false beliefs: The role of language. *Journal of Child Language*, 26, 1-21.

- Lillard, A. (1998). Ethnopsychologies: Cultural variations in theories of mind. *Psychological Bulletin*, 123, 3-32.
- Lewis, C., Freeman, N. H., Kyriakidou, C., Maridaki-Kassotaki, K., & Berridge, D. M. (1996). Social influences on false belief access: Specific sibling influences or general apprenticeship? *Child Development*, 67, 2930-2947.
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98, 224-253.
- Maruyama, M. (1992). Rekishi-ishiki no "koso" ["Old layers" of historical consciousness]. In *Chusei to hangyaku* [Loyalty and rebellion] (pp. 293-351). Tokyo: Chikuma Shobo. (Original work published 1972)
- Miller, J. G. (1984). Culture and the development of everyday social explanation. *Journal of Personality and Social Psychology*, 46, 961-978.
- Miller, J. G. (1986). Early cross-cultural commonalities in social explanation. *Developmental Psychology*, 22, 514-520.
- Miyamoto, Y. (1998). Young children's representational theory of mind in understanding masked facial expression. *Japanese Journal of Psychology*, 69, 271-278.
- Naito, M. (2003). The relationship between theory of mind and episodic memory: Evidence for the development of autothetic consciousness. *Journal of Experimental Child Psychology*, 85, 312-336.
- Naito, M., Komatsu, S., & Fuke, T. (1994). Normal and autistic children's understanding of their own and others' false belief: A study from Japan. *British Journal of Developmental Psychology*, 12, 403-416.
- Naito, M. & Nagayama, K. (2004). Autistic children's use of semantic common sense and theory of mind: A comparison with typical and mentally retarded children. *Journal of Autism and Developmental Disorders*, 34, 507-519.
- Nelson, K. (1996). *Language in cognitive development: Emergence of the mediated mind*. New York: Cambridge University Press.
- Nelson, K., Henseler, S., & Plesa, D. (2000). Entering a community of minds: "Theory of mind" from a feminist standpoint. In P. H. Miller, & E. K. Scholnick (Eds.),

Toward a feminist developmental psychology (pp. 61-83). New York: Routledge.

Nguyen, L., & Frye, D. (1999). Children's theory of mind: Understanding of desire, belief and emotion with social referents. *Social Development, 8*, 70-92.

Ochiai, E. (1997). *The Japanese family system in transition: A sociological analysis of family change in postwar Japan* [Nijuisseiki kazoku e: Kazoku no sengo-taisei no mikata, koekata]. Tokyo: LTCB International Library Foundation. (Original work published 1994)

Pears, K. C., & Moses, L. J. (2003). Demographics, parenting, and theory of mind in preschool children. *Social Development, 12*, 1-20.

Perner, J., Leekam, S. R., & Wimmer, H. (1987). Three-year-olds' difficulty with false belief: The case for a conceptual deficit. *British Journal of Developmental Psychology, 5*, 125-137.

Peterson, C. C. (2004, May). Journeys of mind: ToM development in children with autism, sensory or motor disabilities. *ISSBD Newsletter, 45*, 11-13.

Population Census of Japan 1995, 2000 -- Results of the First Small Area Tabulation: 1999 (13 Tokyo-to, 14 Kanagawa-ken); *2001* (13 Tokyo-to, 14 Kanagawa-ken, 15 Niigata-ken). [Data files]. Tokyo: Somucho/Somusho Tokeikyoku.

Ruffman, T., Perner, J., Naito, M., Parkin, L., & Clements, W. A. (1998). Older (but not younger) siblings facilitate false belief understanding. *Developmental Psychology, 34*, 161-174.

Saito, M. (2000). The development of understanding of knowing in young children. *Japanese Journal of Developmental Psychology, 11*, 163-175.

Shigaki, I. S. (1987). Language and the transmission of values: Implications from Japanese day care. In B. Fillion, C. N. Hedley, & E. C. DiMartino (Eds.), *Homes and School: Early language and reading*, (pp. 111-121). New York: Albex.

Shweder, R. A., Goodnow, J., Hatano, G., LeVine, R. A., Markus, H., & Miller, P. (1998). The cultural psychology of development: One mind, many mentalities. In W. Damon (Series Ed.), R. M. Lerner (Vol. Ed.), *Handbook of child psychology: Vol. 1. Theoretical models of human development* (5th ed., pp. 865-937). New York: Wiley.

Symons, D., McLaughlin, E., Moore, C., & Morine, S. (1997). Integrating relationship

constructs and emotional experience into false belief tasks in preschool children. *Journal of Experimental Child Psychology*, 67, 423-447.

Triandis, H. C. (1989). The self and social behavior in differing cultural context. *Psychological Review*, 96, 506-520.

Ueno, K., Nadeo, T., & Iinaga, K. (1991). *Kaiga goi hattatsu kensa* [Picture vocabulary test]. Tokyo: Nihon Bunka Kagakusha.

Vinden, P. (1996). Junín Quechua children's understanding of mind. *Child Development*, 67, 1707-1716.

Vinden, P. (1999). Children's understanding of mind and emotion: A multi-culture study. *Cognition and Emotion*, 13, 19-48.

Wahi, S., & Johri, R. (1994). Questioning a universal theory of mind: Mental-real distinctions made by Indian children. *Journal of Genetic Psychology*, 155, 503-510.

Wellman, H., Cross, D., & Watson, J. (2001). Meta-analysis of theory-of-mind development: The truth about false belief. *Child Development*, 72, 655-684.

White, M. I., & LeVine, R. A. (1986). What is an ii ko (good child)? In H. Stevenson, H. Azuma, & K. Hakuta (Eds.), *Child development and education in Japan* (pp. 55-62). New York: Freeman.

Wimmer, H., & Mayringer, V. (1998). False belief understanding in young children: Explanations do not develop before predictions. *International Journal of Behavioral Development*, 22, 403-422.

Appendix A

The Stories and Questions Used in Experiment 1

Unexpected Transfer Task

This is Sally. She was playing with a marble. But Sally got hungry, so she put the marble into the blue box and went for something to eat. While she was away, I (the experimenter) moved the marble from the blue box and put it into here in the yellow box. Then, when Sally came back, she wants to play with the marble again.

False belief question: Where will Sally look for the marble first? (If the child did not answer, a forced-choice question was asked with the order of two choices being randomized.) Will she look for it in the yellow box or the blue box?

Reality question: Where is the marble really now?

Memory question: Where did Sally put the marble in the beginning?

Unexpected Contents Task

The experimenter showed a closed chocolate box to the child and asked him/her "What's inside the box?" After the child answered with its apparent contents ("Sweets/Chocolate"), the box was opened to reveal the toothbrush, with the experimenter saying "Let's see inside the box." The child was asked to name its real contents ("a toothbrush") and the box was closed again. The following three questions were then asked with exaggerated gestures so that the child could easily specify the time each question was concerned. The order of questions was counterbalanced across children.

Reality question: What is really inside the box now?

One's own belief question: When I took it from the bag and you first saw the box before we opened it, what did you think was in the box? (If the child did not answer, a forced-choice question was given with the order of the two choices being randomized.) When you first saw the box, did you think there was a toothbrush or chocolate in the box?

Other's belief question: Your teacher has never seen inside the box. I'll take it from the bag and show it to her/him. If the teacher sees it for the first time, before s/he opens the box, what will s/he think is inside of it? (If the child did not answer, a forced-choice question was given with the order of the two choices being randomized.) When the teacher

first sees the box, will s/he think there is chocolate or a toothbrush inside of it?

Appendix B

Examples of Stories Used in Experiment 2.

The Object Condition: The Park Version

This is Taro-kun. Taro-kun was eating snacks in the park. When he'd finished all of them, Taro-kun threw the empty bag into the yellow trash can and went home (He goes out of the scene). After Taro-kun went away, a strong wind blew and the bag was blown. The bag just happened to get into the red trash can.

On the way home, Taro-kun remembered the bag had a coupon sticker on it; in Taro-kun's school, students collect the coupons. "Oh, yes, I just remember now it has a coupon sticker on it. I want to go back and tear it off."

False belief: Where will Taro-kun go to find the empty snack bag?

(If the child did not respond, a forced-choice question was given with the order of the two choices being randomized). Will he go to the red trash can or the yellow trash can?

Memory control: Do you remember where Taro-kun first threw the empty snack bag away?"

Reality control: Where is the bag now really?

The Person External Condition: The Ryokan Version

Taro-kun came to stay in the *onsen ryokan* (i.e., a hot-spring hotel) with his mother. Taro-kun and Mom were shown the Room Sakura. After a while, Taro-kun went alone to a game center (He goes out of the scene).

While he was away, a maid came and said, "As I haven't finished cleaning this room yet, I need to do it now. Until cleaning is over, please wait in the next room Momiji." Mom declined the offer saying "Because I'm rather tired, I don't want to move out of here. No thanks for cleaning." But the maid said, "You have to move" and forced Mom to move to the Room Momiji (Both rooms' doors are closed). In the game center, Taro-kun ran out of his money and wanted to get more money from Mom. Taro-kun wants to see Mom.

False belief: Where will Taro-kun go to see Mom?

(If the child did not respond, a forced-choice question was given with the order of the two choices being randomized). Will he go to the Room Momiji or the Room Sakura?

Memory control: Do you remember where Mom was first in?"

Reality control: Where is Mom now really?

The Person Condition: The Garden Version

Taro-kun was in his house with his mother. They were cleaning. Mom could not find a bucket. She said, "I can't find a bucket, so I'm going to look for one in the garden shed," and went out. Taro-kun kept cleaning (He goes out of the scene).

Mom looked for the bucket but could not find it in the shed. She said, "Well, it may be in the garage," and went to the garage in the opposite side. Because Mom did not come back for a while, Taro-kun started being worried. He spoke to himself, "OK. I'm going to see Mom." Taro-kun wants to see Mom.

False belief: Where will Taro-kun go to see Mom?

(If the child did not respond, a forced-choice question was given with the order of the two choices being randomized). Will he go to the shed or the garage?

Memory control: Do you remember where Mom went first?"

Reality control: Where is Mom now really?

Footnotes

¹However, the more detailed analyses of residents' educational levels revealed that the suburban residents experienced the higher education more than provincial residents. In the suburban areas, on average 39% and 43% of the residents were with the secondary and the higher education, respectively; in the provincial area, 55% and 24% of them were with the secondary and the higher education, respectively. More detailed demographic data of the four areas where children resided are available from the first author.

²Including these 60 data did not underestimate children's performance, as the pattern of results including these data was similar to that excluding them. Particularly between the sample of all 327 children and the sample of 267 children who passed all control questions, the differences in predicted probabilities of passing both transfer and contents tasks as described below were smaller than 6.7% at both chronological and verbal ages below 80 months. At the age and verbal age of 80 months and above, the differences were smaller than 2.5%.

³Japanese children's performance did not differ between the transfer task and the *other* question in the contents task, nor between the *own* and *other* questions within the contents task, McNemar's χ^2 s (1, $N = 327$) < 1.45.

⁴Since children were repeatedly presented a series of six similar tasks with several questions each, they might have thought their answers were wrong and have modified them. However, a preliminary analysis confirmed a test-retest reliability, with no significant performance difference between the first and second half of tasks ($F < 1$).

⁵Prior to this analysis, we conducted a three-way mixed analysis of covariance (ANCOVA) with children's verbal age as a covariate, because Cutting and Dunn (1999) found a sex difference in false belief performance and this was attributed to differential effects of verbal ability between sexes. Results revealed no significant main effect of verbal age or significant interaction related to verbal age (F s < 1).

⁶Preliminary analyses of 6-year-olds' performance revealed no difference between the first and second half of tasks in either location or activity question (F s < 1).

Table 1

Mean Scores and Standard Deviations on the Transfer and Contents tasks

Group	Mean age (Range)	Contents ^a (range 0-2)	Transfer (range 0-2)	Contents + Transfer (range 0-3)
American ^b				
3-year-olds	3;06 (3;02-3;11)	.19 (.40)	.56 (.81)	—
4-year-olds	4;06 (4;00-4:10)	1.06 (.99)	1.44 (.89)	—
Chinese ^b				
3-year-olds	3;06 (3;02-3;10)	.25 (.58)	.19 (.40)	—
4-year-olds	4;06 (4;02-4:10)	1.00 (.89)	1.44 (.81)	—
Japanese				
3-year-olds	3;06 (2;11-3;11)	.37 (.61)	—	.44 (.73)
4-year-olds	4;05 (4;00-4:11)	.76 (.79)	—	1.25 (1.07)
5-year-olds	5;06 (5;00-5:11)	1.41 (.78)	—	2.11 (.97)

^aTwo *other* questions for American and Chinese children; one *own* and one *other* questions for Japanese children. ^bData from Goetz (2003); $n = 32$ with 16 each of 3- and 4-year-olds.

Table 2

Proportions of Children who Passed Each Question of the Transfer and Contents Tasks

Group	<i>n</i>	Mean age	Transfer	Contents	
				Other	Own
American ^a					
4-year-olds	25	4;03	.36	.28	.40
5-year-olds	25	5;03	.84	.56	.68
Japanese					
4-year-olds	120	4;03	.37	.29	.37
5-year-olds	91	5;04	.67	.66	.65
Suburban					
4-year-olds	103	4;03	.41	.32	.37
5-year-olds	66	5;04	.77	.70	.67
Provincial					
4-year-olds ^b	17	4;04	.12	.12	.35
5-year-olds	25	5;05	.40	.56	.60

Note. Except 4-year-olds in Japanese small city, 4-year-olds' ages ranged 3;07 to 4;09; all 5-year-olds' ranged 4;11- 5;05. ^aData from Holmes *et al.* (1996). ^bAge range = 3;11 - 4;09.

Table 3

Mean Scores of Correct Responses as a Function of Age, Sex, and Transfer Condition

Transfer condition ^a	6-year-olds		7-year-olds		8-year-olds	
	Girls	Boys	Girls	Boys	Girls	Boys
Experiment 2						
Object	1.14	.50	1.54	1.08	1.72	1.72
Person external	1.29	.43	1.46	1.25	1.72	1.67
Person	1.21	.43	1.31	1.25	1.83	1.72
Experiment 3						
Object	1.67	1.40	1.93	2.00	1.90	1.90
Location question						
Person external	1.53	1.26	2.00	1.93	2.00	1.95
Person	1.67	1.40	2.00	1.93	1.85	1.95
Activity question						
Person external	1.27	1.40	2.00	2.00	2.00	1.95
Person	1.27	1.27	1.93	2.00	2.00	2.00

^aMaximum score = 2.00.

Table 4

Proportions of Justifications for Correct Responses as a Function of Age

Category	6-year-olds	7-year-olds	8-year-olds	Total
Object				
Ignorance	.22	.34	.09	.14
Fact inference	.07	.05	.05	.06
Initial location	.50	.73	.83	.71
Others and no response	.22	.08	.03	.09
	(46)	(59)	(76)	(181)
Person external				
Ignorance	.19	.10	.03	.09
Fact inference	.10	.17	.19	.16
Initial location	.40	.40	.58	.48
Social rules	.14	.25	.19	.20
Others and no response	.17	.08	.01	.07
	(42)	(59)	(79)	(180)
Person				
Ignorance	.22	.08	.03	.09
Fact inference	.09	.12	.12	.11
Initial location	.43	.47	.58	.51
Social rules	.07	.25	.21	.19
Others and no response	.20	.07	.07	.10
	(46)	(59)	(76)	(181)

Note. Total number of justifications is in parentheses.