CHINESE PRESCHOOLERS’ FALSE BELIEF UNDERSTANDING: IS SOCIAL KNOWLEDGE UNDERPINNED BY PARENTAL STYLES, SOCIAL INTERACTIONS OR EXECUTIVE FUNCTIONS?

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The ontogenesis of social understanding has been linked with a range of cognitive skills involving executive functions and social factors like the child’s social interactions. This research was conducted in China in order to test recent claims that members of the child’s social network and parenting styles are instrumental in facilitating this development and that oriental children show advanced skills in executive functions and relatively slow ‘theory of mind’ development. Sixty-seven preschoolers performed executive and false tests and 64 of their parents returned questionnaires about the child’s social network and their disciplinary strategies. Individual social and cognitive factors predicted false belief but in regression analyses inhibitory control remained significant and one social predictor, interaction with cousins, was negatively related to social awareness. The data suggest the importance of analyses of the origins of social knowledge in diverse cultural settings and exploring the cognitive and social factors that underlie this development.

Key words: false belief, executive function, parenting styles, social networks

The past twenty-five years have witnessed an explosion of research into the foundations of social knowledge under the banner of ‘theory of mind’. While originally concerned with the nature of young children’s understanding of the social world (e.g., Perner, 1991; Wellman, 1990), more recent research has explored the origins of these skills, first in a range of cognitive factors, notably executive functions (Schneider, Schumann-Hengsteler, & Sodian, 2005) and language (Astington & Baird, 2005) and, secondly, in a range of social processes from the structure of the child’s social environment to the nature of their social relationships and their parents’ styles (Carpendale & Lewis, 2004, 2006). This work suggests that social knowledge is founded upon a complexity of social and intellectual factors, although the nature of social, developmental and evolutionary processes is still open to much theoretical debate (Tomasello, Carpenter, Call, Behne, & Moll, 2005). Indeed the term ‘theory of mind’ is now often substituted for the more general label ‘social understanding’ to downplay the idea that the child makes theory-like attributions of mental states and to emphasize the role of domain general influences and processes upon the development of such skills (Carpendale & Lewis, 2006). We use this more general term here. In this paper we explore the relationships between a range of cognitive and social factors in China, a culture selected to provide key pieces in the puzzle of how such social understanding develops.

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In the explosion of research on ‘theory of mind’ one experimental paradigm, false belief, has acted as an anchor point because preschoolers appear to progress through clear stages, with a notable shift between the ages of three and four replicated in over 200 studies (Wellman, Cross, & Watson, 2001). However, these consistencies should be contrasted with individual differences data, which show variations between cultures and between individuals within a culture. Most notably, Wellman et al. report a lag in Japanese children’s grasp of mental states of about six months. Subsequent research in China (Sabbagh, Xu, Carlson, Moses, & Lee, 2006; Tardif, So, & Kaciroti, in press) and Korea (Oh & Lewis, submitted) has suggested that this lag may extend to other oriental cultures. These data raise the questions of why there might be differential access to social knowledge and which factors might be responsible for such cultural patterns. There are a number of candidates in the child’s cognitive and socio-cultural circumstances.

Some researchers have asserted that children’s social experience is associated with their social understanding (e.g., Hughes & Leekam, 2004). A child’s social network is simpler than that of adults and preschoolers gain social knowledge via three main sources: siblings, parents and peers. The most researched influence is the “sibling effect”. Perner, Ruffman, and Leekam (1994) showed that individual differences in the acquisition of false belief skills were accounted for in part by the number of child’s siblings. This finding has been replicated (though for exceptions see Cole & Mitchell, 2000; Cutting & Dunn, 1999; Peterson & Slaughter, 2003) and more recent data suggest that older siblings play a causal role in this sibling effect (Ruffman, Perner, Naito, Parkin, & Clements, 1998). Such sibling data are of relevance to this study, as China’s ‘one child’ policy makes it a natural laboratory for studying other social factors in the absence of a general sibling effect. Sabbagh et al. (2006) attribute the relatively poor performance of Chinese children on theory of mind tests to the lack of siblings in children’s lives, but of course other influences are possible. Lewis, Freeman, Kyriadidou, Maridaki-Kassotaki, & Berridge (1996) found that the number of older kin a child had and the frequency of their interactions correlated with her/his false belief performance as strongly as the number of their siblings. Given the absence of siblings in most Chinese households and high levels of contact between extended kin, one aim of the research here was to consider the effect of this contact upon preschoolers’ social development.

Preschoolers reported to engage in more shared pretence and cooperative play (Lalonde & Chandler, 1995), or those selected as more popular (Peterson & Siegal, 2002), with their peers are also more likely to achieve an earlier grasp of false belief. Thus the data from peer interactions complement those from sibling relationships implying that kinds of negotiation with children may facilitate social development. Astington (2003) suggests that such data support a Vygotskian claim that the child’s social competence emerges in the interaction between the child and more competent individuals. However, this suggestion is based upon research in Western cultural settings and even there we know little about the possible differences between different members of the child’s social network (Dunn, 2004; Dunn & Brophy, 2005).

There are grounds for assuming that social influences might operate in different ways in Confucian cultures with their emphasis on filial duty and respect (Chao & Tseng, 2002).
In this study we explore the differential relationships between parents and the child’s cousins, as in China preschoolers spend time with extended family members, particularly cousins. The literature from the West might predict that cousins serve similar functions to siblings in other cultures. However, the absence of sibling data from Confucian cultures leaves open whether or not an equivalent to the sibling effect will be found in China.

The final social influence concerns the effect of parental style upon preschoolers. To categorize parents according to how demanding and responsive they are, researchers have created a typology of four parenting styles: indulgent, authoritarian, authoritative, and uninvolved (Maccoby & Martin, 1983). According to Western data authoritative parents are more successful because “They monitor and impart clear standards for their children’s conduct. They are assertive, but not intrusive and restrictive. Their disciplinary methods are supportive, rather than punitive. They want their children to be assertive as well as socially responsible, and self-regulated as well as cooperative” (Baumrind, 1991, p. 62). Based on Baumrind’s criteria, a brief questionnaire on how parents react to real or hypothetical transgressions by the child (Ruffman, Perner, & Parkin, 1999) correlated with the child’s false belief understanding. In particular, mothers who reported asking younger preschoolers to reflect on the victim’s feelings (or ‘How Feel’ (HF) responses) had children with more advanced skills. The older siblings effect was independent of the number of HF responses (Ruffman et al., 1999). This study adapts Ruffman’s questionnaire to fit Chinese culture to explore the relation between parenting styles and social understanding. We make no firm predictions as research on parenting in oriental cultures because Vinden (2001) has found that authoritarian parenting was negatively related to social understanding but only in European-American families, not in Asian-American families.

There is increasing evidence from Western studies to suggest that social knowledge is also closely related to cognitive factors (e.g., Carlson & Moses, 2001; Carlson, Moses, & Breton, 2002; Frye, Zelazo, & Palfai, 1995; Hala, Hug, & Henderson, 2003; Hughes, 1998a; Perner, Lang, & Klo, 2002). However, there is much debate about the possible causal mechanisms between these two abilities, ranging from the view that an understanding of internal states assists self-control (Perner & Lang, 2000), to various theories that self-control is a precursor to social understanding. These include the claims that working memory skills provide a crucial aspect for social understanding (Davis & Pratt, 1995; Gordon & Olson, 1998), that false belief is one example of a problem of understanding embedding rules within an overall framework (Frye et al., 1995), or that inhibitory control is a key to developing social understanding (Carlson & Moses, 2001; Carlson et al., 2002; Carlson, Moses, & Hix, 1998; Hala et al., 2003; Russell, 1996).

It has been difficult to tease apart the relationship between executive functioning and social understanding. The longitudinal (Hughes, 1998b) and microgenetic (Flynn, O’Malley, & Wood, 2004) data suggest that executive skills are required for false belief understanding as the former appear to precede the latter. However, there is some evidence for functional interdependence in that Klooo and Perner (2003) found that training of executive skills as measured by the Dimensional Change Card Sort (DCCS) procedure (Frye et al., 1995) enhanced children’s performance on the false belief task and training of
false belief understanding promoted children’s DCCS performance. In addition the data from oriental cultures complicates our understanding of the cognitive underpinnings of social knowledge.

The evidence suggests a number of differences between Asian cultures and those in the West. In Korea (Oh & Lewis, submitted) and China (Sabbagh et al., 2006) children appear to show advanced executive function skills even though their false belief skills lag behind their counterparts in Western countries. These data raise questions about the functional relationships between these two skills. For example, in Oh and Lewis’s two studies three year olds were highly proficient at executive tasks but four year olds still had not mastered false belief. Similarly research by Ogawa and Koyasu (2006) suggests that in Japan working memory and false belief are correlated while false belief and inhibitory control are not once other cognitive skills are taken into account. This goes against the studies reported above. Taken together the data from these cultures indicate that more evidence is required both to reflect upon the validity of data from the West and to generate new hypotheses concerning the cognitive underpinnings of social knowledge, based upon the deeply embedded in Confucian values of such cultures.

Despite the continuing development of Western ideas in preschool education, Chinese teachers (Wang & Mao, 1996) and parents (for a review see Chao & Tseng, 2002) continue to be influenced by traditional emphases upon respect and self-control, particularly as a reaction to several decades of severe social deprivation followed by a dramatic period of economic growth. We thus make five hypotheses about the study. First, we predict that Chinese children would display a slower rate of acquisition of ‘false belief’ skills shown in over 500 experimental manipulations conducted in the West. For this reason we included a sample of children in a preschool up to five years of age. Secondly, we hypothesized that, with the cultural emphasis on self-control, Chinese children would show advanced levels of skill in executive function. Thirdly, we predict that if the sibling effect is generalizable to other cultures then we should see the same facilitative effect of the child’s interactions with her or his cousins. Fourthly, we explore the effects of parents’ styles on social understanding. Ruffman et al. (1999) found that if parents asked their young children to reflect upon how their antagonist feels this has a positive influence, but we know little about whether such patterns generalize to a non-Western culture. Fifthly, we compare the relative contributions of executive control and the two social factors (social interactions and parenting) in relation to one another to investigate whether they contribute unique variance to the development of social knowledge as represented by false belief understanding.

**METHOD**

Participants

Sixty-seven 3–5 year-olds were tested. There were 32 3-year-olds (mean = 41.9 months; range = 36–47 months; 18 girls), 22 4-year-olds (mean = 51.59 months; range = 48–59 months; 10 girls and 12 boys) and 13 5-year-olds (mean = 61.9 months; range = 60–65 months; 6 girls). The children were from lower- and middle-class areas in two kindergartens in Zhuhai, Guangdong province, in southern China. Sixty-four of their parents also completed a questionnaire.
Materials and Procedure

Four tasks tested executive function. Two conflict inhibitory control tasks, the Blue/Red task and Luria’s Hand Game test; one working memory task, the Backward Word Span test; one switching measure task, the Dimension Change Card Sort (DCCS) test. The two tasks of mental state understanding were the Deceptive Box and the Unexpected Transfer tests.

The Blue/Red test was adapted by Oh (2006) from the Grass/Snow test devised by Carlson and Moses (2001). Children were shown an A4 sheet of white paper to which an A5 piece of blue paper and similar sized piece of red paper were attached side by side at the top. The child was instructed to place his or her hand on the middle of the sheet of white paper and to point to the blue paper when the experimenter said “Red” and to point to the red paper when the experimenter said “Blue.” Sixteen test trials (8 blue and 8 red trials) were administered in a pseudorandom order. The dependent measure was the number of correct trials.

At the beginning of Luria’s Hand Game (Hughes, 1998a), the child is asked to copy either a fist or a point gesture for 6 randomly presented practice trials and then is required to produce conflicting hand actions. When the experimenter made a fist, the child had to point a finger, and vice versa. Seven fist trials and 7 finger trials were presented in a pseudorandom order. The dependent measure was the number of correct trials.

The working memory measure, Backward Word Span (Carlson et al., 2002) was modified (Oh & Lewis, submitted) in that the experimenter used two horizontal lines of 2 cm squares of paper corresponding to the number of words on a list. She pointed to each square of paper while saying a word. The child had to repeat what she had just said while pointing to the pieces of paper in reverse order. Two practice trials were administered to ensure that the child understood the task. The experimenter said ‘I am going to say some words to you as I point to these pieces of paper. So if I say ‘cat’ [points to the first square of paper, then points at second square and says] ‘flower’, you say ‘... [Experimenter points at the second square] ...’ ‘... [Experimenter points at the first square].’ ‘Yes that’s right [or if incorrect ‘No’, I said ‘flower’ when I pointed to that piece of paper and ‘cat’] when I pointed to that one’. The child was administered two trials with two items and two with three, four etc. until failure of both trials at that level. The size of the word list increased from 2 to 7, with successful span performance measured by success on one trial out of the two at the highest level reached. The score ranged between 1 (failure at the 2 word level) and 7.

The Dimensional Change Card Sort (DCCS) (Frye et al., 1995) involves 16 sorting cards (depicting either a red car or blue flower) and two model cards (a blue car and a red flower) attached to the back of two sorting trays. The child was shown the cards and the difference in colour between the model and the test cards. The child was asked to sort 6 cards according to one dimension (colour or shape, counterbalanced), placing the card into the sorting tray with feedback if necessary. The sorting dimension was then altered. So, for example, children who had sorted by colour had to switch trays and put the card into the tray with the model identified by shape but not colour. No feedback was given and E recorded performance of the child’s sorting of 8 cards in the post switch phase.

In the Deceptive Box test (Perner, Leekam, & Wimmer, 1987), the child is shown a closed familiar candy box and asked a question ‘What do you think is inside?’ Having said ‘candy’ or the brand name, the child is shown that there is actually a pen in the box. The experimenter put the pen back in the box and closed it. Then the child was asked about his or her own prior false belief ‘What did you think was in this box?’ and another’s current false belief about the chocolate box ‘I am going to show this box to another child. What will he think is inside?’ Finally, the child was asked the reality control question, ‘What is actually inside the box?’ Credits for both self and other questions are given to the child.

In the Unexpected Transfer test (following Baron-Cohen, Leslie, & Frith, 1985), a story is enacted with two dolls, rabbit Mary and rabbit Jackie, two empty baskets with covers and a candy. Mary places her candy bar in one of the baskets and goes outside. Jackie moves the candy to the other basket in Mary’s absence. As Mary comes back from playing the child is asked ‘Where will Mary look for her candy?’, plus three control questions (in counterbalanced order) ‘Where is the candy really?’ ‘Where did Mary put her sweet before she left the room?’ and ‘Did Mary see Jackie move the candy?’ All the questions were scored as correct or incorrect.

To obtain detailed information about Parenting Style and the Children’s Social Network, a questionnaire was sent to the parents of each child. Parents were asked to provide information about: (a) how many people live with the child, (b) how many older and younger cousins live in the same city, (c) the child’s contact with these cousins, (d) contact with friends, (e) parent-child contact during the week and at weekend, (f) the child’s contact with baby sitters.
To assess Parenting Style, we employed four of the five questions from Ruffman et al. (1999) and added another two topics that we thought would be suitable for use in Chinese society. These ask parents to recall an incident when the child has hit someone, lied, taken something or shouted at them and to describe how they reacted. Each topic is scored into four types: [1] encouraging the child to reflect on the emotional perspective of the victim of their transgressions, coded as ‘how feel’ (HF) responses; [2] explaining or exploring the situation in some way without referring to the victim’s feelings, termed ‘general discussion’ (GD) responses; [3] disciplining the child, scored as a ‘reprimand’ (REP); and [4] ambiguous (AMB) as to whether they involved both REP and GD responses (Ruffman et al., 1999). To make the scale comparable to the original only the questions taken from Ruffman et al. were scored here.

RESULTS

The first hypothesis concerns the performance of the children on the false belief tests. In keeping with previous findings on oriental children, Table 1 shows that the children in all three age groups performed less well than those in the hundreds of Western samples. The same applies to all three critical test questions—two deceptive box tasks and one unexpected transfer probe. There were not the usual age differences expected from Western data. To maximize the possibility of finding these the two older age groups were collapsed, but on no test did the older ones perform better than the younger ones ($\chi^2(1, N = 67) = 1.1$, .89 & .68, NS, respectively, for the ‘Self’, ‘Other’ and Unexpected Transfer questions). A series of binomial tests revealed that both the three year olds and the older groups were at chance for the ‘self’ question of the deceptive box and below chance for the other question ($P = .001$ and .018 for the other question and $P < .001$ for unexpected transfer in both groups). These data contrast sharply with those in the West where at worst four year olds perform at chance (see Wellman et al., 2001, for comparison).

Table 2 presents the means of children’s performance on the tests of executive function. It conceals the fact that distributions were not completely normal, partly because on all but the word span some children of all ages were at ceiling. For example, on Luria’s Hand-Game over 90% of the children made no more than 4 errors across 14 trials and 53 (79%) of the children were at ceiling. In the Blue/Red task, 30 out of 67 of the children had reached the ceiling. Table 2 conceals the fact that on the Dimensional Change Card Sort (DCCS) Test scores were bimodal with 42 (63%) children at ceiling and 16 (24%) at floor. Table 2 also shows a slight improvement with age but in none of the measures was the age difference statistically significant ($F(2, 64) = 2.31$, 1.05 and 2.41, NS, for the Blue/Red, Hand Game and DCCS respectively—the data bordered on the non-normal and equivalent nonparametric analyses were similarly NS). In contrast in the Word Span test there was a significant improvement with age ($F(2, 64) = 10.93$, $p < .001$, $\eta^2_p = .25$). Tukey Tests ($p < .005$) showed that the three year olds were significantly less proficient than the older groups.

Table 2 also presents the data from the questionnaire about the child’s social network. On average each lived with three other household members, although the range was from lone parent households to those with seven other family members. Over half had one cousin and one child had seven within the city. The scales on frequency of play
with cousins and friends were from 0, never, to 3, often. Play with friends appears more frequent than that with cousins. Mothers reported interacting with their preschoolers much more frequently than were their peers or relatives.

In the questionnaire parents were asked about a total of 256 events of misbehaviour (the 4 under consideration × 64 parental questionnaires) and they agreed that they had taken place in 139 times (59%). This is comparable to the frequency reported in the English study by Ruffman et al. (61%). In their study the modal response (46%) to the child’s infringement was to reprimand her or him. In this Chinese sample the vast majority (69%) of responses involved the parent reporting that they responded to a deed like teasing, hitting or misbehaving by talking to the child about the transgressions but did not mention referring to the victim’s feelings. Ten percent of responses discussed how the victim felt. Only 3% involved a reprimand, but a further 18% were categorized as

<table>
<thead>
<tr>
<th>Age group</th>
<th>Deceptive box self</th>
<th>Deceptive box other</th>
<th>Unexpected transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>fail pass</td>
<td>fail pass</td>
<td>fail pass</td>
</tr>
<tr>
<td>3.00</td>
<td>17 15</td>
<td>26 6</td>
<td>28 4</td>
</tr>
<tr>
<td>4.00</td>
<td>16 6</td>
<td>16 6</td>
<td>17 5</td>
</tr>
<tr>
<td>5.00</td>
<td>7 6</td>
<td>9 4</td>
<td>11 2</td>
</tr>
<tr>
<td>Totals</td>
<td>40 27</td>
<td>51 16</td>
<td>56 11</td>
</tr>
</tbody>
</table>

Table 2. Mean scores (SD) on the four executive function tests and measures of social contact in each age group

<table>
<thead>
<tr>
<th>Executive Function Test</th>
<th>Range:</th>
<th>Age: Three</th>
<th>Four</th>
<th>Five</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue/Red</td>
<td>0–16</td>
<td>11.93 (4.94)</td>
<td>12.5 (5.55)</td>
<td>15.23 (1.09)</td>
</tr>
<tr>
<td>Luria Hand Game</td>
<td>0–14</td>
<td>12.91 (2.75)</td>
<td>13.04 (2.36)</td>
<td>14 (0)</td>
</tr>
<tr>
<td>Card Sort</td>
<td>0–8</td>
<td>5.34 (3.42)</td>
<td>4.86 (3.85)</td>
<td>7.38 (2.21)</td>
</tr>
<tr>
<td>Word Span</td>
<td>0–4*</td>
<td>1.98 (1.09)</td>
<td>2.86 (0.71)</td>
<td>3.15 (0.55)</td>
</tr>
</tbody>
</table>

Social Network:

<table>
<thead>
<tr>
<th>No. in house</th>
<th>1–7</th>
<th>3 (1.31)</th>
<th>3.05 (1.07)</th>
<th>3.38 (1.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. older cousins</td>
<td>0–7</td>
<td>.73 (1.26)</td>
<td>1.05 (1.07)</td>
<td>.31 (.48)</td>
</tr>
<tr>
<td>No. younger cousins</td>
<td>0–3</td>
<td>.3 (.65)</td>
<td>.29 (.46)</td>
<td>.31 (.48)</td>
</tr>
<tr>
<td>Play with cousins</td>
<td>0–3</td>
<td>.9 (1.15)</td>
<td>1.15 (1.29)</td>
<td>1 (1.22)</td>
</tr>
<tr>
<td>Play with friends</td>
<td>0–3</td>
<td>2.17 (.79)</td>
<td>2.38 (.8)</td>
<td>2.38 (.87)</td>
</tr>
<tr>
<td>Time with mother per week [minutes]</td>
<td>0–1830</td>
<td>688.33 (334.21)</td>
<td>629.05 (200.43)</td>
<td>852.43 (383.04)</td>
</tr>
</tbody>
</table>

* The possible maximum was 7 for word span

with cousins and friends were from 0, never, to 3, often. Play with friends appears more frequent than that with cousins. Mothers reported interacting with their preschoolers much more frequently than were their peers or relatives.

In the questionnaire parents were asked about a total of 256 events of misbehaviour (the 4 under consideration × 64 parental questionnaires) and they agreed that they had taken place in 139 times (59%). This is comparable to the frequency reported in the English study by Ruffman et al. (61%). In their study the modal response (46%) to the child’s infringement was to reprimand her or him. In this Chinese sample the vast majority (69%) of responses involved the parent reporting that they responded to a deed like teasing, hitting or misbehaving by talking to the child about the transgressions but did not mention referring to the victim’s feelings. Ten percent of responses discussed how the victim felt. Only 3% involved a reprimand, but a further 18% were categorized as
ambiguous—containing both a reprimand and discussion about the event without mentioning the other’s feelings.

To address the final three hypotheses we conducted correlations and regression analyses to investigate whether any of the cognitive or social measures predicted false belief. Some measures were not normally distributed, although only the Luria Hand Game showed high skewness and kurtosis values. Careful checks were made to ensure that any significant results were not the product of such distributions by using Spearman’s correlations and/or recoding the scales so that they were more normal. None of these manipulations of the data led to different results, so for the sake of clarity parametric tests alone will be presented. To avoid Type 1 errors the three false belief measures and their control questions were summed into a scale of false belief. Given that of the 14 measures correlated with false belief four were statistically significant it is unlikely that these arose by chance, as at the .05 level we would expect fewer than one (.7) to be significant by chance.

The first block of Table 3 shows that one executive measure, the Blue/Red task, correlated significantly with false belief, supporting the many studies in the West (Moses & Carlson, 2004) and East (Oh & Lewis, submitted; Sabbagh et al., 2006), which claim that executive skills underpin social knowledge. That the other measures with a high inhibitory control component did not correlate significantly may reflect the near ceiling effect on the Luria Hand Game and the bimodal distribution of the DCCS. This is
supported by the fact that each of these measures was significantly correlated with each other and with the Blue/Red scores.

The second block in Table 3 shows that two social interaction measures related to false belief—the number of older cousins that a child has and the frequency of contact with cousins. In both cases the effect was negative, thus providing an effect in the opposite direction to the sibling effect reported in the Western data. None of the other social interactional measures was significant. In the third block of measures in Table 3, one of the four parenting styles, the proportion of response to transgressions with ambiguous parental sanctions, was negatively related to false belief. In Ruffman et al.'s (1999) study, ‘how feel’ responses related to mental state understanding once the child’s age was taken into account. As a check we did a partial correlation with age as a covariate but it had no effect on the correlation between ‘how feel’ and false belief.

The results in Table 3 suggest that a mixture of factors in the child’s social environment and executive skills predict the social understanding measure used here. The final aim was to explore whether any of these individual variables continues to contribute significant variance to this measure once the child’s age is taken into account. A hierarchical regression on false belief was conducted in which age was forced into the equation before the four significant variables in Table 3. The first step was not significant, $F(1, 55) = 3.34, p = .07$, but the second step was highly significant, $F(1, 52) = 4.82, p < .001$, adjusted $R^2 = .25$. Table 4 displays the regression coefficients. Two factors remained significant, the Blue/Red task, which was positively related to false belief, and the number of a child’s cousins which had a negative effect.

**DISCUSSION**

The results of this study partially replicate previous experiments but raise some intriguing questions about the origins of social knowledge. These concern the specific findings from the tests of executive function and false belief, the relationships between the

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Constant</th>
<th>1.88</th>
<th>.8</th>
<th>2.35</th>
<th>.02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.03</td>
<td>.02</td>
<td>.24</td>
<td>1.83</td>
<td>.07</td>
</tr>
<tr>
<td>Model 2</td>
<td>Constant</td>
<td>2.15</td>
<td>.72</td>
<td>2.96</td>
<td>.005</td>
</tr>
<tr>
<td>Age</td>
<td>0.02</td>
<td>.02</td>
<td>.13</td>
<td>1.05</td>
<td>.3</td>
</tr>
<tr>
<td>Blue/Red</td>
<td>0.05</td>
<td>.025</td>
<td>.28</td>
<td>2.22</td>
<td>.03</td>
</tr>
<tr>
<td>No. of older cousins</td>
<td>−0.2</td>
<td>.1</td>
<td>−.29</td>
<td>−1.97</td>
<td>.05</td>
</tr>
<tr>
<td>Frequency of play with cousins</td>
<td>−0.06</td>
<td>.12</td>
<td>−.08</td>
<td>−0.52</td>
<td>.61</td>
</tr>
<tr>
<td>Ambiguity in parental styles</td>
<td>−0.61</td>
<td>.41</td>
<td>−.18</td>
<td>−1.49</td>
<td>.14</td>
</tr>
</tbody>
</table>
two and the intriguing social and familial predictors of false belief understanding in this Chinese sample. We will discuss each of these issues in relation to one another.

Two apparently contradictory patterns of results from the executive and mental state tests are striking. The first appears to validate the use of the constructs under investigation here. This is the significant association between the Blue/Red test and false belief even when other factors are partialled out. This replicates other data in the East (Oh & Lewis, submitted) and West (e.g., Carlson et al., 2002). It provides both some reassurance that the measures employed in this study are valid within an oriental setting and evidence for the view (Moses & Carlson, 2004) that for social understanding to develop the child must be able to deliberate between conflicting cognitive demands. Moses and Carlson argue strongly that this is not a causal relationship; it simply suggests that executive control is required for such understanding to be expressed. The data here support the expression account relating to conflict inhibition over other recent theories of the development of false belief understanding, including the claim that false belief is simply an example of a class of reasoning which requires embedded thinking (e.g., Zelazo, Müller, Frye, & Marcovitch, 2004), since the latter would predict that the DCCS would also be linked with false belief.

Yet, secondly, the data contrast with the large numbers of studies conducted in Western countries. The false belief data clearly suggest that even five-year-old Chinese children struggle with demonstrating a social understanding that most four-year-old Western children clearly show. The findings from the executive measures in which inhibitory control is a central feature indicate at least as high levels of skill in three-year-olds than are found in Western children at age four. These differences in performance most likely explain why most of the cognitive measures shown in Table 3 do not predict false belief understanding, as the former show high levels of competence, while the latter show relatively poor performance. There are a number of possible reasons why the Blue/Red -False belief association was found. First, the Blue/Red task was designed to be harder than other inhibition measures (Oh & Lewis, submitted), like the Day/Night ‘stroop’ procedure (Gerstadt, Hong, & Diamond, 1994). Oh and Lewis found that it was only this new task that provided enough variance within the sample to enable the link between inhibition and false belief to be found. In this study, as in that of Oh and Lewis, the lack of a link with another measure of inhibition (Luria’s Hand Game) was probably attributable to the near ceiling effect on this measure. At the same time the relatively low variance in the false belief scores sample might account for this lack of an association.

Why might the above patterns be in evidence in this and other recent studies (e.g., Oh & Lewis, submitted; Sabbagh et al., 2006)? A number of explanations are possible. One suggestion of Sabbagh et al. is that higher levels of inhibitory control in oriental preschoolers might be the product of genetic differences in inhibitory control between cultures. However, we have reasons to doubt this simple explanation. For a start, a simple genetic explanation cannot easily account for the simultaneous delay in false belief understanding.

A second possible explanation for the delay in false belief and enhanced inhibitory control in Chinese preschoolers might be the product of their socialization experiences—
one of the main reasons why this study examined both cognitive and social predictors of mental state understanding. The motivation behind the parenting research of Ruffman et al. (1999) was that particular family experiences (especially parent-child discussion about how others feel; Dunn, Brown, & Beardsall, 1991) promote early false belief understanding. Certainly, in this sample the numbers of 'how feel' responses by the parents was much smaller than those reported by Ruffman et al. (1999), so perhaps it is not surprising that this variable did not relate to social understanding. Yet the lack of an association raises questions about whether the pattern found in European children generalizes to oriental cultures. The significant effects of ‘ambiguous’ parental responses to the child’s transgressions on the delay in mental state understanding might have arisen because ambiguous comments contain a reprimand, and this aspect of parenting related to false belief in Ruffman et al.’s (1999) sample. However, we have our doubts about leaping to an assumption that the delay in false belief understanding found here could be attributed to low levels of parent-child discussion about victim’s feelings or an increase in ambiguous parental sanctions, because the patterns of executive and social understanding data found here extends to very different oriental cultures.

A third possibility is that Confucian cultures promote different aspects of intellectual functioning to those influenced by Western societies. Oh and Lewis (submitted) claim that advanced executive skills in Korea are likely to be influenced by their culture’s pervasive emphasis upon self control, manifested by the attitudes of both parents and preschool teachers. There are similar debates on the impact of Confucian values in China (e.g., Wang & Mao, 1996). However, this emphasis upon control does not necessarily explain the apparent delay in false belief understanding, particularly as Confucian cultures place great emphasis upon understanding the perspectives of others. For this argument to hold we would need to show that the emphasis on filial duty imposed by Confucian cultures in some way inhibits the development of the ability to understand the relationship between an agent’s actions and their mental states. We suggest that this possibility will only be addressed if more close analyses are conducted on the relative impact of traditional values within rapidly changing social and economic environments. Analyses of social change and preschoolers’ environment are underway (e.g., Tobin, Karasawa, & Hsueh, 2004; Tobin, Wu, & Davidson, 1989).

Such analyses of preschoolers’ everyday interactions will be vital to explain the intriguing social data in this study which indicated that the proximity of, and interaction with, older cousins is related to poorer social understanding in this Chinese sample. Given than this is the opposite of the sibling effect and the apparent positive influence of kin in Western samples (Lewis et al., 1996), such contrasts could reveal a lot about how cultural processes are mediated in different ways by the same relationships. We selected China because of its distinctive family policy and this might have particular effects on wider family relationships, which we did not predict. For example, there has been much written in the media about the ‘one child’ policy creating ‘spoilt’ Chinese children and indulgent parental interaction styles (Taylor, 2005). It could be the case that such children would be adversely influenced by the ambiguities in parental communication and that their interactions with their ‘spoilt’ cousins would be problematic. However, we must not
leap to this conclusion. Another possibility is that the ‘one child’ policy in China exerts differential effects across the social spectrum, with families having more than one child being less affluent. If this were the case then more impoverished children might interact with their cousins more, as they would be more likely to come from larger families. Data in the West show a clear relationship between parents’ economic circumstances and false belief performance (Cutting & Dunn, 1999; Holmes, Black, & Miller, 1996). Our conclusion is that more research is needed to explore the nature of relationships between Chinese preschool children and their cousins before we can fully understand their effects. The very differences between these findings and the patterns in the West certainly suggest that cross-cultural comparisons may help us to understand the origins of social knowledge.

Table 3 shows that a range of cognitive (Blue/Red), social (contact with cousins) and parental (ambiguity) variables correlated with false belief performance and Table 4 showed that the first two contributed unique variance in the regression. This mixture of measures, while not wholly expected, suggests that studies of the foundations of social knowledge may need to compare social and cognitive building blocks of social understanding. This may lead to more sophisticated models of both factors. The current theoretical emphasis is on the relationships between executive skills and their underlying neural correlates. However, we should be mindful that the current interest in executive skills was largely inspired by the work of Luria (1961) who situated executive skills within the development of language and social communication. Future research on executive functions and social skills might benefit from closer analysis of the dynamic between these two areas of skill.

In conclusion, the data presented here point to the value of research on the origins of social knowledge in studies conducted in the orient. They demand further exploration and a number of possible lines of enquiry are clear. For example, we know that language is heavily implicated in social understanding (Astonington & Baird, 2005). There is much discussion in the West about broadening our assessments of social understanding beyond false belief tasks (Astonington, 2001). Given wide cultural differences in the acquisitions of these skills (Vinden, 1996, 1999) we need to explore the apparent delay of false belief understanding across a range of cultures. Oriental societies provide an excellent location for such research because of the simultaneous advances shown in executive skill and a diversity of social processes like the one child policy of China. Taken together the data presented here, and notably the mix of significant social and cognitive explanatory variables presented in the multiple regression in Table 4, provide support for a longstanding claim that social understanding develops gradually within a complex network of social relationships (Carpendale and Lewis, 2004; Chandler, 1988; Tomasello, Kruger & Ratner, 1993).

REFERENCES


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