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Peer Relations and the Understanding of *Faux Pas*:

Longitudinal Evidence for Bidirectional Associations

### Abstract

Research connecting children's understanding of mental states to their peer relations at school remains scarce. Previous work by the authors demonstrated that children's understanding of mental states in the context of a *faux pas* – a social blunder involving unintentional insult – is associated with concurrent peer rejection. The present report describes a longitudinal follow-up investigation of 210 children from the original sample, aged 5-6 or 8-9 years at Time 1. The results support a bidirectional model suggesting that peer rejection may impair the acquisition of faux pas understanding, and also that, among older children, difficulties in understanding faux pas predict increased peer rejection. These findings highlight the important and complex associations between social understanding and peer relations during childhood.

**Keywords:** faux pas, theory of mind, peer relations

Peer Relations and the Understanding of *Faux Pas*:  
Longitudinal Evidence for Bidirectional Associations

Children's social understanding has been a major focus of developmental psychology research over the last 25 years. Work on this topic has revealed reliable developmental progressions in children's understanding of mental states, such as beliefs, emotions, intentions, and desires, which are clearly pertinent to human social behaviour (e.g., Flavell, 2004; Hughes & Leekam, 2004). Moreover, there is dramatic evidence of individual differences in this kind of 'theory of mind' (ToM) understanding. Research with individuals on the autistic spectrum has suggested that significant social impairments can be linked to difficulties in reasoning about mental states (e.g., Baron-Cohen, 1995; Happé, 1994, 1995). Such evidence supports the intuitively appealing notion that individual differences in social understanding are connected with children's social interactions and relationships.

Many research studies have also shown that there are individual differences in social understanding within typically-developing samples. Existing theoretical and empirical work gives us reason to expect close connections between these individual differences on the one hand and variations in children's social interactions and relationships on the other (e.g., Dunn, 1995; Repacholi & Slaughter, 2003). However, our knowledge of the social antecedents and consequences of children's social understanding is far from complete. Perhaps most neglected of all is the relevance of school-aged children's social understanding to their interactions and relationships with their peers. Given the recognised importance of peer relations at school in children's development (e.g., Ladd, 1999; Rubin, Bukowski, & Parker, 2006), investigations of this issue are sorely needed. The present study examines longitudinal connections between children's performance on an age-appropriate measure of social understanding – the faux pas task – and their levels of peer acceptance and rejection at school.

*Social understanding and social relationships*

Carpendale and Lewis (2004) have proposed a theoretical formulation of children's social understanding that explicitly emphasises the construction of social understanding within the context of social interaction. Not surprisingly, most of the extant empirical evidence indicating such social construction has concerned family processes. These include common forms of triadic interaction experienced during infancy (e.g., social referencing, gaze following, pointing), but the presence and quality of enduring social relationships is also likely to be important. For example, some research identifies having older siblings as conferring an advantage to children on false belief tasks (e.g., Ruffman, Perner, Naito, Parkin, & Clements, 1998), and numerous longitudinal studies have pointed to aspects of the parent-child relationship as influencing children's understanding of mental states. These studies highlight the importance of broad variables such as parental warmth, sensitivity, attachment, and harshness (e.g., Meins, Fernyhough, Wainwright, Das Gupta, Fradley, & Tuckey, 2002; Pears & Moses, 2003), as well as specific features of family interactions such as references to mental states in conversations (e.g., Adrián, Clemente, & Villanueva, 2007; Dunn, Brown, & Beardsall, 1991; Ensor & Hughes, 2008; Peterson & Slaughter, 2003; Ruffman, Slade, & Crowe, 2002).

Adding to this literature is a body of work investigating the reverse causal connection, namely the impact of social understanding on children's social interactions. In contrast with the many analyses of autism that attribute significant relational and behavioural impairments to inadequacies in social understanding, the evidence for the 'real-life' manifestations of individual differences in typically-developing children's social understanding is less than overwhelming. Hughes and Leekam's (2004) review provides many sound reasons for expecting ToM to predict social relations, but the number of empirical studies that have actually linked individual differences in ToM to variations in social relations is fairly small.

Some studies have shown that children who are relatively advanced on ToM tasks display more elaborate pretend play (e.g., Hughes & Dunn, 1997; Taylor & Carlson, 1997) and also exhibit greater social competence – such as more cooperation and less conflict – than children with lower ToM performance (e.g., Bosacki & Astington, 1999; Cassidy, Werner, Rourke, Zubernis, & Balaraman, 2003; Lalonde & Chandler, 1995; Watson, Nixon, Wilson, & Capage, 1999). However, the connection between ToM performance and social interactions is not always found (e.g., Badenes, Estevan, & Bacete, 2000). The lack of a solid research base demonstrating the social advantages conferred by strengths in social understanding is somewhat surprising, insofar as the notion of ‘social competence’ is widely assumed to encompass good social understanding (e.g., Rose-Krasnor, 1997).

#### *Social understanding in the peer context*

We believe that children’s interactions with other children, outside the family context, are a key context for the construction and manifestation of social understanding.

Unfortunately, this issue has not been addressed adequately. Part of the problem is that research on social-cognitive development has largely focused on the period up to around five years of age, during which the family may be assumed to be the dominant socialising context. On the other hand, it is noteworthy that some of the most commonly cited developments in social understanding – such as false-belief understanding – occur between around 3 and 5 years of age (e.g., Wellman, Cross, & Watson, 2001), a time when peer interaction increases dramatically for many children in Western cultures. Moreover, the peer context in early, middle, and late childhood has long been recognised by developmental theorists as providing important opportunities not only for learning socio-behavioural skills such as sharing and turn-taking, but also for making advances in empathy and perspective-taking (e.g., Eisenberg, Fabes, & Spinrad, 2006). Indeed, in response to Carpendale and Lewis’s (2004) paper on the social construction of social understanding, both Banerjee (2004) and Zerwas, Balaraman,

and Brownell (2004) argued that peer interactions provide an important context for the development of children's social understanding. Yet, despite evidence showing that children vary dramatically in the quantity and quality of peer interactions they experience (Gifford-Smith & Brownell, 2003), empirical evidence linking features of peer relations to variations in social understanding remains scarce.

Some important observational studies have shown us that children's interactions with their friends do appear to provide valuable opportunities for learning about the mind. Children talk about mental states in their peer play, as well as in conversations with families, and the peer context often involves highly relevant experiences such as pretend play (e.g., Howes & Matheson, 1992; Lillard, 1993; Youngblade & Dunn, 1995). In line with this, some longitudinal studies have shown that children's belief and emotion understanding can be predicted by features of earlier friendship interaction (e.g., Faulkner & Miell, 1993; Maguire & Dunn, 1997). Moreover, as noted above, other authors have suggested that individual differences in social understanding have consequences for the qualities of children's conversations and play interactions with peers (e.g., Cassidy et al., 2003; Cutting & Dunn, 2006; Hughes, Lecce, & Wilson, 2007; Lalonde & Chandler, 1995; Slomkowski & Dunn, 1996; Walker, 2005; Watson et al., 1999). Although some evidence has suggested that advanced social-cognitive capabilities may sometimes be evident in children displaying negative behaviour such as bullying (Renouf et al., 2010; Sutton, Smith, & Swettenham, 1999), most of the work in this area has pointed to the associations of better social understanding with more positive interpersonal relationships and interactions.

Notwithstanding the value of the studies discussed above, we have relatively little insight into how commonly observed variations in peer relations are associated over time with children's understanding of the social and psychological world they inhabit. Perhaps the most commonly studied indices of a school-aged child's peer relations concern the extent to

which he or she is liked or disliked by the peer group. Longstanding sociometric techniques, commonly involving three positive and three negative peer nominations made by each child in a class, are widely used in the peer relations literature to uncover these levels of 'peer acceptance' and 'peer rejection' (often put together in order to classify children into peer status categories, such as popular or rejected) and an extensive literature is devoted to understanding the antecedents and consequences of these markers of children's peer relations (e.g., Rubin et al., 2006). The use of sociometric techniques to elucidate differences in the interpersonal functioning of children at school has been firmly established over many decades, and has the advantage of drawing on multiple informants (multiple peers) with privileged access to interactions with each other across multiple formal and informal settings (see Pepler & Craig, 1998). Moreover, reviews of studies utilising sociometric nominations have shown that these data map closely onto qualities of peer interaction and self-reported socio-emotional experiences (e.g., Gifford-Smith & Brownell, 2003; Newcomb, Bukowski, & Pattee, 1993).

Despite the extensive body of work on the correlates of sociometric acceptance and rejection, only a small number of studies have considered links with children's performance on social understanding tasks. One study of 4- to 6-year-olds (Slaughter, Dennis, & Pritchard, 2002) provided some indications that individual differences in mindreading abilities may be related to greater peer acceptance, although this was apparently only the case among children older than five years of age. Another study of 3- to 5-year-olds (Peterson & Siegal, 2002) found that children who were rejected by their peers lagged behind their more popular counterparts on ToM tasks. In contrast, another study (Badenes et al., 2000) showed no clear link between peer rejection and mentalising abilities among 4- to 6-year-olds at all. Thus, the few extant studies on this topic do not lend themselves to a coherent portrayal of

the connection between social understanding and peer relations, and none provides longitudinal evidence to suggest likely developmental pathways.

### *The faux pas task*

One of the difficulties in establishing connections between social understanding and peer relations may be that standard ToM tasks do not adequately capture the forms of mental-state reasoning that are most pertinent to real-life social interactions and relationships. This is especially so when we move beyond the ages of 5 or 6 years of age; undoubtedly, there are substantial variations in pupils' social behaviour in middle childhood, but these clearly cannot be mapped onto performance on ToM tasks that most children pass by 6 years. However, there is some tentative evidence that more 'naturalistic' measures of mental-state reasoning, tapping the understanding of links between multiple mental states (e.g., intentions, emotions, beliefs) in everyday social situations, may have some connection with school-aged pupils' interpersonal relations. Specifically, one recent study has shown that peer rejection in school-aged children is associated with performance on the *faux pas* measure of social understanding (Banerjee & Watling, 2005).

The faux pas task was first conceived in the context of work with high-functioning autistic individuals, a significant proportion of whom perform successfully on standard ToM tasks despite clearly showing distinctive socio-behavioural and relational impairments (e.g., Dahlgren & Trillingsgaard, 1996). Baron-Cohen, O'Riordan, Stone, Jones, and Plaisted (1999) showed that such participants display difficulties in the ability to identify and explain 'faux pas' situations where one character unintentionally insults another due to lack of knowledge about some key feature of the other character (e.g., making a derogatory comment about dinner ladies to another child whose mother – unbeknownst to the protagonist – is herself a dinner lady). Importantly, several recent studies with typically-developing children have shown that performance on the faux pas task is associated with other complex forms of



social reasoning (Banerjee, 2000; 2002), with teacher ratings of sociability (Banerjee & Henderson, 2001), and with peer rejection (Banerjee & Watling, 2005).

These studies provide persuasive evidence that the faux pas task taps mental-state reasoning that is relevant to everyday peer interaction. In Banerjee and Watling's (2005) adaptation of the faux pas task, children responded to a series of questions following each hypothetical story, showing whether or not they detected the faux pas, understood that one character has upset another, and recognised that this upset occurred as a result of an under-informed knowledge/belief state and was therefore not intended. Crucially, the authors found that 8- to 9-year-old children who received more negative sociometric nominations from their classmates performed less well on the task. This association was not due to basic comprehension or to first-order understanding of the emotional impact of the faux pas, but rather to the more complex recognition that the upset was not intentional and to the appreciation of the ignorance that led to the faux pas. No such association was found in a sample of 5- to 6-year-olds, most of whom performed poorly on the task. The report on that investigation also noted the distinctive importance of the faux pas task in particular, since a version of Sullivan, Zaitchik, and Tager-Flusberg's (1994) second-order false-belief task was not significantly correlated with levels of social preference after controlling for the faux pas scores (whereas faux pas scores remained significantly correlated with social preference even after controlling for the second-order false-belief performance).<sup>1</sup>

These results raise the intriguing question of how distinctive the faux pas task is in capturing an aspect of social understanding that clearly relates to real-life peer experiences. Clearly, it stands out as a more demanding task than the standard first-order false belief task, which is typically passed by 4-5 years of age (Wellman et al., 2001). Yet, as the evidence above implies, it also differs from other relatively demanding assessments of mental-state reasoning, such as second-order false-belief tasks, insofar as it maps onto real-life differences

in interpersonal relations in a more intimate way. In fact, this distinctive link between faux pas reasoning and peer relationships corresponds with early work – predating research on ToM – that connected children’s skills in perspective-taking with qualities of their social behaviour and relationships.

In the late 1960s and early 1970s, researchers were already devising strategies for assessing and remediating difficulties in ‘social role-taking’ (e.g., Chandler, 1973; Chandler, Greenspan, & Barenboim, 1974; Flavell, Botkin, Fry, Wright, & Jarvis, 1968). These authors showed how, for example, sequences of cartoons could be used to reveal some children’s difficulties in “discount[ing] their own understanding of the test situations and adopt[ing] the roles of persons less well informed than themselves” (Chandler et al., 1974, p. 548). At around the same time, an elaborate stage model of increasing sophistication in role-taking was developed by Selman (1976, 1980), who went on to consider how differences in role-taking are manifested in different ‘interpersonal negotiation strategies’ (Selman, Beardslee, Schultz, Krupa, & Podorefsky, 1986). The theoretical implication of these early investigations was that a full and mature appreciation of others’ perspectives leads to qualitatively different experiences of peer interaction, in comparison with a more ‘egocentric’ perspective; indeed, Vernberg, Ewell, Beery, and Abwender (1994) have shown that 12- to 14-year-old pupils with more sophisticated negotiation strategies tend to develop greater intimacy and companionship when establishing new friendships.

The precise details of social understanding implicated in a child’s perspective-taking performance often remained opaque in this work, but one important feature of the early conceptualisations of developments in perspective-taking was that children were not assumed to undergo a seismic shift from no understanding to full understanding of others’ perspectives. Unfortunately, in the years that followed, children’s gradually increasing sophistication in understanding others’ mental states was to a large extent overshadowed by

the focus on a single transition in recognising the representational nature of belief states as measured by the false-belief task (Chandler, 2001). Now, however, we can return to the notion of a complex and multi-faceted model of social understanding, emerging within the context of children's interactions with social partners, in order to understand why the faux pas task may serve as an important correlate of real-life peer relations.

Even in Chandler and colleagues' cartoon task, skilful perspective-taking required far more than an appreciation of false belief. In fact, LeMare and Rubin (1987), in the course of demonstrating that performance on the cartoon task was linked with qualities of peer interaction, noted that successful role-taking in this cartoon task required, among other components, not only a recognition of how certain antecedent situations could bring about a character's emotional state, but also how another character without information about those antecedent situations could form inaccurate cognitive representations and interpretations of the first character's emotional behaviour. We believe that this linkage of situational events, emotional states, and cognitive representations (influenced by access to information) maps closely onto the kinds of social insights needed for understanding a faux pas. The appreciation of this interplay between cognitive and emotional states is not tapped by standard first- or second-order ToM tasks (which typically address only beliefs about the physical identity or location of inanimate objects). The faux pas task may also differ in this respect from other measures of relatively 'advanced' social understanding which still concentrate mainly on cognitive representations of one's own or another person's belief states (e.g., double-bluff, interpretive diversity, etc.; Carpendale & Chandler, 1996; Happé, 1993).

#### *The present study*

Building on our hypothesis that the faux pas task offers a distinctively powerful tool for capturing the social understanding involved in everyday peer interactions, the present

study reports on a 24-month longitudinal follow-up of children from Banerjee and Watling's (2005) study. Tracking the children's faux pas understanding and sociometric scores over time provides a valuable opportunity to evaluate likely sequential pathways from faux pas understanding to peer relations, and from peer relations to faux pas understanding. We believe that both pathways are likely, in line with Hughes and Leekam's (2004) argument that social relations may both transform and be transformed by children's ToM. Our analysis should help to address several key predictions that could not be tested in the original study. First, we can evaluate whether peer rejection is likely to hinder children's acquisition of advanced mental-state reasoning skills. Banerjee and Watling (2005) indicated that the presence of highly negative social relations, rather than the absence of highly positive social relations, might be especially predictive of difficulties in learning about faux pas situations. We expect that this would be especially true over periods when children typically make the most progress in the faux pas task (between 7 and 9 years for girls and between 9 and 11 years for boys, in Baron-Cohen et al., 1999; between 6 and 8 years, in Banerjee, 2000), since active rejection and social exclusion will reduce opportunities to learn from peer interactions.

Second, we can evaluate the extent to which faux pas scores relate to subsequent peer relations. We expect that difficulties in faux pas early on (e.g., around 5 to 6 years) are unlikely to be related to peer rejection since such difficulties would be normative for children at that age, but it is unclear whether better faux pas understanding may over time lead to increased peer acceptance. However, if the faux pas task does indeed capture the kind of social understanding that is involved in everyday peer interaction, we can justifiably predict that when most children have typically made progress in understanding faux pas, those who stand out with relatively poor performance will be more likely to experience growing peer rejection. Following on from the pattern noted by Banerjee and Watling (2005), we expect that these negative sequelae of faux pas understanding will primarily reflect the consequences

of difficulties in the more complex and subtle aspects of social reasoning in this task, specifically a relatively poorer understanding of the ignorance and lack of intention on the part of the protagonist making the faux pas. The present study offers the first opportunity to test such hypotheses about longitudinal associations between social understanding and peer relations in school-aged children.

## Method

### *Participants*

The present study concerns data from 210 children, in two age groups, who were part of the sample described by Banerjee and Watling (2005). At the first time point of data collection, the younger group consisted of 31 boys and 41 girls aged approximately 6 years ( $M(SD) = 5.98 (.29)$ ), and the older group consisted of 78 boys and 60 girls aged approximately 9 years ( $M(SD) = 9.02 (.27)$ ). The children were seen again at two time points 12 months (aged 7 or 10 years) and 24 months (aged 8 or 11 years) later. The children, who were all in classes participating in a longitudinal project on social-cognitive and socio-emotional development, attended seven primary schools situated in urban and suburban neighbourhoods in a city in the UK. The schools covered a wide range of socioeconomic status (percentage claiming free school meals ranged from 5.3% to 45.7%), and their pupils were predominantly white in ethnicity (percentage from ethnic minorities ranged from 2% to 14%).

The present sample included all children from Banerjee and Watling's (2005) study who were still in the same school and available to complete all tasks at both follow-up time points (68% of the original sample). For both age groups, the longitudinal sample did not score significantly differently on Time 1 faux pas performance or peer rejection from those who did not complete both follow-ups (all  $t$ s < 1.62,  $p$ s > .10). However, among the younger children, the longitudinal sample scored higher on peer acceptance than those who did not

complete the two follow-ups ( $M(SD) = .18 (1.00)$  vs.  $-.27 (.89)$ , respectively;  $t(118) = 2.47$ ,  $p < .05$ ). No such effect was observed for the older children ( $t < 1$ ).

The materials, measures, and procedures relating to the faux pas and sociometric nominations tasks are described in Banerjee and Watling (2005); the details are reproduced below.

### *Materials*

Children completed all tasks using a multimedia computer interface designed and created by the authors using Runtime Revolution software. All responses were made by using a mouse to click on on-screen buttons, and all text on the screen (e.g., instructions, stories, questions, response options, etc.) was read out loud to the child via headphones. The tasks were presented on PCs running Windows 95, 98, or 2000 in the schools' computer laboratories.

### *Measures*

At each time point of the longitudinal study, children completed a battery of measures using the multimedia computer interface. The measures relevant to the present investigation are described below. It should be noted that children also completed a number of other measures (assessing self-presentational understanding and moral reasoning) that are not addressed here.

*Faux pas.* Children completed this measure at each of the three time points. Children were told (orally and through on-screen text) that they would hear four different stories, that they should listen carefully to the stories, and that they would be asked some questions at the end of each story. They then were presented with four faux pas stories in random order, each followed by six forced-choice questions in a fixed order. A single cartoon-style illustration accompanied each story, and all instructions, story text, questions, and response options were presented orally. Each story involved two child story characters where the 'insulting'

character makes an unintentional insult about some target object and a neutral statement is made by the ‘insulted’ character. The insulting character was always ignorant with respect to the insulted character’s relationship with the target object. For example, in one story, one character says a painting is awful to a second character, not realising that he was the person who had painted it. The order in which the faux pas and neutral statements appeared was counterbalanced across stories. The six forced-choice questions are listed below, with the correct answer identified in italics.

- 1) Detection – In the story, did someone say something they should not have said? (*Yes* or No).
- 2) Identification – What was said that should not have been said? (*[insult by insulting character]* or [neutral statement by insulted character]).
- 3) Feelings – How does [insulted character] feel now? (Happy/Pleased or *Sad/Upset*).
- 4) Intention – Did [insulting character] want to make [insulted character] upset? (Yes or *No*).
- 5) Comprehension – [question regarding target object] (*Correct answer* or Incorrect answer).
- 6) Ignorance – Did [insulting character] know [insulted character’s relationship with the target object]? (Yes or *No*).

The six questions were presented in a fixed order after each story. All response options appeared as on-screen buttons, and children used a mouse to click on these buttons in order to make their responses. The order of correct and incorrect response options was counterbalanced across stories, with the exception of the first, fourth, and sixth questions, where Yes and No response buttons remained in fixed positions in accordance with a standard presentation of these buttons in other tasks in the battery. The first two and the last two questions correspond to the four questions listed in Baron-Cohen and colleagues (1999),

with the exception that forced-choice response options were presented to the children. Two stories involved a male character making the faux pas and two stories involved a female character making the faux pas. A sample story and question set is presented in the Appendix.

*Peer acceptance and rejection.* Children completed this measure at each of the three time points. Children were presented with a class photograph and the following instructions (presented orally and in on-screen text):

Please click on the faces of three children in your class who you would really like to play with. Then click on the green “OK” button to go on. If you change your mind, click on the red “Start Again” button.

A black oval ring ‘button’ surrounded each face on the screen and when the mouse-controlled pointer was moved over each ring the child would hear the name of the corresponding child. When a face was clicked, the corresponding name would appear in a space near the bottom of the screen and the button around that face was disabled. Children could clear the selection and start over at any point by clicking on a red ‘Start Again’ button. If fewer than three nominations were made, the child received an alert which gave him or her the choice of either completing three nominations or of skipping to the next task. After making the positive nominations and clicking on a green ‘OK’ button to indicate completion, children saw the same class photograph but this time were asked to click on the faces of three children with whom they would really not like to play. Children were prevented from nominating themselves (their own ‘button’ was disabled), but were free to nominate classmates of either sex. In total, more than 95% of the children at each time point gave a complete set of six peer nominations.

*Receptive vocabulary.* Children completed this measure once only at the end of the final school year of the project (approximately three months after the third main time point). The task was a computerised adaptation of the British Picture Vocabulary Scale Second



Edition (Dunn, Dunn, Whetton, & Burley, 1997; adapted for computer administration with permission of the publishers).

### *Procedure*

Each time point of data collection took place in the second trimester of the school year, so that children completing the sociometric assessment would have had daily experience of being with each other in class for at least one trimester. At every time point, children completed the tasks in groups of between 3 and 7 (with smaller groups for the younger children). Each child was seated at a computer in the school's computer laboratory, spaced apart from other children as much as possible. They were given a general introduction to the tasks, and then put headphones on and clicked on the Start button on the first screen to commence the task. Trained research assistants were present for all data collection sessions and provided help with using the computer interface when required. Few problems were reported, and all children were familiar with the use of the mouse. All tasks were presented in a random order (which, along with the use of headphones, helped to preserve individual privacy), and children completed the battery of tasks in a session usually lasting between 10 and 20 minutes, although there were no time limits on any task.

### Scoring

#### *Faux Pas*

Consistent with Baron-Cohen et al. (1999), children had to answer all questions for a story correctly in order to pass that story (scoring 1 point). Thus, correct answers to all 24 questions in the task would lead to a faux pas score of 4. Since there were two response options for each of six questions, the probability of passing a story by random guessing is very low (.016; across four stories, .06). Also, for each of the six faux pas questions (Detection, Identification, Feelings, Intention, Comprehension, Ignorance), we calculated a

score out of 4 representing the number of stories in which the question was answered correctly.

### *Peer acceptance and rejection*

Following Coie and Dodge (1983, 1988), the numbers of ‘like’ and ‘dislike’ nominations received by each participant were standardised within each classroom (i.e., converted to z scores such that the mean number of received nominations in a given class becomes a z score of 0), resulting in Peer Acceptance and Peer Rejection scores, respectively.

## Results

We first examined age and gender differences in performance on the faux pas task. Table 1 shows the children’s mean scores on the faux pas task at each time point. A mixed-design analysis of variance was conducted on the faux pas scores, with age group and gender between subjects and time point within subjects. Receptive vocabulary scores were included as a covariate. The analysis yielded a main effect of age group ( $F(1, 205) = 61.27, p < .001$ , partial  $\eta^2 = .23$ ), with older children scoring higher than younger children (adjusted  $M(SE) = 2.84 (.09)$  vs.  $1.66 (.12)$ , respectively), and a main effect of gender ( $F(1, 205) = 8.58, p < .01$ , partial  $\eta^2 = .04$ ), with girls scoring higher than boys (adjusted  $M(SE) = 2.47 (.10)$  vs.  $2.03 (.11)$ , respectively). There was also a significant interaction effect of time point by gender ( $F(2, 410) = 3.48, p < .05$ , partial  $\eta^2 = .02$ ), with a sharper rise in scores over the three time points for girls than for boys (girls’ adjusted  $M(SE) = 1.89 (.13), 2.64 (.14), 2.87 (.14)$ ; boys’ adjusted  $M(SE) = 1.77 (.14), 2.10 (.14), 2.20 (.14)$ ). There was also a significant main effect of the receptive vocabulary covariate on the faux pas scores ( $F(1, 205) = 29.34, p < .001$ , partial  $\eta^2 = .13$ ).

Table 2 shows the mean scores on each faux pas question across the three time points, subdivided by age group. A mixed-design ANCOVA was conducted on the scores for each question, with time point within subjects, age group between subjects, and receptive

vocabulary as a covariate in each analysis. There was a significant main effect of age group on all questions (all  $F > 7.47$ ,  $p < .01$ , partial  $\eta^2 > .03$ ), with the strongest effect sizes apparent for the Intention and Ignorance questions (partial  $\eta^2 = .11$  and  $.10$ , respectively). Over and above this basic developmental contrast, there were significant effects of time point for Detection and Identification (both  $F > 5.44$ ,  $p < .01$ , partial  $\eta^2 > .02$ ), and significant interaction effects of time point by age group for Detection, Identification, Feelings, and Comprehension (all  $F > 3.18$ ,  $p < .05$ , partial  $\eta^2 > .01$ ). This reflects the fact that the younger age group in particular showed a steady increase across the three time points in responding correctly to those four questions.

Given the clear age differences in relationships among variables reported by Banerjee and Watling (2005), we examined each age group separately from the outset. Tables 3 and 4 show the correlations among the variables at each time point for the younger and older groups, respectively. There was robust continuity of individual differences in all three key variables (faux pas, peer rejection, and peer acceptance) over the three time points, for both age groups. Looking within each time point, it is noteworthy that significant correlations between the faux pas and sociometric scores appeared mainly at the third time point for the younger group (i.e., around 8 years old) and at the first time point for the older group (i.e., around 9 years old). Finally, in line with the ANCOVA reported above, receptive vocabulary was significantly correlated with faux pas scores at all three time points for the younger group and at the first time point for the older group.

In order to evaluate the longitudinal relations among the variables, we tested cross-lagged associations among the variables from Time 1 to Time 2 and from Time 2 to Time 3. By looking at each age group separately, we can therefore track developmental pathways from 6 to 7 years and from 7 to 8 years (younger group) and from 9 to 10 years and from 10 to 11 years (older group). We used AMOS software for structural equation modelling to

evaluate these associations. Following recommendations by Hu and Bentler (1998), we used maximum likelihood-based fit indices suitable for models with  $Ns \leq 250$ , specifically CFI and SRMR. Hu and Bentler suggest cutoffs of approximately  $CFI > .95$  and  $SRMR < .08$  to determine good fit. With each age group, we started with the cross-lagged model shown in Figure 1. This included all autoregressive effects connecting the same variables over the three time points, as well as cross-lagged effects of Peer Acceptance (PA) and Peer Rejection (PR) on Faux Pas (FP) scores at the subsequent time point, and cross-lagged effects of FP on PA and PR scores at the subsequent time point. It should be noted that receptive vocabulary scores were included as a control variable, predicting all scores at all time points. Finally, we allowed error terms for the PA and PR scores to covary within and between time points, to allow for unmeasured variables that could have influenced the pattern of children's sociometric nominations.

This initial model showed good fit with the data provided by the younger group ( $\chi^2(11) = 14.24, p > .10$ ;  $CFI = .984$ ;  $SRMS = .047$ ), but many of the cross-lagged paths were nonsignificant. We evaluated a second model without the nonsignificant cross-lagged paths, leaving only one significant cross-lagged effect: the negative association between PR at 7 years and FP at 8 years. This model, shown in Figure 2 with standardised coefficients, still had good fit, with no significant deterioration from the first model ( $\chi^2(18) = 21.49, p > .10$ ;  $CFI = .983$ ;  $SRMS = .062$ ;  $\Delta\chi^2(7) = 7.25, p > .10$ ). Moreover, an examination of modification indices showed that adding any further cross-lagged paths between would not significantly improve model fit. Finally, in order to assess whether the cross-lagged paths were moderated by gender, we evaluated our initial model before and after forcing all cross-lagged path coefficients to be equal for boys and girls. Both models showed good fit ( $CFI > .95$ ;  $SRMR < .06$ ), and there was no significant deterioration in fit after forcing equality across gender ( $\Delta\chi^2(8) = 8.22, p > .10$ ).

With the older age group, we again started with the model including all cross-lagged paths, but we added a link between PR and FP at the first time point in line with the known association between these variables at this time point. This model showed good fit ( $\chi^2(10) = 13.15, p > .10$ ; CFI = .991; SRMR = .032), but again included many nonsignificant cross-lagged paths. We evaluated a second model without the nonsignificant cross-lagged paths, leaving three significant cross-lagged effects: the negative association between PR at 9 years and FP at 10 years, the positive association between FP at 9 years and PA at 10 years, and the negative association between FP at 10 years and PR at 11 years. This model, shown in Figure 3, continued to have good fit, without significant deterioration from the first model ( $\chi^2(15) = 19.92, p > .10$ ; CFI = .987; SRMR = .042;  $\Delta\chi^2(5) = 6.77, p > .10$ ). Again, an examination of modification indices showed that adding any further cross-lagged paths would not significantly improve model fit. Finally, as for the younger group, we evaluated our initial model before and after forcing all cross-lagged path coefficients to be equal for boys and girls. Both models showed good fit (CFI > .95; SRMR < .05), and there was no significant deterioration in fit after forcing equality across gender ( $\Delta\chi^2(8) = 10.14, p > .10$ ).

In our final analysis, we revisited each of the significant cross-lagged paths observed in the above modelling analysis in order to determine which of the specific faux pas questions were responsible for carrying the effects. First, with regard to the negative association between age-7 Peer Rejection and age-8 Faux Pas (after controlling for age-7 Faux Pas and receptive vocabulary), we found significant partial correlations when using the faux pas scores for Detection, Identification, Feelings, Comprehension, and Ignorance (all  $|r| > |-.24|, p < .05$ ). Second, the negative association between age-9 Peer Rejection and age-10 Faux Pas (after controlling for age-9 Faux Pas and receptive vocabulary) was significant when using the faux pas scores for Identification, Feelings, and Comprehension (all  $|r| > |-.18|, p < .04$ ). In contrast, the positive link between age-9 Faux Pas and age-10 Peer Acceptance (after

controlling for age-9 Peer Acceptance and receptive vocabulary) was significant only when using the Intention and Ignorance faux pas scores (both  $r > .16$ ,  $p \leq .05$ ). Finally, the negative correlation between age-10 Faux Pas and age-11 Peer Rejection (after controlling for age-10 Peer Rejection and receptive vocabulary) was also significant only when using the Intention and Ignorance scores (both  $|r| > |-.17|$ ,  $p < .04$ ).

### Discussion

This study extended Banerjee and Watling's (2005) observation of an inverse association between peer rejection and faux pas performance among 9-year-old children by tracking bidirectional links between sociometric and faux pas scores over a period of 24 months, during which mean-level performance on faux pas steadily rises. We found that peer rejection predicted relatively poorer faux pas understanding between 7 and 8 years of age and between 9 and 10 years of age. In addition, higher faux pas performance was associated with relatively increased peer acceptance scores from 9 to 10 years of age, and lower faux pas performance was associated with relatively increased peer rejection scores from 10 to 11 years of age. The pattern of longitudinal associations did not significantly vary by gender, even though performance on the faux pas task was generally superior among girls, consistent with research by Baron-Cohen and colleagues (1999). Our results thus present the first longitudinal evidence of a cyclical relationship between faux pas understanding and peer relations during the primary school years.

#### *The role of peer relations in social understanding*

The longitudinal follow-up of the sample described in Banerjee and Watling (2005) has allowed us to extend our understanding of the developmental pathways connecting social understanding and peer relations. First, we have shown that even though the original study found a concurrent link between peer rejection and faux pas understanding only in the older cohort, at 9 years of age, the developmental trajectory that connects these variables in fact

begins earlier. Specifically, our longitudinal analysis of changes in the younger cohort shows that peer rejection at 7 years of age predicted relatively lower faux pas scores the following year. This pattern continues in the first two time points of data collection with the older cohort, as peer rejection at age 9 predicts relatively lower faux pas scores at age 10. Both of these effects are occurring at a time when mean-level performance on the faux pas task is showing a steady increase. Although longitudinal associations cannot in themselves demonstrate causal influence, this pattern is certainly consistent with our hypothesis that peer rejection could hinder the acquisition of faux pas understanding.

These observations fall neatly in line with other research suggesting that aspects of children's interpersonal experiences play a role in the development of their social understanding. In past research, this has been most convincingly demonstrated within the family context. As noted earlier, both general aspects of the mother-child relationship and specific features such as use of mental-state language have been implicated in the development of ToM skills (e.g., Dunn, Brown, & Beardsall, 1991; Meins et al., 2002; Ruffman, Perner, & Parkin, 1999; Ruffman et al., 2002). Similarly, a number of studies have highlighted the role of siblings in this area of social-cognitive development (McAlister & Peterson, 2007; Ruffman et al., 1998). The present study builds on this evidence by showing how the peer relations context may be critical for acquiring advanced forms of mental-state reasoning.

Particularly noteworthy is the finding that peer rejection – not peer acceptance – was the key antecedent of faux pas understanding. This implies that it is the active rejection of children that carries the most significant implications for faux pas understanding. Such a conclusion would fit with what we know about the impact of peer rejection on children's socio-emotional experiences and behaviour. Peer rejection is associated with a greater likelihood of experiencing negative peer treatment as well as a decline in classroom

participation (Buhs & Ladd, 2001). Moreover, chronic peer rejection may lead to the development of adjustment problems and severe psychological difficulties (Ladd, Herald-Brown, & Reiser, 2008), and is certainly associated with greater feelings of loneliness (Asher & Wheeler, 1985). Our research suggests that the consequences of peer rejection are likely to extend beyond the immediate socio-emotional functioning of children, to the development of social-cognitive skills and knowledge.

The results we obtained are consistent with some existing evidence suggesting that qualities of peer relations predict biases in children's social information-processing (see Dodge & Pettit, 2003). It is interesting to note that it was the foundational features of faux pas reasoning – recognising the insult that had been made by the protagonist, understanding the impact on the other characters' feelings, identifying the key story information relevant to the insult – that were most strongly predicted by prior peer rejection. This corresponds with evidence from research on social information-processing biases in early elementary school that peer rejection predicted poorer encoding of the important social cues in ambiguous situations (Dodge et al., 2003). We therefore suggest that the limited opportunities for rejected children to experience positive social engagement with peers may have crucial consequences for children's encoding of the key social cues relevant to the mental states held by social interactants.

As far back as Piaget's (1932) work on moral development, it has been recognised that cooperative social relationships, as opposed to relationships characterised by constraint, offer unique opportunities for growth in understanding. However, in our study, relatively high levels of peer acceptance did not appear to confer any particular advantages in terms of subsequent gains in social understanding. This may reflect the fact that the absence of active rejection is the key factor influencing social understanding; as long as a child is not actively excluded from peer interactions, there may be sufficient opportunities for him or her to make



gains in social reasoning. However, we recognise that particularly high levels of peer acceptance may well generate or accelerate patterns of social reasoning not tapped by the faux pas task. One possibility is that a high level of positive relations within the peer group promotes more sophisticated understanding of the interpretive character of the mind (Carpendale & Chandler, 1996) – the understanding that, for example, two people can be exposed to the same information but form entirely different interpretations of what they have seen – since close positive relationships with a wider range of peers should present greater opportunity for observing diversity in interpretation of everyday events and situations. A further possibility is that the main social-cognitive consequences of high levels of peer acceptance are domain-specific rather than domain-general. In this view, high levels of peer liking may not significantly extend generic skills in mental-state reasoning, but may promote domain-specific reasoning about particular kinds of social situations, such as the consideration of multiple viewpoints in negotiation and compromise (e.g., Selman et al., 1986). Investigating these hypotheses is an important challenge for future research.

#### *The role of social understanding in peer relations*

The present study suggests not only that qualities of peer relations may serve as an important antecedent of subsequent faux pas understanding, but also that relatively low or high scores on the faux pas task could have significant consequences for subsequent peer relations. Specifically, higher faux pas scores at age 9 predicted relatively higher peer acceptance at age 10, while lower faux pas scores at age 10 predicted relatively higher peer rejection at age 11. These patterns were evident only in the older cohort, possibly indicating that a certain degree of progression in faux pas understanding must first take place within the peer group before individual differences in faux pas scores begin to have any meaningful social consequences. Moreover, the aspects of faux pas reasoning most strongly predictive of subsequent peer relations were those that were the most complex and demanding, namely the

appreciation of the ignorance on the part of the protagonist making the faux pas, and the recognition that the upset caused to the other character was not intended.

Of greatest interest is the finding that at 10 years of age, when mean-level performance on the faux pas task appears to have risen to a developmental plateau, those individuals with lower scores on the task appear to become relatively more rejected by their peers over the following year. This emergence of peer rejection as a consequence of impaired or delayed faux pas understanding – when the peer group in general is performing at a high level on the task – suggests that social understanding has a critical role to play in children's interpersonal relationships. This pattern adds to a small but growing literature clarifying the value of social understanding for social interactions. We noted earlier that ToM skills have been implicated in the development of pretend play (e.g., Hughes & Dunn, 1997), connected communication between friends (e.g., Slomkowski & Dunn, 1996), and general social competence (e.g., Watson et al., 1999). The present study builds on these findings by identifying the consequences of difficulties in faux pas understanding for children's peer relationships at a time when most of the peer group is performing well on the task.

The finding that Intention and Ignorance responses were the key antecedents of peer acceptance and rejection is particularly interesting, as this maps neatly onto evidence from social information-processing theory that biases in attribution (and particularly the presumption of hostile intent) play a key role in negative social behaviour and interpersonal relations (Dodge & Pettit, 2003). The faux pas situation is of particular interest because correct judgements about intent (or lack thereof) depend on complex inferences about what the protagonist knows of the other character's preferences. Thus, the present study encourages us to integrate perspectives on information-processing biases with theoretical views on the development of mental-state reasoning. This kind of integration is still in its

early days, but already some analyses have shown that it is a fruitful approach to understanding children's socio-emotional development. Specifically, Banerjee's (2008) review of social-cognitive factors involved in childhood anxiety suggests that biases at various stages of information-processing are likely to interact with social-cognitive difficulties, notably including difficulties in understanding faux pas (Banerjee & Henderson, 2001).

#### *Implications for models of social-cognitive development*

The present study has important implications for our theoretical models of social-cognitive development, and in particular for our formulations of social-cognitive development beyond the age of 5 years. Perhaps most significantly, it shows that peer relations constitute a critical context for the development of social understanding, with peer rejection not only shaping, but also being shaped by, children's reasoning about complex social situations. The peer context offers unique incentives to understand how people can have different perspectives on situations and events, both when managing cooperative peer group interactions as well as when handling stressful situations involving competition and conflict (Banerjee, 2004; Zerwas et al., 2004). The notion that children's peer interactions should be so entwined with their social understanding is consistent with the growing importance of the peer context in children's social lives during the school years. As children grow older, as Parker and Gottman (1989) pointed out, acceptance by the peer group becomes an increasingly vital objective of social life. Moreover, to profit from schooling and to be "ready" for academic learning, children must cooperate with others, avoid disrupting others' interactions, and form constructive and supportive relationships with teachers and peers (e.g., Ladd, Herald, & Kochel, 2006). Given these changing social priorities, it seems entirely appropriate that we begin to study in more detail the social-cognitive dimension of children's peer experiences.

The results from the present study complement and extend some of the foundational research that set the scene for theory of mind research. The connections between faux pas performance and social relations resonate with the evidence from LeMare and Rubin (1987) that peer sociability is linked with the ability to take the perspective of an uninformed bystander when interpreting the emotional behaviour of a character who (unknown to the bystander) had experienced a highly affectively-charged situation. Our research has the advantage of showing how reasoning about social situations involving emotions, knowledge states, and intentions are linked longitudinally with the quality of children's peer group functioning. In doing so, our study details the critical position of social relationships as a context for the child's construction of social understanding (Carpendale & Lewis, 2004). Specifically, negative peer relationships appear to inhibit children's emerging ability to track the details of complex social situations where people's behaviour has consequences for each others' feelings, and – subsequently – difficulties in developing a mature capacity to infer knowledge states and intentions in these situations predict increasing peer rejection.

We believe that at least two key issues need to be considered in further analyses. First, investigations of social understanding in the context of peer relations require measures which are suitably sensitive to the kinds of mental-state reasoning that are involved in children's actual social interactions. Clearly, first-order ToM tasks, such as the standard false belief task, will be inadequate for explaining individual differences in typically-developing children's social relationships beyond the age of 5 or 6 years. Furthermore, although standard 'advanced' ToM tasks, such as measures of second-order false belief understanding (Perner & Wimmer, 1985; Sullivan et al., 1994) have been shown to relate to various other measures of social reasoning such as the understanding of self-presentation and social emotions (e.g., Banerjee & Yuill, 1999; Bennett & Matthews, 2000; see also review by Miller, 2009), they may not be adequate to capture the mental-state reasoning involved in

everyday peer interactions. Indeed, Peterson, Garnett, Kelly, and Attwood (2009) have recently shown that even those autistic children who pass laboratory ToM tasks typically were rated as poorer on ‘everyday mindreading’ (social and conversational skills requiring mental-state reasoning). Thus, more naturalistic measures of the specific mental-state reasoning skills required for ‘everyday mindreading’ – probably including tasks such as faux pas understanding, but also tasks measuring the comprehension of irony, sarcasm, and complex emotions (e.g., Channon, Pellijeff, & Rule, 2005; Happé, 1993; Heerey, Keltner, & Capps, 2003; Ozonoff, Pennington, & Rogers, 1991) – are a critical requirement for future research.

A second issue of importance concerns the developmental timing of the associations between peer relations and social understanding. In the present study, we observed that peer rejection was an antecedent of subsequent faux pas understanding between 7 and 10 years of age, when mean-level performance on the faux pas task was steadily rising. However, between 10 and 11 years, when faux pas scores in general appeared to have flattened out, peer rejection emerged as a longitudinal consequence of having relatively low faux pas scores. Thus, the nature of the relationship between social relationships and social understanding is likely to vary depending on the age of the participants and the normative developmental trajectory for the given measure of social understanding. For example, as we have seen above, some parents’ interactions with their young children can provide particularly fertile soil from which social understanding can grow and mature, insofar as features such as mental-state talk can facilitate and accelerate the development of mentalising skills (e.g., Ruffman et al., 2002). On the other hand, we suggest that individual differences in a given mentalising skill may come to play a more prominent role in influencing peer group processes once most children have mastered that skill: at that point, the relevant social understanding may become an important foundation for successful peer group interaction and

those who lack that understanding may therefore be “unable to enter deeply into peer relations” (Slaughter et al., 2002, p. 560).

Bringing together both of the points above is the possibility that different social understanding tasks may have varying importance at different ages. Just as we noted that standard false-belief tasks cannot explain variance in peer relations during middle childhood, we must also observe that the faux pas task does not explain variance in peer relations during early childhood. This raises key questions about which dimensions of social understanding are linked to interpersonal relations during different periods of a child’s development. In fact, research over the past 25 years has revealed a remarkable array of developmental accomplishments in social understanding from toddlerhood to adolescence, including – apart from the faux pas reasoning studied here – capacities for understanding pretence, reasoning about desires, recognising emotions, understanding false belief, appreciating interpretative diversity, explaining emotional ambivalence, and knowing how to regulate emotional and cognitive states (see Carpendale & Lewis, 2006). A systematic analysis of when, how, and why these different accomplishments are linked to social relationships is a critical challenge for future research.

#### *Limitations and directions for further work*

The present study has a number of important limitations which must be acknowledged, and which correspond with directions for further research. First, we have relied on a single measure of social understanding, the faux pas task. Although we believe there is good reason to view this as a valuable naturalistic measure of social understanding – it has been successfully examined in connection with a range of socially meaningful characteristics (e.g., social anxiety, Banerjee & Henderson, 2001; autistic spectrum disorders, Baron-Cohen et al., 1999; and frontal lobe lesions, Stone, Baron-Cohen, & Knight, 1998) – further work using a wider range of tasks, tapping different features of social understanding,

is required to substantiate the claims made above about the reciprocal links between social understanding and peer relations.

Second, the potential contributions of cognitive and verbal ability to children's social understanding is not sufficiently clear. In the present study, we controlled for a basic measure of receptive vocabulary – which was indeed associated with performance on the faux pas task – but it seems plausible that other dimensions of cognition and language may have important roles to play (e.g., semantic dimensions, Milligan, Astington, & Dack, 2007; syntax, Ruffman, Slade, Rowlandson, Rumsey, & Garnham, 2003; Smith, Apperly, & White, 2003; executive function, Blair, Zelazo, & Greenberg, 2005; Carlson & Moses, 2001; Hughes, 1998).

Third, it is important to stress that there may be unmeasured variables that contribute to the relationship between the faux pas and peer relations scores. Even though social understanding is obviously and immediately relevant to children's peer interactions, it seems plausible that other variables play a role in influencing each of these. One key area concerns children's motivation. Wentzel (1996), for example, reports on research connecting children's social goals with their academic attitudes, goals, and achievements. It seems highly plausible that broad motivational orientations concerning dimensions such as peer affiliation will also give rise to different responses to the kinds of scenarios and questions presented in the faux pas task. However, we must recognise that those differences in goal orientation and motivation themselves are likely to stem from variations in children's social experiences. Indeed, aspects of family functioning discussed earlier (e.g., Meins et al., 2002; Ruffman et al., 2002) will almost certainly have independent as well as causally connected effects on both interpersonal functioning and social understanding. Future research that combines assessment of family and peer contexts will therefore be invaluable for identifying the potential additive and interactive effects of these social environments.

Fourth, a major direction for further research concerns the mediating mechanisms that explain the observed longitudinal associations between social understanding and peer relations. With regard to the potential inhibition of social-cognitive development caused by peer rejection, we have suggested above that constrained opportunities to engage in positive social interactions are likely to reduce opportunities to learn about complex social situations involving interplays of intentions, emotions, and beliefs. While this seems a plausible line of argument, it is important to stress that we do not have any direct measurements of the quantity or quality of children's social interactions. Research which provides such fine-grained measurements will be critical for understanding precisely what aspects of peer rejection might lead to delays or impairments in social understanding. For example, it is not clear if there are differences in social understanding between children who are rejected because of aggressive behaviour and children who are rejected because of withdrawn behaviour (see Gifford-Smith & Brownell, 2003). On a related point, further research should take into account the subtle difference between friendlessness and group exclusion; in fact, a mutual friendship could potentially mitigate the negative effects of peer rejection on mindreading abilities (Peterson & Siegal, 2002).

In a similar way, we need to understand more about the specific social, emotional, and behavioural features that mediate the relationship between poor faux pas scores and subsequently increased peer rejection, as observed among the 10- to 11-year-olds in the present study. It seems possible that children who do not have a sophisticated insight into the interplay of mental states involved in the faux pas situations are more likely to react inappropriately to these situations in their social life; such responses, in turn, could lead to a more negative peer reputation and ultimately to greater rejection. However, this is an empirical question that demands multi-informant assessment of behaviour and further longitudinal analysis of mediational models.



Thus, gaining insight into the subtle connections between social understanding and peer relations is likely to depend on the use of a variety of different methodologies in future research. Pepler and Craig (2005), for example, point to the richness of data that can be derived from observation of peer interactions, both in naturalistic and structured settings. Adding such work to the knowledge gained from sociometric analysis, one can potentially determine the specific aspects of peer group functioning and discourse that serve as antecedents and/or consequences of particular forms of social reasoning. This would help us to go beyond broad indices of acceptance and rejection in order to identify which features of social interaction might contribute to different aspects of faux pas understanding. In addition, such a multi-method approach can help us uncover the potential moderating role of gender in the connection between peer relations and social understanding. Although we found only a main effect of gender on faux pas reasoning in the present study, more detailed methodological approaches to both peer relations and social understanding may help us see how important gender-related differences in peer relationships (e.g., Benenson, Apostoleris, & Parnass, 1998) map onto distinctions between boys and girls in their social reasoning, particularly concerning negative emotions (Banerjee et al., 2006).

### *Conclusion*

In summary, the present study has for the first time revealed bidirectional links between peer relations and social understanding in school children between the ages of 6 and 11 years. The results indicate that active rejection by the peer group is likely to hinder the understanding of faux pas, at a time when such understanding is typically increasing. In addition, difficulties in understanding faux pas towards the end of primary school appear to predict subsequently elevated peer rejection. These developmental patterns not only underline the importance of naturalistic measures of social understanding as both antecedents and consequences of children's interpersonal relationships, but also show that the nature of

these longitudinal relationships changes over time. Further research is needed to identify the specific mechanisms that account for the development of different aspects of social understanding within the peer context.

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## Appendix

*Sample story, questions, and response options*

Nick has painted a picture of a rocket for a class exhibition. Nick's friend, Peter, is in another class, but he comes to see the exhibition after school. Peter points to Nick's picture and says, "The rest of the paintings are quite nice, but this rocket picture is dreadful, isn't it?" Nick says, "Oh, I need to go home now."

*Detection.* In the story, did someone say something they should not have said? [Yes OR No]

*Identification.* What was said that should not have been said? [Nick said, "I need to go home now" OR Peter said, "This rocket picture is dreadful"]

*Feelings.* How does Nick feel now? [Sad OR Pleased]

*Intention.* Did Peter want to make Nick upset? [Yes OR No]

*Comprehension.* Who painted the rocket picture? [Nick painted it OR Someone else painted it]

*Ignorance.* Did Peter know that Nick had painted the rocket picture? [Yes OR No]

*Content of other scenarios*

One character says curtains are horrible to person who has just bought them.

One character says he hates apple pie to cousin who has just made one.

One character is negative about violins to friend who has just started violin lessons.

### Author Note

Robin Banerjee, School of Psychology, University of Sussex, UK; Dawn Watling, Department of Psychology, Royal Holloway, University of London, UK; Marcella Caputi, Department of Psychology, University of Pavia, Italy.

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Correspondence concerning this article should be addressed to Robin Banerjee, School of Psychology, University of Sussex, Falmer, Brighton BN1 9QH, UK. Email: [robinb@sussex.ac.uk](mailto:robinb@sussex.ac.uk)



## Endnote

<sup>1</sup> In our longitudinal follow-up study, we noted that the second-order false-belief task was correlated with the faux pas task at each time point, even after controlling for receptive vocabulary (all partial  $r > .29$ ,  $p < .001$ ). Therefore, we again evaluated the potential importance of the second-order false-belief task as an antecedent or consequence or differences in peer relations. However, there were no significant cross-lagged pathways between our measures of peer relations and scores on the second-order false-belief task after controlling for receptive vocabulary (all partial  $|r| < .13$ ,  $p > .30$ ). Therefore, we have excluded the second-order false-belief task from the main analysis reported here.

*Table 1**Mean (SD) scores on the faux pas task at each time point, by age group and gender*

Gender	Younger Cohort			Older Cohort		
	Time 1 (age 6)	Time 2 (age 7)	Time 3 (age 8)	Time 1 (age 9)	Time 2 (age 10)	Time 3 (age 11)
Male	1.19 (1.42)	1.52 (1.55)	1.77 (1.50)	2.44 (1.40)	2.74 (1.41)	2.71 (1.51)
Female	1.02 (1.31)	1.88 (1.62)	2.29 (1.42)	2.62 (1.35)	3.30 (1.06)	3.33 (1.19)
Total	1.10 (1.35)	1.72 (1.59)	2.07 (1.47)	2.51 (1.38)	2.99 (1.30)	2.98 (1.41)

*Table 2**Mean (SD) scores on specific faux pas questions at each time point, by age group*

Question	Younger Cohort			Older Cohort		
	Time 1 (age 6)	Time 2 (age 7)	Time 3 (age 8)	Time 1 (age 9)	Time 2 (age 10)	Time 3 (age 11)
Detection	2.46 (1.58)	3.18 (1.37)	3.51 (.86)	3.62 (.69)	3.55 (.91)	3.38 (1.09)
Identif.	3.31 (1.06)	3.54 (.92)	3.64 (.92)	3.89 (.36)	3.78 (.73)	3.70 (.85)
Feelings	3.43 (1.02)	3.61 (.90)	3.65 (.79)	3.88 (.45)	3.82 (.70)	3.70 (.92)
Intention	2.81 (1.43)	3.08 (1.40)	3.01 (1.32)	3.38 (1.07)	3.70 (.81)	3.67 (.91)
Comp.	3.49 (.71)	3.65 (.70)	3.68 (.71)	3.88 (.33)	3.93 (.39)	3.78 (.80)
Ignorance	2.75 (1.28)	3.00 (1.31)	2.85 (.127)	3.17 (1.11)	3.56 (.91)	3.60 (.91)

Table 3

*Intercorrelations among the variables over three time points (younger age group)*

		Time 1 (aged 6 years)			Time 2 (aged 7 years)			Time 3 (aged 8 years)			BPVS
		Peer Acc.	Peer Rej.	Faux Pas	Peer Acc.	Peer Rej.	Faux Pas	Peer Acc.	Peer Rej.	Faux Pas	
Time 1 (aged 6 years)	Peer Acc.	--									
	Peer Rej.	-.28*	--								
	Faux Pas	.07	-.16	--							
Time 2 (aged 7 years)	Peer Acc.	.49***	-.35**	.19	--						
	Peer Rej.	-.25*	.52***	-.01	-.25*	--					
	Faux Pas	.07	-.12	.49***	.19 <sup>+</sup>	-.05	--				
Time 3 (aged 8 years)	Peer Acc.	.26*	-.36**	.21 <sup>+</sup>	.45***	-.31**	.18	--			
	Peer Rej.	-.20 <sup>+</sup>	.64***	-.07	-.17	.66***	-.19	-.32**	--		
	Faux Pas	-.03	-.36**	.45***	.08	-.30**	.56***	.29*	-.39***	--	
	BPVS	-.05	-.19	.50***	.09	-.07	.41***	.12	-.14	.43***	--

*Note.* Peer Acc. = Peer Acceptance, Peer Rej. = Peer Rejection, <sup>+</sup>  $p \leq .10$ , \*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\*  $p \leq .001$

Table 4

Intercorrelations among the variables over three time points (older age group)

		Time 1 (aged 9 years)			Time 2 (aged 10 years)			Time 3 (aged 11 years)			BPVS
		Peer Acc.	Peer Rej.	Faux Pas	Peer Acc.	Peer Rej.	Faux Pas	Peer Acc.	Peer Rej.	Faux Pas	
Time 1 (aged 9 years)	Peer Acc.	--									
	Peer Rej.	-.34***	--								
	Faux Pas	.09	-.23**	--							
Time 2 (aged 10 years)	Peer Acc.	.55***	-.16 <sup>+</sup>	.25**	--						
	Peer Rej.	-.34***	.55***	-.14 <sup>+</sup>	-.37***	--					
	Faux Pas	.06	-.27***	.48***	.02	-.11	--				
Time 11 (aged 8 years)	Peer Acc.	.48***	-.43***	.16 <sup>+</sup>	.47***	-.35***	-.03	--			
	Peer Rej.	-.31	.67***	-.16 <sup>+</sup>	-.28***	.53***	-.26**	-.43***	--		
	Faux Pas	-.01	-.13	.29***	-.11	.02	.41***	.09	-.11	--	
	BPVS	.04	-.09	.21**	.07	-.01	.09	.03	-.07	.13	--

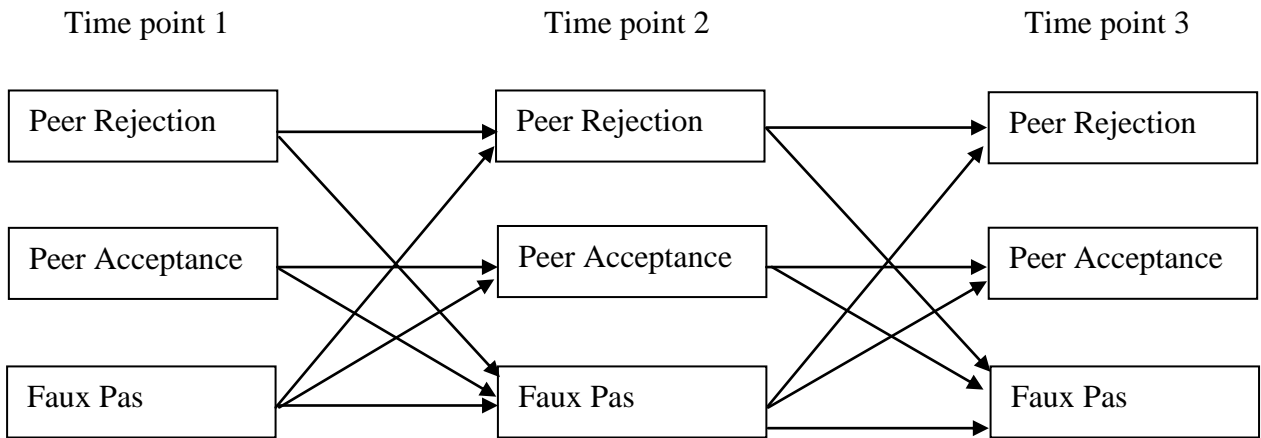
Note. Peer Acc. = Peer Acceptance, Peer Rej. = Peer Rejection, <sup>+</sup>  $p \leq .10$ , \*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\*  $p \leq .001$

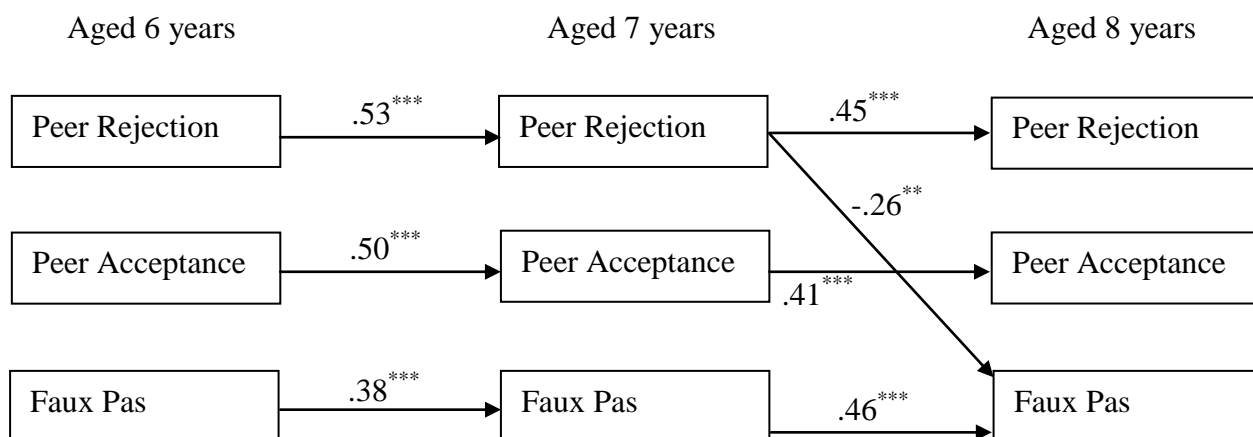
## Figure Captions

Figure 1. Initial model to be tested, showing autoregressive and cross-lagged effects of key variables over the three time points (error terms and receptive vocabulary not shown, in order to enhance clarity).

Figure 2. Final model for younger age group (error terms and receptive vocabulary not shown, in order to enhance clarity).

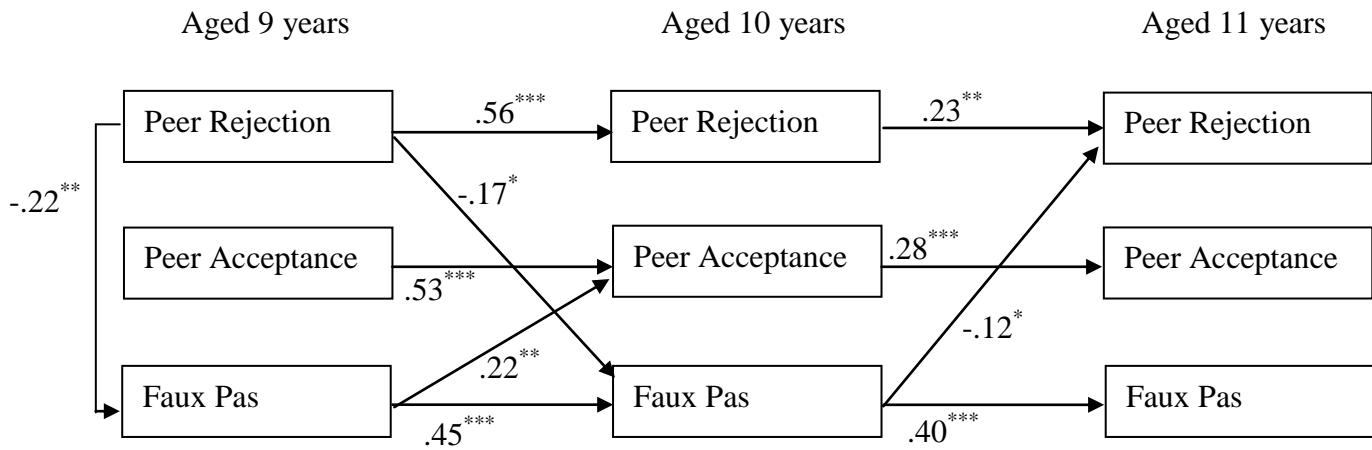
Figure 3. Final model for older age group (error terms and receptive vocabulary not shown, in order to enhance clarity).





\*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\*  $p \leq .001$





\*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\*  $p \leq .001$