




# Conflicting perspectives mediate the relation between parents' and preschoolers' self-referent mental state talk during collaboration

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We examined the relations between the referent of parents and preschoolers' mental state talk during a collaborative puzzle-solving task ( $N = 146$  dyads;  $n = 81$  3-year-olds,  $n = 65$  4-year-olds). The results showed that parents' references to their own knowledge and beliefs (self-referent cognitive talk), and references to their child's knowledge and beliefs (child-referent cognitive talk) were both related to children's (primarily self-referent) cognitive talk. We then tested whether any of the observed relations could be explained by the presence of conflicting perspectives within the collaborative interaction. Mediation analyses revealed that conflicting perspectives mediated the positive relation between parents' production of self-referent cognitive talk and child cognitive talk. By contrast, the positive relation between parents' production of child-referent cognitive talk and child cognitive talk did not depend on the presence of this type of conflict. These findings highlight an important mechanism through which parents' references to their own mind might promote children's developing mental state talk in collaborative contexts.

## Statement of Contribution

### What is already known on this subject?

- Developmental research has explored the benefits of parent mental state talk for children's emerging understanding of the mind.
- Yet, few studies have systematically investigated relations between the specific referent of parental mental state input and children's developing mental state talk.

### What does this study add?

- The present results showed that parents' production of self-referent and child-referent cognitive talk were both related to preschooler's cognitive talk during a collaborative puzzle-solving task.
- Importantly, the presence of conflicting perspectives mediated the relations between parents' self-referent cognitive talk and child cognitive talk.
- These findings highlight an important mechanism through which parents' references to their own mind might promote children's developing mental state talk in collaborative contexts.

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Social interactionist theories of development suggest that children's language, cognitive, and social skills develop as a result of interacting with caregivers and parents (Bruner, 1982; Vygotsky, 1978). A substantial effort in developmental research has highlighted the benefits of early parent-child interactions for children's understanding of (typically) unobservable social and cognitive processes, such as the beliefs, desires, and emotions that might motivate an individual's behaviour (Cutting & Dunn, 1999; Nelson, 2005; Ruffman, Slade, & Crowe, 2002). A recent meta-analysis revealed that parent mental state talk has a modest, significant influence on children's developing theory-of-mind abilities (i.e., false belief and emotion understanding; Tompkins, Benigno, Kiger Lee, & Wright, 2018). Importantly, this research has suggested that increases in the frequency of parent talk about the mind has a direct causal influence on children's developing vocabulary regarding mental states (Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003; Taumoepeau & Ruffman, 2008) and on their social understanding more generally (Appleton & Reddy, 1996; Gross *et al.*, 2015; Hughes *et al.*, 2005).

Despite the extended focus on the role of parent mental state language in promoting relevant child outcomes, the contribution of whose mental state is being referred to – that is, whether the parent refers to the child's mental state or that of another person – has been somewhat overlooked (Tompkins *et al.*, 2018). This distinction could be theoretically important in identifying the different mechanisms through which parental talk contributes to children's mental state understanding. Specifically, it would delineate when pointing to the child's own perspective versus the perspectives of others might be a more significant driver of children's developing talk about the mind or, alternatively, could confirm that any talk about mental states is sufficient.

There is some evidence from previous research that child-directed mental state talk is uniquely predictive of longitudinal measures of young children's mental state abilities. A body of work has shown that parent talk which appropriately interprets the mind of their infants (i.e., 'mind-mindedness') predicts children's performance on theory-of-mind measures in subsequent years (Meins, Fernyhough, Arnott, Leekam, & de Rosnay, 2013). However, only a few studies have systematically coded and tested the effects of this feature of parent mental state talk. Taumoepeau and Ruffman (2006, 2008) found that mothers' talk about their child's desires and needs at 15 months was predictive of children's mental state language proficiency at 2 years of age, but that mothers' references to the thoughts and knowledge of others (i.e., characters in a picture book) were more important for child mental state talk at age 3. In a related study, Adrian, Clemente, and Villanueva (2007) revealed that mothers' reflections about the mental states of storybook characters was the most consistent predictor of 3- to 6-year-olds' theory-of-mind understanding one year later. The authors argue that this developmental shift in the benefits of parents' initial references to their child's mind, followed by their references to the minds of others aligns with Vygotsky's (1978) zone of proximal development. In other words, parents are continually scaffolding their child's developing understanding of inner psychological states (from their own to those of another person) throughout this crucial period (Adrian *et al.*, 2007; Taumoepeau & Ruffman, 2006, 2008).

Taken together, these longitudinal findings indicate that the specific referent of parental mental state talk could also be an important factor for young children's developing mental state in situated dyadic interactions. For example, parents' proclivity to mark their child's own mental states during conversation could promote child talk in a certain situation because it is helpful in making explicit representational links between the child's internal experiences and their behaviour (Kirk *et al.*, 2015). In comparison, parent conversational references to the perspectives of others highlight the independent

and potentially differing viewpoints that may not be readily available to the child (Harris, 1996, 2005), and thus could feasibly also encourage children's use of mental state language in a given situation.

The first aim of the present research was to test for these associations between the specific referent of parent talk and children's use of mental state terms. Based on previous findings that young children tend to produce more mental state references to their own perspective during interactions with their parents (Bartsch & Wellman, 1995; Hughes, Marks, Ensor, & Lecce, 2010), we decided to focus on children's production of mental state talk more generally (and not on the referent of such talk). The second aim was to explore the role of a potential mechanism through which the subject of parents' mental state language promotes child mental state talk in early interactions. To accomplish this, we tested for patterns of talk in a collaborative puzzle-solving context in which parent's mental state references could either be *consistent* with the child's current perspective and behaviour or present an a *conflicting* mental perspective to that of the child.

Collaborative interaction partners often need to discuss, and potentially reconcile, different perspectives in the pursuit of a shared understanding or common goal (Fernyhough, 2008; Harris, 2005). Previous research has demonstrated that preschool children make a variety of references to mental states during instances of emotional and behavioural conflict with parents and their peers (Comparini, Douglas, & Perez, 2014; Dunn, Slomkowski, Donelan, & Herrera, 1995) and found a positive association between 3- and 6-year-old children's references to their own inner states (e.g., thoughts, desires) and the number of conflict episodes recorded in conversations with their mother (Hughes *et al.*, 2010). However, to our knowledge, there has been no work investigating whether the presence of conflicting perspectives accounts for *the relation between the referent of parents' mental state talk* and children's production of mental state talk.

We explored whether the presence of conflicting perspectives acted as a potential mechanism to explain the relation between the specific referent of parents' mental state talk – talk that either refers to their own mental perspective (self-referent) or their child's mental perspective (child-referent) – and children's use of mental state language during a joint puzzle-solving task. Drawing from theoretical accounts about the function of parents' references to perspectives that are distinct to that of their child's (Harris, 1996, 2005; Harris, de Rosnay, & Pons, 2005), we reasoned that observed relations between parents' self-referent mental state talk and children's mental state talk might be especially apparent when one or both partners need to explicitly address differing perspectives (e.g., 'I don't think it goes that way'). In comparison, because parent references to their child's mental state only labels the point of view or goals of the child, the relation between parent-child-referent mental state talk and child mental state talk may not depend on the presence of shifting perspectives.

For a number of reasons, the present focus was on discourse concerning the content and certainty of knowledge, which is sometimes labelled *cognitive talk* (e.g., 'to think', 'to remember', and 'to believe'). First, cognitive talk is a useful linguistic tool in reconciling incongruous perspectives between interaction partners. Moreover, previous research has indicated that both parental talk about knowledge and beliefs, as well as the sophistication of young children's own cognitive talk (Moore & Frye, 1991), is more closely related to theory-of-mind development when compared to other talk about mental states (e.g., emotion talk; Tompkins *et al.*, 2018). In addition, one recent study that coded for a variety of parent and 4-year-old children's mental state comments when solving a puzzle task suggested that cognitive talk is produced quite frequently yet variably in this context (see Lundy & Fyfe, 2016).

We tested our predictions when children's cognitive talk undergoes significant development in the preschool years i.e., 3- to 4-years of age (Bartsch & Wellman, 1995; Jenkins *et al.*, 2003). We first hypothesized that there could be two association patterns between the referent of parent cognitive talk and preschoolers' general use of cognitive talk in a joint puzzle-solving context: (1) By prompting children to reflect on their internal experiences and how they could be related to the task at hand, parents' child-referent cognitive talk (e.g., 'Do you know. . .?'), would be related to child talk about beliefs and (2) by making the viewpoint of the interaction partner explicit with relation to the joint task, parent self-referent cognitive talk (e.g., 'I think that. . .') could also be related to children's cognitive talk. However, we expected that (3) because self-referent cognitive talk might become especially salient during conversations that involve incongruous perspectives (e.g., 'I don't think that's right'), (A) any relations between parents' self-referent and child cognitive talk would be mediated by the presence of conflicting perspectives when solving the puzzle task but that (B) relations between parents' references to their child's knowledge state and child cognitive talk will not be mediated by the presence of such conflict when solving the puzzle task. We define conflict in the present study as any utterance or series of utterances through which the parent or child communicate a juxtaposing cognitive perspective to that of their partner (see section on 'Conflicting perspectives' below).

## Method

### Participants

One hundred and forty-six parents ( $n = 144$  mothers) and their children (72 boys,  $M_{\text{age}} = 3.11$ , age range = 2.10–4.11) were recruited from a participant database at a university laboratory. Although detailed demographic information was not obtained, families recruited from this database tend to be White and middle to upper middle income, with at least one parent possessing a four-year college degree. The families are recruited from both urban and suburban areas around a medium-sized city in New England, United States. Participants were part of a broader study investigating children's social learning. All parent–child dyads completed the joint puzzle task before completing two social learning tasks. We only coded and analysed families' participation in the puzzle task for the current study. Ten additional families completed the puzzle task phase but were not included in the present analyses because they did not speak English during the interaction ( $n = 4$ ), produced no or very minimal dialogue ( $n = 2$ ; <10 utterances), or the child was distracted throughout the session ( $n = 4$ ).

### Materials and procedure

The parent–child dyads were asked to collaboratively solve a gender-neutral jigsaw puzzle targeted for 3+ year-old children (i.e., Melissa and Doug's 24-piece 'African Plains Wooden Jigsaw Puzzle'). The experimenter brought the parent and child to a room with a table and two chairs. The unassembled puzzle was on the table. The experimenter then told the parent and child: 'Ok, to start, you get to do this puzzle. You can sit down at this table, and we'd like you to do this puzzle together. I'll be back in a few minutes, and then we'll move on to the next part of the study'. The experimenter then left the room and the parent–child interaction was video recorded. After three minutes, the experimenter returned and said, 'All right, awesome job!' before putting away the puzzle to begin the next task.

## Coding

### *Transcription*

Sessions were video-recorded and transcribed by trained research assistants using the CHAT conventions of the Child Language Data Exchange System (CHILDES; MacWhinney, 2000). The interactions were transcribed at the level of the utterance, that is, a series of words followed by a pause or change in conversational turn. A second research assistant verified the transcripts to ensure accuracy, and any disagreements were resolved through discussion.

### *Cognitive talk*

We developed a coding scheme based on past studies examining the content of parents' and children's mental state talk at the level of the utterance (Adrian *et al.*, 2007; Jenkins *et al.*, 2003). *Cognitive talk* was defined as utterances that contained words that denoted a person's thoughts, memories, or knowledge (e.g., 'to know', 'to wonder', and 'to guess'). All variations of these cognitive mental state words (henceforth referred to only as 'cognitive' words) were counted, including certain terms that have sometimes been excluded in previous studies because they were considered to only function as conversational devices (e.g., 'What do you think?' for turn-taking; Bartsch & Wellman, 1995). However, in line with other related research (e.g., see Harris, Yang, & Cui, 2017; Taumoepeau & Ruffman, 2008), in the context of our study, we could not definitively rule out the possibility that these utterances reflect genuine mental state references and therefore could encourage cognitive talk among adults and children.<sup>1</sup> This coding yielded a total of 1,318 parent and child cognitive utterances across the entire sample. To control for the role of imitative learning within the interaction, cognitive utterances which involved self-repetitions or a direct repetition of the other individual's utterance were not counted.

Each cognitive utterance then received a second code for either referring to the *self* (e.g., 'I think this is the right place for it!', 'I decided to do this part first', and 'I wonder if we have that correct'), the *other* individual ('Do you remember this?', 'You've figured it out', and 'Where do you think this piece goes?'), or the *collective dyad* (e.g., 'We don't know if we have the corners in the right places'). Note that these categories were not always mutually exclusive and cognitive utterances could be coded as, for example, referring to both the self and the other (e.g., 'I think you have a good idea'). However, we found that the cognitive talk that occurred during the collaborative task was rarely coded as including more than one type of referent ( $n = 15$  parent utterances;  $n = 1$  child utterance contained more than one referent).

### *Conflicting perspectives*

Each dyad received a code for whether or not they experienced a conflict of perspectives during the course of the puzzle task. A conflict of perspectives was defined as at least one instance in which either the parent or child used cognitive talk to disagree with the other person or to highlight an explicitly incongruous or contradictory perspective in response to the other person's action. Table 1 presents brief examples of conflicting perspectives

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<sup>1</sup> The phrase 'You know what?' used in isolation was not coded as cognitive. We reasoned that this term was used to gain the child's attention and not to refer to their underlying knowledge state.

**Table 1.** Brief examples of a conflict of perspectives during the joint puzzle-solving task

Presence of conflicting perspectives	No conflict of perspectives present
Child: <i>I think this goes here</i> [Child attempts to force piece into the same spot] Parent: <i>I don't think so hon</i>	Parent: <i>Did you find two that fit?</i> Child: <i>Yeah!</i> Parent: <i>How did you know that?</i> Child: <i>Cause it has a zebra on it</i>
[Child keeps trying to fit pieces on puzzle] Parent: <i>Listen, look at the piece. Do you think it is in the right position? Do you think the corner could go somewhere else?</i>	Parent: <i>Do you think those go together?</i> [Child takes one piece off the board] Child: <i>No</i> Parent: <i>No, I don't think so</i>
[Child moves piece around the puzzle] Parent: <i>We might have to switch things around</i> Child: <i>No, I think that goes. . .</i> Parent: <i>Okay</i> Child: <i>Those go here and then like this. But how do you make. . .</i> Parent: <i>No, remember what goes here? Do you remember what goes on the sides here?</i>	Child: <i>I see just the right pieces!</i> Parent: <i>I think you're close</i> [Child tries fitting pieces together] Parent: <i>What do you think this puzzle is going to be of?</i> [Child picks up a piece] Child: <i>Hmm, uh, a tiger</i> Parent: <i>Hmm, it's a pretty good guess, I think so</i>

with relation to this specific task. We coded conflict in a binary manner (i.e., presence of conflicting perspectives = 1 and no conflicting perspectives present = 0) because the task was relatively short and thus would presumably not allow for sufficient variance in the number of individual conflict statements within dyads for the main analyses. Approximately half of the dyads (51.37%) were coded as experiencing a conflict of perspectives during the puzzle task.

### Reliability

For the coding of cognitive utterances, the first author initially coded 20% of the transcripts and two trained research assistants, unaware of the predictions of the study, performed reliability coding. Average agreement between coders for both whether an utterance included a cognitive term and the referent of that cognitive term was very high (92% agreement,  $\kappa = .91$  and 91% agreement,  $\kappa = .87$ , respectively). The two research assistants then coded the remainder of the transcripts.

The first and second author coded the transcripts for whether or not the dyad experienced a conflict of perspectives in completing the puzzle. A trained research assistant, unaware of the hypotheses of the study, performed reliability coding on 20% of the transcripts and agreement between the coders was very high (90% agreement,  $\kappa = .80$ ). Any disagreements were resolved by discussion between the research assistants and the first author.

## Results

### *The referent of cognitive talk (CT) during collaboration*

There was no significant effect of child gender for the raw frequency and proportion of utterances coded as cognitive talk (now referred to as 'CT'; all  $p$ 's > .18); therefore, all subsequent analyses did not include gender. All parents (with the exception of one



parent) produced at least one utterance related to knowledge and beliefs ( $M$  utterances per parent = 7.84,  $SD$  = 4.46, range = 0–21, 13.06% of total utterances). On average, parents were equally likely to refer to their own ( $M$  = 3.68,  $SD$  = 2.74, range = 0–16, 6.21% of total utterances) and their child's knowledge states ( $M$  = 3.97,  $SD$  = 3.11, range = 0–17, 6.56% of total utterances): the results of within-subjects  $t$ -tests did not reveal any differences between parents' self-referent CT and child-referent CT, raw frequency of utterances:  $t(145) = 0.90$ ,  $p = .37$ ; proportion out of total utterances:  $t(145) = 0.65$ ,  $p = .52$ .

Over half of the children (58%) engaged in CT during the task ( $M$  utterances per child = 1.18,  $SD$  = 1.37, range = 0–6, 5.28% of total utterances; note that these and the following descriptive statistics represent all of the children who participated, including those who never produced CT during the interaction). In contrast to parents, the mean CT that children produced in a given interaction was much more likely to reference their own perspective (child self-referent CT:  $M$  = 1.05,  $SD$  = 1.28, range = 0–6, 4.74% of total utterances; child–parent-referent CT:  $M$  = 0.12,  $SD$  = 0.36, range = 0–2, 0.45% of total utterances). We decided to retain and collapse the few instances of child parent-referent CT in the variable of child CT.

References to a collective mental state (e.g., 'We have to figure it out') were relatively rare for the dyads ( $n = 44$  parent utterances;  $n = 4$  child utterance were coded as collective CT). Thus, the relations between this specific kind of parent talk and child CT were not explored further. The collective-referent CT was only retained in the parent and child measures of total CT (i.e., was not counted in the individual measures of parents' self-referent and/or child-referent CT). To control for variation in the amount of talk the dyads produced while completing the puzzle, we include the main parent and child measures of CT as a proportion of their total utterances in the main analyses.

### **Relations between the referent of parent CT and child CT during collaboration**

The proportion of children's CT was not related to children's age in months,  $r(144) = .12$ ,  $p = .15$ . The proportion of parents' self-referent CT was also not related to children's age,  $r(144) = -.05$ ,  $p = .56$  but the proportion of parents' child-referent CT was positively associated with child age,  $r(144) = .21$ ,  $p = .01$ . Table 2 presents the relations between the variables of interest when controlling for the age of the child.

The proportion of parents' self-referent and child-referent CT were both positively associated with children's proportion of total CT and to the children's CT that specifically referenced the child's own beliefs. This latter finding indicated that our decision to

**Table 2.** Partial correlations between the proportion of parent and child cognitive talk measures when controlling for children's age in months

	Child	
	Total	Self-referent
Parent		
Total	.33***	.32***
Self-referent	.25**	.24**
Child-referent	.23**	.22**

Note. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

collapse the child–parent-referent CT in the main outcome variable of child CT did not significantly change the observed relations between parent and child CT.

In addition, we found that parents' production of self-referent and child-referent CT had a very low, non-significant correlation,  $r(144) = .05, p = .53$ . We could thus consider them as independent features of parent talk to test the present hypotheses in the following mediation analyses.

### ***Do conflicting perspectives mediate the relation between the referent of parent CT and child CT during collaboration?***

To test our predictions about the relations between the referent of parent CT and child CT when collaborating on a joint task, we conducted two mediation models. We first examined whether the presence of conflicting perspectives (binary variable) mediated the observed relations between the proportion of parent self-referent CT (continuous predictor) and proportion of child CT (continuous outcome). We then ran a second model in which we tested whether this type of conflict acted as a mediator between the proportion of parent–child-referent CT and child CT. Children's age in months was controlled for in all steps of the mediation models, and the alpha levels were adjusted for these two sets of analyses ( $\alpha = .05/2 = .025$ ).

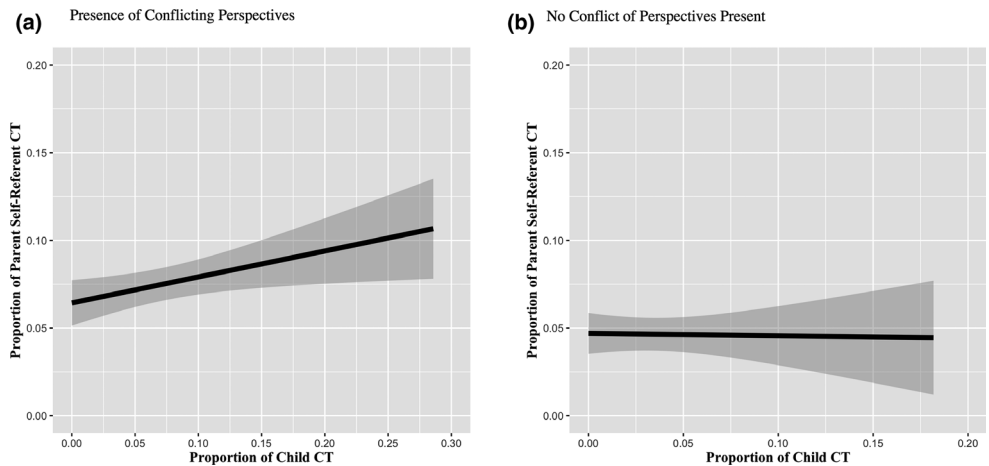
The four mediation assumptions (Baron & Kenny, 1986) were met for the first mediation model: (1) the predictor variable (parent self-referent CT) was positively related to the outcome variable (child CT),  $\beta = 0.36, SE = 12, p = .002$ ; (2) the predictor variable (parent self-referent CT) was positively related to the mediating variable (presence of conflicting perspectives),  $\beta = 17.81, SE = 4.65, p < .001$ ; (3) the mediating variable (presence of conflicting perspectives) was positively related to the outcome variable (child CT),  $\beta = 0.03, SE = 0.01, p = .002$ ; and (4) when controlling for the mediating variable (presence of conflicting perspectives), the predictor variable (parent self-referent CT) was no longer significantly related to the outcome variable (child CT;  $\beta = 0.24, SE = 12, p = .05$ ). A Sobel test revealed that the presence of conflicting perspectives was a significant mediator of this association,  $z = 2.37, p = .02$ . Thus, experiencing a conflict of perspectives statistically accounted for the positive relation between parents' production of CT referring to their own perspective and children's production of CT when jointly solving a puzzle task (see Figure 1).

The mediation assumptions were not met when parent–child-referent talk was entered as the predictor variable: this predictor was not related to the mediating variable of conflict ( $\beta = 0.63, SE = 3.49, p = .86$ ) and the positive relation between this predictor and the child CT outcome remained significant after including the mediating variable into the model,  $\beta = 0.30, SE = 0.11, p = .006$ . Finally, a Sobel test confirmed that the presence of conflicting perspectives did not significantly mediate this association ( $z = 0.18, p = .86$ ). Hence, the positive relation between parents' production of CT that referred to their child's perspective and children's use of CT was not affected by the presence of conflicting perspectives in this task (see Figure 2).

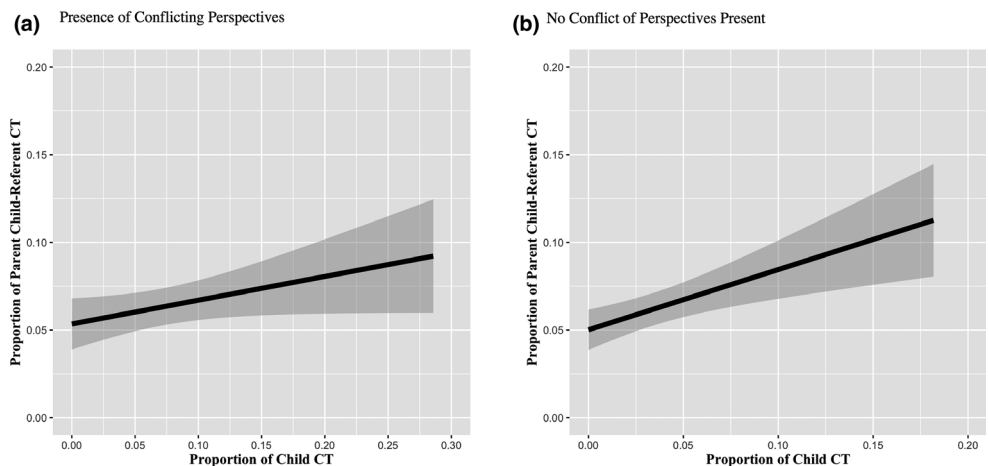
## **Discussion**

The results revealed that preschoolers' belief and knowledge talk was associated with parents' talk about their own beliefs (i.e., 'I think I know what that is...') and their talk about the knowledge states of their children (e.g., 'You know that...'). This finding





**Figure 1.** The relation between the proportion of parents' self-referent cognitive talk (CT) and children's CT among the dyads who (a) experienced a conflict of perspectives and (b) did not experience this type of conflict during the joint puzzle-solving task. Conflicting perspectives significantly mediated the positive relation between parents' self-referent CT and child CT. Shaded areas represent 95% confidence intervals.



**Figure 2.** The relation between the proportion of parents' child-referent cognitive talk (CT) and children's CT among the dyads who (a) experienced a conflict of perspectives and (b) did not experience this type of conflict during the joint puzzle-solving task. Conflicting perspectives did not mediate the positive relation between parents' child-referent CT and child CT. Shaded areas represent 95% confidence intervals.

supports past studies that parents' references to the minds of their children and the minds of others can both play an important role in children's developing mental state talk (Adrian *et al.*, 2007; Taumoepeau & Ruffman, 2006, 2008) and significantly extends this work by demonstrating these association patterns within a situated puzzle-solving context. Importantly, the present research has pinpointed a feature of collaboration that might draw out and account for individual differences in children's production of cognitive talk, that is, the articulation of shifting perspectives in the pursuit of a common goal.

The results showed that the presence of a juxtaposition between the perspective of the child and parent significantly mediated the relation between parents' and children's marking of their own beliefs states (because child cognitive talk largely referred to their own perspective). Thus, the association between parent and child talk about their own beliefs was situated within interactions in which the dyad communicated *differing* beliefs. To our knowledge, this is some of the first empirical evidence to confirm the theoretical assumption that parent talk about mental states that are distinct, and presumably less obvious, to their child's perspective can be useful for children's developing mental state talk (Harris, 1996, 2005; Harris *et al.*, 2005). Furthermore, the present research suggests that situations which involve shifting perspectives (even brief moments of disagreement when solving a puzzle task) could be an important mechanism through which *parental references to their own mind* help to promote children's reflection and talk about their own belief state. It further emphasizes the relevance of delineating the referent of mental state talk – we observed that parents were equally likely to refer their own and their child's knowledge state, that there was a low non-significant correlation between both kinds of talk and that the association patterns for parent self-referent and child-referent cognitive talk varied depending on the presence of conflicting perspectives.

Although parent–child-referent cognitive talk was sometimes used to address a perspective that differed to that of the child (see Table 1), the observed relation with child cognitive talk was not mediated by this occurrence. One possible interpretation of this finding is that the use of parent–child-referent cognitive talk to resolve a juxtaposing belief when completing the puzzle (e.g., 'Do you think the corner could go somewhere else?') might not efficiently communicate the parents' contrasting perspective to that of the child. Instead, it could be that parent references to their child's mind might play a different role in this joint context. For example, given that these utterances were often in the form of a question (e.g., 'Where do you think this piece goes?'), they might serve as a pedagogical move to encourage children's autonomous actions (Lundy & Fyfe, 2016; Yu, Bonawitz, & Shafto, 2017). An additional explanation could be that parents' attention to their children's mental state serves to principally communicate an affective message and reinforce an affiliative bond (Meins *et al.*, 2013). Therefore, child-directed mental state talk led to increases in child talk in a more general sense during this collaboration, regardless of whether the parent and child's mental perspectives overlapped or were in conflict with one another.

The current research examined relations between the referent of parent and children's mental state discourse that occurred during one time point and when completing a specific type of collaborative task. Given the limited scope of this context, it would be important to investigate whether this pattern of findings hold in other interaction settings at home or whether the results are specific to puzzle-solving task. Future studies can also build on the present findings to reveal whether the presence of conflicting perspectives continues to act as an important mechanism for children and their caregiver's self-referent mental state talk over time. For instance, it could be that, as children's discourse, awareness, and understanding of mental states continues to develop in middle childhood (Grazzini & Ornaghi, 2012; Pons & Harris, 2005), requests about the knowledge state of an interaction partner (e.g., 'How do you know?') might be more frequent when that partner conveys a differing belief or perspective. Furthermore, future work should seek to replicate the present results when the occurrence of conflict between the perspective of the child and that of an interaction partner is experimentally manipulated and test whether the specific point at which a conflicting perspective occurs matters for child

cognitive talk. The present research could also be meaningfully extended to examine how the referent of mental state talk during collaboration relates to children's ability to effectively solve problems in cooperative dilemmas (Tomasello & Hamann, 2012).

Children rarely referred to their parents' perspective in the current task, but parents acted as both a collaborative partner and as a more knowledgeable and authoritative figure. Future work should explore the role of the referent of collaborative mental state talk in interactions beyond the parent-child dyad. For example, previous work has shown that young children are more likely to discuss the psychological states of the other person when communicating with a sibling versus their parent (Hughes *et al.*, 2010). This finding suggests that interactions with more expert partners could constrain children's mental state language and that the present pattern of results might differ when preschoolers collaborate with relatively less competent partners, such as siblings and peers (Hartup, 1979). Finally, similar to previous studies (Tompkins *et al.*, 2018), the observed associations between parent and child mental state talk were modest. Hence, identifying the contribution of additional factors that could help explain relations between parent and child collaborative mental state talk, for example, familiarity with the task at hand, socioeconomic status and individual variation in children's verbal and socio-cognitive abilities, would be a worthy avenue for future investigation.

To conclude, this study contributes to a corpus of research illustrating that different features of parental mental state talk might contribute to children's developing mental state abilities in very specific ways. The present research suggests that when a conflict between the perspectives of partners arises during naturally occurring interactions, parent references to their own mind can facilitate their child's talk about the mind. More broadly, these findings highlight the importance of early parent-child collaborative experiences for children's emerging mental state understanding.

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## Author contributions

Niamh McLoughlin: Formal analysis, Visualization, Writing – original draft, Writing – review & editing; Kathryn A. Leech: Formal analysis, Writing – review & editing; Nadia Chernyak: Conceptualization, Data curation, Writing – review & editing; Peter R. Blake: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Writing – review & editing; Kathleen H. Corriveau: Formal analysis, Supervision, Writing – review & editing.

## Data availability statement

Research data are not shared.

## References

- Adrian, J. E., Clemente, R. A., & Villanueva, L. (2007). Mothers' use of cognitive state verbs in picture-book reading and the development of children's understanding of mind: A longitudinal study. *Child Development, 78*(4), 1052–1067. doi: 10.1111/j.1467-8624.2007.01052.x
- Appleton, M., & Reddy, V. (1996). Teaching three-year-olds to pass false belief tests: A conversational approach. *Social Development, 5*(3), 275–291. doi: 10.1111/j.1467-9507.1996.tb00086.x
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality & Social Psychology, 51*(6), 1173–1182. doi:10.1037/0022-3514.51.6.1173.
- Bartsch, K., & Wellman, H. M. (1995). *Children talk about the mind*. New York, NY: Oxford University Press.
- Bruner, J. (1982). The formats of language acquisition. *American Journal of Semiotics, 1*(3), 1–16.
- Comparini, L., Douglas, E. M., & Perez, S. N. (2014). The development of social cognition: Preschoolers' use of mental state talk in peer conflicts. *Early Education and Development, 25* (7), 1083–1101. doi: 10.1080/10409289.2014.896770
- Cutting, A. L., & Dunn, J. (1999). Theory of mind, emotion understanding, language, and family background: Individual differences and interrelations. *Child Development, 70*(4), 853–865. doi: 10.1111/1467-8624.00061
- Dunn, J., Slomkowski, C., Donelan, N., & Herrera, C. (1995). Conflict, understanding, and relationships: Developments and differences in the preschool years. *Early Education and Development, 6*(4), 303–316. doi: 10.1207/s15566935eed0604\_2
- Fernyhough, C. (2008). Getting Vygotskian about theory of mind: Mediation, dialogue, and the development of social understanding. *Developmental Review, 28*(2), 225–262. doi: 10.1016/j.dv.2007.03.001
- Grazzini, I., & Ornaghi, V. (2012). How do use and comprehension of mental-state language relate to theory of mind in middle childhood? *Cognitive Development, 27*(2), 99–111. doi: 10.1016/j.cogdev.2012.03.002
- Gross, R. L., Drummond, J., Satlof-Bedrick, E., Waugh, W. E., Svetlova, M., & Brownell, C. A. (2015). Individual differences in toddlers' social understanding and prosocial behavior: Disposition or socialization? *Frontiers in Psychology, 6*, 600. doi: 10.3389/fpsyg.2015.00600
- Harris, P. L. (1996). Desires, beliefs, and language. In P. Carruthers & P. Smith (Eds.), *Theories of theories of mind* (pp. 20–220). Cambridge, UK: Cambridge University Press.
- Harris, P. L. (2005). Conversation, pretense, and theory of mind. In J. W. Astington & J. Baird (Eds.), *Why language matters for theory of mind* (pp. 70–83). Oxford, UK: Oxford University Press.
- Harris, P. L., de Rosnay, M., & Pons, F. (2005). Language and children's understanding of mental states. *Current Directions in Psychological Science, 14*(2), 69–73. doi: 10.1111/j.0963-7214.2005.00337.x.
- Harris, P. L., Yang, B., & Cui, Y. (2017). 'I don't know': Children's early talk about knowledge. *Mind & Language, 32*(3), 283–307. doi: 10.1111/mila.12143
- Hartup, W. W. (1979). The social worlds of childhood. *American Psychologist, 34*(10), 944–950. doi: 10.1037/0003-066X.34.10.944
- Hughes, C., Jaffee, S. R., Happé, F., Taylor, A., Caspi, A., & Moffitt, T. E. (2005). Origins of individual differences in theory of mind: From nature to nurture? *Child Development, 76*(2), 356–370. doi: 10.1111/j.1467-8624.2005.00850.x
- Hughes, C., Marks, A., Ensor, R., & Lecce, S. (2010). A longitudinal study of conflict and inner state talk in children's conversations with mothers and with younger siblings. *Social Development, 19*(4), 822–837. doi: 10.1111/j.1467-9507.2009.00561.x
- Jenkins, J. M., Turrell, S. L., Kogushi, Y., Lollis, S., & Ross, H. S. (2003). A longitudinal investigation of the dynamics of mental state talk in families. *Child Development, 74*(3), 905–920. doi: 10.1111/1467-8624.00575

- Kirk, E., Pine, K., Wheatley, L., Howlett, N., Schulz, J., & Fletcher, B. C. (2015). A longitudinal investigation of the relationship between maternal mind-mindedness and theory of mind. *British Journal of Developmental Psychology, 33*(4), 434–445. doi: 10.1111/bjdp.12104
- Lundy, B. L., & Fyfe, G. (2016). Preschoolers' mind-related comments during collaborative problem-solving: Parental contributions and developmental outcomes. *Social Development, 25*(4), 722–741. doi: 10.1111/sode.12176
- MacWhinney, B. (2000). *The CHILDES Project: The database* (Vol. 2). Mahwah, NJ: Lawrence Erlbaum Associates.
- Meins, E., Fernyhough, C., Arnott, B., Leekam, S. R., & de Rosnay, M. (2013). Mind-mindedness and theory of mind: Mediating roles of language and perspectival symbolic play. *Child Development, 84*(5), 1777–1790. doi: 10.1111/cdev.12061
- Moore, C., & Frye, D. (1991). The acquisition and utility of theories of mind. In D. Frye & C. Moore (Eds.), *Children's theories of mind: Mental states and social understanding* (pp. 1–14). Mahwah, NJ: Erlbaum.
- Nelson, K. (2005). Language pathways into the community of the minds. In J. W. Astington & J. Baird (Eds.), *Why language matters for theory of mind* (pp. 26–49). Oxford, UK: Oxford University Press.
- Pons, F., & Harris, P. L. (2005). Longitudinal change and longitudinal stability of individual differences in children's emotion understanding. *Cognition and Emotion, 19*(8), 1158–1174. doi: 10.1080/02699930500282108
- Ruffman, T., Slade, L., & Crowe, E. (2002). The relation between children's and mothers' mental state language and theory-of-mind understanding. *Child Development, 73*(3), 734–751. doi: 10.1111/1467-8624.00435
- Taumoepeau, M., & Ruffman, T. (2006). Mother and infant talk about mental states relates to desire language and emotion understanding. *Child Development, 77*(2), 465–481. doi: 10.1111/j.1467-8624.2006.00882.x
- Taumoepeau, M., & Ruffman, T. (2008). Stepping stones to others' minds: Maternal talk relates to child mental state language and emotion understanding at 15, 24, and 33 months. *Child Development, 79*(2), 284–302. doi: 10.1111/j.1467-8624.2007.01126.x
- Tomasello, M., & Hamann, K. (2012). Collaboration in young children. *Quarterly Journal of Experimental Psychology, 65*(1), 1–12. doi: 10.1080/17470218.2011.608853
- Tompkins, V., Benigno, J. P., Kiger Lee, B., & Wright, B. M. (2018). The relation between parents' mental state talk and children's social understanding: A meta-analysis. *Social Development, 27*(2), 223–246. doi: 10.1111/sode.12280
- Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Yu, Y., Bonawitz, E., & Shafto, P. (2017). Pedagogical questions in parent-child conversations. *Child Development, 90*(1), 147–161. doi: 10.1111/cdev.12850

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