

Thinking or feeling? An exploratory study of maternal scaffolding, child mental state talk and emotion understanding in language-impaired and typically-developing school-aged children

Abstract

Background. Mother–child mental-state talk (MST) supports children’s developing social–emotional understanding. In typically-developing (TD) children, family conversations about emotion, cognition and causes have been linked to children’s emotion understanding. Specific language impairment (SLI) may compromise developing emotion understanding and adjustment.

Aims. We investigated emotion understanding in children with SLI and TD, in relation to mother–child conversation. Specifically, is cognitive, emotion or causal MST more important for child emotion understanding and how might maternal scaffolding support this?

Sample. Nine 5–9-year-old children with SLI and nine age-matched typically developing (TD) children, and their mothers.

Method. We assessed children’s language, emotion understanding and reported behavioural adjustment. Mother–child conversations were coded for MST, including emotion, cognition and causal talk, and for scaffolding of causal talk.

Results. Children with SLI scored lower than TD children on emotion understanding and adjustment. Mothers in each group provided similar amounts of cognitive, emotion and causal talk, but SLI children used proportionally less cognitive and causal talk than TD children did, and more such child talk predicted better child emotion understanding. Child emotion talk did not differ between groups and did not predict emotion understanding. Both groups participated in maternal-scaffolded causal talk but causal talk about emotion was more frequent in TD children, and such talk predicted higher emotion understanding.

Conclusions. Cognitive and causal language scaffolded by mothers provides tools for articulating increasingly complex ideas about emotion, predicting children’s emotion understanding. Our study provides a robust method for studying scaffolding processes for understanding causes of emotion.

Introduction

Family conversation is recognised as an important context for supporting the development of children's emotion understanding. This understanding provides a basis for children's harmonious interaction with family and peers, including peer acceptance, prosocial behaviour and emotion regulation (Denham, McKinley, Couchoud, & Holt, 1990; Dunn, Brown, & Beardsall, 1991).

Scaffolding processes in conversations about mental states are widely accepted as an important mechanism through which children develop such social and emotional understanding (Lewis, Freeman, Kyriakidou, Maridaki-Kassotaki, & Berridge, 1996). Children with specific language impairment (SLI) may therefore be at a particular social disadvantage if they cannot gain the same benefits from conversational engagement, because of constraints imposed by receptive and expressive language weaknesses. We know that children with SLI show impairments in social understanding and adjustment, and we have some evidence about the nature of their conversations with mothers, but little is known about the relations between features of mother and child conversations in SLI and how these might scaffold children's developing emotion understanding and adjustment. In this paper we present an exploratory study linking children's emotion understanding and adjustment directly to features of their conversation with their mothers about emotion. In doing so, we present a method of coding conversations that distinguishes specific features of talk relevant to supporting emotion understanding and we argue for the usefulness of a scaffolding approach to understand mechanisms through which conversations support the development of emotion understanding, with implications for intervention to support children with SLI.

Given the complexity and separateness of the relevant literatures, we proceed as follows. First we summarise literature on the role of family conversations about feelings in fostering emotion understanding in typically-developing (TD) children. This is followed by a brief review of relevant findings from the broader literature on qualities of mothers' mental state talk in relation to TD children's social understanding. We then move to research involving children with SLI. After

summarising research into emotion understanding and adjustment in SLI, we go on to review the smaller body of work on qualities of these children's mental state talk in conversations with mothers. This enables us to ask new questions about how conversations involving children with SLI might differ from those with TD, in relation to how such conversations might scaffold children in articulating the causes of emotion, and how features of talk relate to children's emotion understanding and adjustment.

Conversation and emotion understanding in typical development

The pioneering work of authors such as Dunn, Bretherton and colleagues (e.g. Dunn, Bretherton, & Munn, 1987) demonstrated the importance of family conversation for children's social cognition and for understanding emotions in particular. There are now many studies showing such links. For example, Dunn et al. (1987) found that the use of emotion terms by mothers and by older siblings to 18-month-old children predicted those children's own use of emotion terms at 24 months. Dunn, Brown & Beardsall (1991) showed that 3-year-olds in families that talked more about emotions scored better at age 6 on a test of judging others' emotions. Aznar & Tenenbaum (2013) reported that maternal (although not paternal) use of emotion labels predicted 4- and 6-year-old Spanish children's understanding of emotion 6 months later, using the standardised Test of Emotion Comprehension (TEC: Pons & Harris, 2000).

Some studies showed that the sheer frequency of emotion words used by mothers predicts children's emotion understanding, at least in young children, but over developmental time the picture becomes more nuanced, particularly as children become more verbally able. Thus, Ensor & Hughes (2008) found that only emotion talk within connected conversational turns predicted preschool children's emotion understanding. Cervantes & Callanan (1998) suggested that mothers' emotion talk with pre-schoolers showed a scaffolding pattern, with different aspects of talk important at different ages: at age 3, children's emotion talk was predicted by mothers' use of emotion labels, while emotion talk in children of 4 was predicted by mothers' causal explanations

about emotion. Garner, Jones, Gaddy, & Rennie (1997) showed that preschool children whose mothers provided more explanations and empathic comments had children with greater knowledge about emotion situations and emotion role-taking skills, respectively.

In sum, there appears to be a shift in typical development from mothers of pre-schoolers supporting the acquisition of emotion labels to an increasing role for causal talk about emotion for children from the age of approximately 4 years.

Mental state talk and social understanding in typical development

The studies mentioned above focused primarily on talk about emotion rather than other mental states, but other mental state terms may also play a role in supporting emotion understanding. Studies of emotion development therefore can also be informed by the substantial, and largely separate, body of literature on mothers' conversation and young children's social understanding, particularly in relation to Theory of mind (ToM). This literature has the advantage of investigating the whole range of talk about mental states, rather than just conversation about emotions specifically. Mental state talk (MST) in this literature includes talk about cognitions (what people think and know, expressions of degrees of certainty of belief) and desires (wants and wishes), as well as talk about emotions. In some cases, e.g. Ruffman, Slade, & Crowe (2002), it also identifies so-called 'non-mental state talk' such as causal talk and links to the child's life. There is evidence of substantial continuity across childhood in the nature and frequency of MST, both in mothers (Ruffman, Slade, Devitt & Crowe, 2006) and in children, and early mother MST predicts children's social understanding up to age 10 (Devine, White, Ensor, & Hughes, 2016). It is clear, then, that measures of MST are valuable in tapping stable properties of conversation that are significant in the development of children's social understanding.

Most of these studies focus on the precursors of child ToM in particular, but some also include assessments of emotion understanding, either directly (e.g. Taumoepeau & Ruffman, 2008), or indirectly, e.g. ToM tasks beyond the age of 4 that involve emotion understanding, such as belief-

based emotion inference or emotions in 'Strange Stories' (Happé, 1994) . We now examine what this literature can tell us about the links between emotion understanding and a wider range of types of talk. In particular, we focus on a question raised by de Rosnay & Hughes (2006) in their review of the role of conversation in child ToM development: is there specificity in the role of different types of MST for different aspects of social understanding? In particular, does emotion talk support children's emotion understanding, or is cognitive talk also important?

For maternal talk, common sense, and the literature mentioned earlier, suggests that talk about emotions in particular should foster children's emotion understanding. LaBounty, Wellman, Olson, Lagattuta & Liu (2008) found that mothers' references to emotion, and emotion explanations, predicted concurrent child emotion understanding at age 3.5 and at age 5. Jenkins, Turrell, Kogushi, Lollis & Ross (2003) showed that exposure to maternal emotion talk predicted children's own use of such talk two years later, for children of 2 and 4 years of age. However, other evidence suggests that it is mothers' cognitive talk that facilitates children's emotion understanding. Taumoepeau & Ruffman (2008) showed that mothers' cognitive talk early in the child's third year predicted child emotion understanding 9 months later, whereas mother emotion talk did not do so. Ensor et al (2014) found that mothers' use of cognitive references at child age 2 predicted those children's mental-state talk at 6 years of age, although they did not differentiate the type of child MST. Ensor, Devine, Marks & Hughes (2014) cite the 'long reach' of cognitive references through development, with maternal cognitive talk at age 2 predicting children's mental-state story understanding at age 10.

We mentioned above that causal talk about emotions may play a special role in children's emotion understanding. Consistent with this, some studies of maternal MST have found links between maternal causal talk and children's social understanding. For example, Ruffman et al. (2002) found that mothers' use of causal talk at child age of 3 years predicted child ToM performance a year later, and Peterson & Slaughter (2003) found frequency of reported use of causal, explanatory talk by

mothers to their 4- to 5-year-olds to be most helpful in predicting children's social understanding. Dunn & Brown (1993) studied causal talk between 2- to 3-year-old children with their mothers and older siblings, in relation to the child's emotion labelling and affective perspective-taking. Causal talk by the child at 33 months, but not by mother or sibling, predicted the child's emotion understanding at 40 months. Furthermore, causal talk about internal states (e.g. why someone is sad) appeared to be more highly involved in this process than causal talk about physical causes (e.g. why an object won't fit into a small space). In sum, the MST literature in TD children provides support for the role of cognitive and causal talk in the development of children's social understanding, although evidence of the link of such talk to emotion understanding specifically, rather than to more cognitive ToM measures, is limited. It is not clear whether mothers' and children's talk about cognition, emotion or causality better predicts children's emotion understanding. We developed a modification of existing MST coding schemes to facilitate our investigation of this question, as described in the Method.

Relation of mental state talk and emotion understanding in TD to behaviour and adjustment

Conversations about mental states are thought to foster behavioural adjustment as well as cognitive growth, although this relation is by no means simple and straightforward (Hughes & Leekam, 2004). For example, Ensor & Hughes (2005) found that emotion understanding in 2-year-olds predicted mothers' ratings of the child's prosocial behaviour, while Ensor, Spencer & Hughes (2011) extended this finding to show that child emotion understanding at age 3 predicted ratings of their prosocial behaviour at age 4. Ruffman et al. (2006) showed that mother MST at child age 3 predicted those children's prosocial behaviour with a peer at age 4, with more maternal MST predicting greater child cooperation and less conflict later on. For emotion talk specifically, Garner, Dunsmore & Southam-Gerrow (2008) revealed concurrent links between mothers' talk about emotions and 3- to 5-year-old children's aggression and prosocial behaviour in a triadic play task. Brownell, Svetlova, Anderson, Nichols & Drummond (2013) showed that children of 18 - 30 months who behaved more pro-socially had caregivers who talked more often about emotions than less prosocial children, consistent with a

link between scaffolding of social understanding through early conversation and subsequent child behaviour. Thus the link between language and emotion understanding in TD shows evidence of implications for social behaviour. We now turn to the implications of this role of language for children with specific language impairment (SLI).

Emotion understanding and adjustment in children with SLI

Children with SLI by definition lag behind their peers with typical language development in their ability to understand and express themselves. Although the exact definition of SLI is strongly debated (Bishop, 2014), children with language impairments will have either or both expressive and receptive language difficulties that interfere with communicative functioning and are out of line with age and/ or other abilities. These difficulties may involve syntax, semantics, pragmatics or a mixture of these, and each of these features has been proposed as influencing the link between language and social understanding in TD (Harris, de Rosnay, & Pons, 2005; Pons, Lawson, Harris, & De Rosnay, 2003). Given the strong evidence just reviewed on the role of conversation in developing understanding of mental states, and specifically emotions in TD, how might language impairments affect the role of conversation in SLI children's emotion understanding and adjustment? We review the relevant literature on SLI as follows. First we look at research on emotion understanding and social adjustment in children with SLI. We then review research on features of mothers' and SLI children's language in conversations. This leads to our main questions about the relation between features of mothers' and children's talk in relation to children's emotion understanding and adjustment, and the potential role of scaffolding in the relationship between conversation and understanding.

Several studies suggest that children with SLI perform more poorly in emotion understanding than expected given their age, and they also tend to have more difficulties in social adjustment.

Spackman, Fujiki & Brinton (2006), for example, showed that 5- to 12-year-old children with SLI were poorer at emotion understanding and inference than TD children, while Loukusa, Mäkinen,

Kuusikko-Gauffin, Ebeling & Moilanen (2014) reported poorer emotion recognition in 5- to 7-year-olds with SLI compared with TD children, although the SLI group outperformed a comparison group of children with autism. There is a fairly substantial literature suggesting higher rates of socio-emotional difficulties in children with SLI (Yew & O’Kearney, 2013), and language difficulties have been associated with adverse outcomes such as school exclusion (Ripley & Yuill, 2005). Bakopoulou & Dockrell (2016) reported that social cognitive understanding by 6- to 11-year-olds with SLI predicted their teachers’ ratings of difficulties using the Strengths and Difficulties Questionnaire (SDQ). The literature on TD children tells us that maternal MST has an important role to play in fostering socio-emotional understanding, so we now turn to the literature on conversational experiences for SLI children.

Qualities of talk in mothers and children with SLI

Maternal input to pre-school children with SLI suggests that in general terms, mothers adjust their conversational style in ways that seem appropriate for the difficulties their children experience, for example by making more topic initiations (Conti-Ramsden & Friel-Patti, 1984). Blackwell, Harding, Babayiğit & Roulstone (2015) conducted a systematic review comparing general parent - child interaction in children with TD and with SLI (with most studies involving pre-schoolers), and suggested that any differences reported in maternal input were likely to be driven by the differences in conversational input from children in the two groups. However, there is less evidence about how mothers of children with SLI might specifically adapt their talk about thoughts and feelings in the light of their children’s communication difficulties, and no research linking conversational features to emotion understanding.

The most relevant evidence regarding conversational experiences of children with SLI is the work of Rescorla and Lee on mothers’ language with children aged 3 to 5 years. Lee & Rescorla (2008) studied both mother and child MST in late talkers – children who showed expressive language difficulties before 4 years of age despite adequate non-verbal abilities and receptive language.

Interestingly, they found that mothers of late talkers up to age 5 used fewer cognitive terms than mothers of TD children. The late-talking children also used fewer such terms themselves than age-matched TD children did. The researchers found no differences between TD and SLI in the use of emotion or desire terms by either mothers or children. We do not have measures of the children's social understanding, but this result is of particular interest given the link between mothers' use of cognitive and causal terminology and emotion understanding in TD.

There are also several studies of features of speech in children with SLI in relation to the complex embedded syntax of cognitive state terms and of causal language, which seem to be used more rarely by children with SLI. Owen Van Horne & Lin (2011) found similar use of cognitive state verbs in children with SLI and mental-age-matched TD peers in peer conversations, while Johnston, Miller & Tallal (2001) found lower use of cognitive state predicates (e.g. know, remember, think) in 4-year-olds with SLI than in mental-age-matched TD children, during conversations with a researcher.

Donaldson, Reid & Murray (2007) found that 5- to 7-year-old children with SLI produced markedly fewer causal connectives in a structured experimental task than TD children, even for simple imitation tasks.

In summary, there is evidence that children with SLI have poorer understanding of various aspects of emotion, and also that they tend to show more difficulties in social adjustment. Furthermore, there is some evidence that mothers of children with SLI use fewer cognitive terms and that children with SLI use fewer such terms themselves. We know from the literature in TD that cognitive talk, and causal talk about emotion, seem to play a role in children's understanding of emotion. However, there is no direct evidence about the relation between children's emotional understanding and adjustment and features of their conversation with mothers about mental states. In the present study, we aim to address this missing link by analysing mental-state talk and causal talk between mothers and children conversing about pictures, in methods similar to those used in the studies of MST, and relating features of this talk directly to children's understanding of emotion, using the TEC,

and to their adjustment, using the SDQ. We developed a refined version of the MST typology that supports us in identifying relevant features of conversation, and how these might scaffold children's talk.

Studying the role of scaffolding in conversation and emotion understanding in SLI

In the literature reviewed above, scaffolding is a common theme. Many authors discuss how their findings might be explained by scaffolding, and there has been a particular effort in the work on MST to examine relations longitudinally and partial out various factors in order to establish patterns of causality between mother and child language. Ruffman and colleagues (e.g. Ruffman et al., 2006) have provided evidence that mothers' talk drives the development of child ToM, comparing correlations over time between mother and child MST. Taumoepeau & Ruffman (2008) showed that mothers alter their talk in response to children's changing capacities, showing a shift from desire to belief talk, and from talk about own to others' mental states, in the second and third years of children's lives, and these shifts are tied to their child's own use of such terms. Our small-sample, single-time point study cannot provide large-scale correlational evidence of this nature, but instead enables us to examine in detail the within-session structure of conversations to assess scaffolding from a more micro-developmental standpoint. If child MST provides the mental tools needed to support children's articulation of their social and emotional understanding, we would expect children with SLI to be challenged in developing emotion understanding. Assuming such challenges exist, though, we know little about how mother - SLI child conversations might scaffold children to gain greater understanding of emotion.

The importance of scaffolding children's talk is very noticeable in children with SLI, who have goals and needs to fulfil, just as TD children do, but are strongly constrained in doing so by their difficulties in expression and/ or reception. By assessing what features of conversation predict children's emotion understanding, we can then look at the scaffolding processes through which relevant types

of talk are supported in conversations. This is important both for theoretical understanding of mechanisms of development and for informing practical support for children with SLI.

We address our aims in the following sequence: first we establish whether the children with SLI in our sample showed poorer emotion understanding (as we would expect from previous literature), on a standardised task, the TEC, and greater difficulties in reported behavioural adjustment, using the SDQ, compared with children with typical language development. Second, we investigate differences in the features of conversation in which children in the two groups are involved. More specifically, we compare the frequency of maternal and child cognitive and emotional MST, and investigate the role of emotion talk involving causation. There is comparatively little previous research on the content of children's contributions in conversations, and we could not find evidence linking these aspects of SLI children's talk to children's emotion understanding and social adjustment. Our third aim is to assess relations between these conversational features and both child emotion understanding and reported behavioural adjustment. While we have sound evidence of links between MST and measures of ToM understanding, evidence of links between MST and emotional functioning is limited, even in the literature on TD children (Aznar & Tenenbaum, 2003). The conceptual framework uniting these aims is that mother - child conversations provide scaffolding for children to develop verbal tools to articulate explanations of the causes and consequences of emotions, and hence, support to articulate and regulate one's own emotions. Our fourth aim is to investigate how viewing conversation in terms of scaffolding might help us understand how different sorts of talk support children's developing understanding of emotion.

Research Questions

Q1: Will children with SLI show lower emotion understanding and higher reported adjustment difficulties than TD children?

Q2: Will there be differences in frequency of emotion, cognitive and causal talk in conversations between mothers and children with SLI, and their TD counterparts?

Q3: Does mother or child frequency of emotion, cognitive and causal talk relate to child understanding of emotion and reported adjustment difficulties?

Q4: How is children's talk about the causes of emotion scaffolded by mothers and does this differ for children in TD and SLI groups?

Method

Participants. Families were recruited through mainstream schools and schools with facilities for language-impaired children, in an urban, primarily white and socio-economically-mixed area of south-east England. Levels of parent education ranged from secondary certificate to postgraduate: 5 parents in the TD group had further education compared to 3 in the SLI group, while 5 in SLI ended their education at secondary level compared to 1 parent in the TD group, and the remaining ones had post-compulsory non-degree occupational qualifications. Most children (5 TD and 7 SLI) were the eldest sibling in the family, one child with SLI was an only child and the remaining children had at least one older sibling. All families were English-speaking White British except for one Asian-British bilingual family in the TD group. From an original sample of 14 in the SLI group, 4 were excluded because they had additional diagnoses of autism spectrum condition (ASC), and a further 1 child who was in the final stages of such a diagnosis was also excluded, to ensure that we considered children with 'pure' SLI, rather than with associated autism spectrum conditions.

Language measures: Receptive vocabulary was assessed with the British Picture Vocabulary Scale 3rd edition (Dunn & Dunn, 2009), in which children are asked to point to one of 4 pictures representing a spoken word. Expressive language was measured using the Assessment of Comprehension and Expressive Language naming task (Adams, Coke, Crutchley, Hesketh, & Reeves, 2001), which requires the child to name sets of pictures. For both language measures we used standard scores derived from published norms.

The characteristics of the children with SLI and their TD counterparts appear in Table 1. The SLI group spanned a wider age range (from 5 to 9.5 years) and, as expected, scored markedly and significantly below the TD group on all the language measures. SLI children showed a mixed picture of receptive and expressive difference. There was no standard score discrepancy above 30 except for one child with a discrepancy of 45 (expressive higher) and another a discrepancy of 53 (receptive higher).

Table 1 about here

Measures

Emotion Understanding: The Test of Emotion Comprehension (TEC; Pons & Harris, 2000) is a widely-used standardised test of 4 - 11 year-old children's understanding of 9 aspects of emotion, using simple line drawings and with minimal language demands. The nine components tested are recognition of facial expression of emotions, comprehension of external causes of emotion, understanding desire-based emotions, understanding belief-based emotions, understanding reminders of past emotion, comprehension of emotion regulation, and understanding of hidden, mixed and moral emotions. These are clustered, conceptually and empirically, into 3 subsets: external (recognition, causes and reminders), mental (desire, belief, hidden emotion) and reflective (morality, regulation, mixed emotion), with raw scores out of 11, 6 and 4 respectively. The total score was computed following the test guidelines, with a maximum total score of 9 for passing all components.

Adjustment: Parents completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) scoring frequency of the child's behaviours on 5 scales based on 25 behaviour descriptions rated from 0 to 2 (never, sometimes or often): emotional symptoms, conduct problems, hyperactivity/inattention, peer problems and prosocial behaviour.

Conversation: This measure was adopted from Ruffman et al. (2002), as adapted from the Thorpe Interaction Measure (Thorpe, Rutter, & Greenwood 2003). A series of 12 photographs were selected from those used by Ruffman et al., depicting people in a wide range of situations, times and cultures (e.g. a group of children laughing while a boy sits separately on his own, children playing together, two adults apparently arguing, trainee monks finishing school, wartime queuing). Parents were asked to look through and discuss the pictures with their child as they would a picture book or magazine.

Procedure

The study was approved by the authors' University Research Ethics committee. Parents gave consent and children gave assent. Children first completed the language assessments and the TEC with the second author, a qualified occupational therapist trained in test administration. Meanwhile parents completed the CCC and SDQ questionnaires.

For the subsequent conversation task, mother and child sat comfortably side by side, on a sofa or in chairs, with a tablet displaying the photographs in a self-paced slideshow format, and were videotaped using a camera facing them. The researcher provided instructions and then left the room until the participants signalled they had finished.

Conversation coding

Conversations were transcribed and split into utterances (a unit of speech separated by a pause or shift in meaning). The coding was an extended version of that used by Ruffman and colleagues (Ruffman et al., 2002), modified into two coding systems that more sharply separated MST from type of utterance within which the MST might be contained. This was necessary to take proper account of the differences in language capability of the children and to provide mutual exclusivity, hence enabling the use of proportional measures in case of differing talk frequencies. The existing coding scheme had involved a mix of specific single-word mental state terms e.g. 'know', 'want', and

entire sequences of words, e.g. factual utterances or causal talk. By separating mental state terminology from utterance type, we were able to code utterances exhaustively and mutually exclusively, and to assess both absolute and relative frequency of talk as proportions of number of words, and of utterances. In order to achieve a high level of reliability, the coding system went through several iterations, adding examples and clarifications when coders disagreed. The first coder then coded all transcripts using the final scheme. A randomly-selected 17% of complete transcripts were then blind double-coded by a second rater. Coding of each sub-category showed high reliability, with percentages of agreement for each separate sub-category never falling below 88%, giving final kappa values of .99 for mental state talk and .96 for utterance type.

Mental state talk (MST): We used categories largely similar to those of Ruffman et al. (see Table 2): desire, emotion, cognitive (think/know), modulation of assertion (expressions about certainty of knowledge), other mental states, don't know, and physical state. Within mental state talk, we defined Emotion MST as the number of terms assigned to the emotion category, and Cognitive MST was the sum of 'think and know' plus 'modulation of assertion' (MOA) categories. We interpreted MOA generously, in that we included talk about what a picture 'seemed' to or 'might' show: as no context was provided with the pictures, speakers often speculated about what might be happening, and terms indicating epistemic uncertainty were common. 'Don't know' was coded but not included in cognitive MST totals, since many authors argue it is used holophrastically without indicating reflection on knowledge, e.g. Ruffman et al., 2002. Because these codings were single words or holophrases, in addition to counting the absolute number of mentions in each category, we could also compute the total as a proportion of the number of words uttered by that speaker.

Utterance type (UT): This was derived from an extended version of the coding by Ruffman et al., such that every utterance could be categorised exhaustively and mutually exclusively, as shown in Table 2, enabling computation of utterance types as absolute and proportional frequency if required. We included causal talk, following the Ruffman et al. scheme. We also included the

gestures of shrugging, or shaking or nodding the head where these acted semantically, as responses to questions.

Table 2 about here

Scaffolding of causal talk: We identified all statements involving a child in causal talk and these were categorised on two dimensions, according to whether or not the statement was supported by maternal scaffolding, and what type of cause was involved:

Un scaffolded: where a child produced a complete 2-clause causal statement unaided, e.g. *Child: He is not happy because they are laughing at him.*

Scaffolded: where the mother produced a partial causal utterance (typically, a question), completed by the child e.g. *Mother: Why is he sad? Child: Because he is sitting by the edge.*

Each of these statements was then coded for content. Because of the particular nature of the task, i.e. working out what was happening in emotion-relevant pictures, causal talk fell into 3 clear categories, which were sufficient to code all the transcripts:

Emotional: talk about the causes of emotion e.g. *Child: She is sad because they are not talking to her.*

Behavioural: talk about the causes of people's behaviour, e.g. *Child: They [police] are trying to get them [a crowd] so they can't get through [the barrier].*

Deductive: use of evidence or reason to warrant a particular inference, e.g. *Mother: Why do you think he is happy? Child: Because he is smiling.*

The 'deductive' label is derived from Donaldson's (2003) research into children's language of explanation, which contrasts empirical uses of *because* (giving causes of an event or state) with deductive uses, giving warrants for knowledge or claims. Its deductive use can be clearly identified by the formal phrase '*How do we know that...*' but it is more usual in everyday conversation to use '*Why*'. This means that statements can be ambiguous as to whether '*why*' is being used in an

empirical sense ('*Why is he sad? Because the boy hit him*') or a deductive sense ('*Why is he sad? Because he is crying*'). We coded deductive usage according to the nature of the response. Deductive usage was coded when the speakers clearly interpreted a question 'Why' in a deductive sense, i.e. giving reasons to warrant a statement rather than causes to explain an event or state.

Results

We first address SLI/ TD group differences in emotion understanding and reported adjustment. Next we look at the frequency of different types of talk by mothers and by children, notably for cognitive, emotion and causal talk. Third, we relate these types of talk to children's emotion understanding on the TEC and reported adjustment on SDQ. Fourth, we examine in more detail the sorts of causal utterances that children produced, in particular in relation to emotion, and assess how mothers' utterances scaffolded such causal talk.

An initial check showed that there were no gender differences in measures of language, emotion understanding or mental state talk, and no indication of interactions between gender and language group, so we did not analyse this variable further. The size of the sample clearly requires caution in interpretation for all analyses. There was little evidence of deviations from normality (skewness or kurtosis) in the SDQ, TEC and MST variables, other than one outlying score for child causal utterances, but there was some evidence for kurtosis in the scaffolding variables, which are thus analysed using non-parametric tests.

Group differences in Test of Emotion Comprehension and Adjustment

The total TEC score and the raw scores (as proportions of the maximum score) on each subtest for each group are shown in Table 3 (upper panel). As predicted, the SLI group performed significantly lower than the TD group on TEC emotion understanding overall, $t(16) = 5.38, p < .001$. Scores for each of the three separate subscales were also significantly different between groups, all $t(16) > 3.0, ps < .01$.

Scores on each subscale of the SDQ are also shown in Table 3 (lower panel). Children with SLI tended to score higher on indicators of difficulty: their average difficulty scores were borderline or clinically significant, and were significantly higher than those of the TD group, for each of emotion symptoms, inattention and peer problems. There were no significant differences between groups for conduct problems or prosocial behaviour.

Table 3 about here

We expected that emotion understanding would relate to reported adjustment problems, but we did not find any evidence for this: there were no significant correlations within either the TD or the SLI group between total TEC score and any of the SDQ sub-scales. Table 4 shows inter-correlations between these variables for each group. It also displays relations with language measures, which were largely not significant.

Table 4 about here

Qualities of Mother and Child Mental State Talk

We first checked for any absolute differences between TD and SLI groups in frequency of overall talk by mothers and by children. The two groups did not differ significantly either in the total number of mother utterances (TD $M = 109.67$, $SD = 41.7$, SLI $M = 112.56$, $SD = 36.87$, $t(16) = .52$), or in total child utterances (TD $M = 87.11$, $SD = 29.92$ and SLI $M = 77.22$, $SD = 18.06$ respectively, $t(16) = .85$). We also compared total number of words. There was no significant group difference in the total of mothers' words (TD $M = 731.11$, $SD = 332.88$ and SLI $M = 663.11$, $SD = 209.09$ respectively, $t(16) = .52$). TD children uttered a slightly but not significantly higher number of words than those in the SLI group, TD $M = 259.22$, $SD = 105.36$ and SLI $M = 198.22$, $SD = 136.39$, $t(16) = 1.06$, n.s.. This meant we used absolute number of mother and child utterances and words for each comparison.

Mothers' Talk

Mothers' uses of the different MST categories for each child group appear in Figure 1 (top). The two subcategories of cognitive talk (think/ know and MOA) are shown separately but were combined for analysis. The pattern was very similar across groups, with fairly frequent use of emotion and cognitive terms, and no significant group differences for either category, $t_s(16) = -.50$ and $.42$ respectively, n.s.. We also compared the range of emotion types (i.e. distinct emotion vocabulary items) mentioned by mothers. Mothers of TD children used a slightly greater range of terms ($M = 9.11$ types, $SD = 3.26$) than mothers of SLI children ($M = 6.78$ types, $SD = 2.68$) but this difference was not significant, $F(1, 16) = 2.75$, $p > .12$.

Figure 1 about here

There were similarly few differences for mothers' utterance types between TD and SLI groups, as shown in Figure 1(bottom). Mothers of SLI children used more repetition of the other, SLI $M = 12.44$, $SD = 7.52$ and TD $M = 5.11$, $SD = 5.97$, $F(1, 16) = 5.25$, $p < .05$.

Children's Talk

We now turn to children's talk, which yields a more differentiated picture. Types of MST uttered by children in the two groups appear in Figure 2 (top). There was no difference between groups in use of emotion terms, which were used fairly frequently, $F(1, 16) = .08$, n.s. However, SLI children used cognitive terms (think, know, MOA) significantly less often than TD children did, with $M = 2.33$, $SD = 2.78$ compared to $M = 7.22$, $SD = 4.84$ for TD children, $F(16) = 6.90$, $p < .05$: indeed, no child in the SLI group used a *think* or *know* term more than once in their conversations. Furthermore, children with SLI tended to use 'don't know' more ($M = 2.89$, $SD = 2.8$) than those with TD, $M = 1$, $SD = 1$, $t(1, 10) = 1.90$, $p < .10$, supporting the decision to analyse this category separately from think/know. For child utterance types (Figure 2, bottom), as with mothers, there were no differences in most categories. There was however a clear difference in children's use of causal utterances: these were more than twice as frequent in TD, $M = 7.44$, $SD = 5.00$, than in SLI, $M = 2.89$, $SD = 3.44$, $F(1, 16) = 5.06$, $p < .05$.

Figure 2 about here

Relations of emotion, cognition and causal talk to emotion understanding and adjustment

Patterns of correlations suggest that while there were high inter-correlations between measures of expressive language, in particular, and of mental-state talk, emotion understanding and adjustment, children's diagnostic group (SLI or TD) did not appear to strongly mediate these relations, using inspection of overlaps of diagnostic group data points in scatterplots. We therefore collapsed across diagnostic groups to investigate the correlations between MST and emotion understanding, following the practice of Lee and Rescorla (2008) in their study of MST in language-impaired children, thus also supporting greater statistical power.

Our first question in this section is about the relative importance of mother and child emotion, cognitive and causal talk in children's emotion understanding and adjustment. We look first at mothers. Mothers who frequently used cognitive talk also tended to use much emotion talk, $r(16) = .57, p < .01$, but neither of these talk types predicted children's TEC score, $r(16) = -.34$ with emotion talk and $r(16) = .22$ with cognitive talk. Mothers' cognitive talk was significantly associated with causal utterances, $r(16) = .57, p < .01$, which similarly did not predict children's TEC score, $r(16) = .21$.

The picture for children's talk is different. Their cognitive and emotion talk was not significantly correlated, $r(16) = .27$, and, like mothers, their causal and cognitive talk was closely related, $r(16) = .79, p < .01$. However, children's cognitive talk did significantly predict their TEC scores, $r(16) = .59, p < .01$, although their emotion talk did not, $r(16) = -.08$, and the difference between these two correlations was significant using Fisher's $z-r$ transformation, $z(16) = 2.46$, 2-tailed $p < .01$. The significant relation of TEC score with child cognitive MST also remained when child receptive and expressive language was partialled out, $r(14) = .49, p = .05$. Furthermore, child causal talk also predicted TEC scores, $r(16) = .52, p < .05$.

We also looked at relations between MST and adjustment scores on the SDQ, even though we had not found strong relations between emotion understanding and SDQ scores, as mentioned above. Mother emotion talk, cognitive talk and causal talk did not predict any of the child's SDQ sub-scores, all r s (17) $<.20$. For child MST, unlike the pattern of relations found with TEC emotion comprehension scores, child's SDQ emotion symptom scores were predicted neither by child emotion talk nor by child cognitive talk, r s (16) $<.20$. However, lower frequency of child emotion talk did predict higher ratings of peer problems, r (16) = $-.58$, $p <.01$, and low child cognitive talk predicted higher ratings of inattention, r (16) = $-.62$, $p <.01$. This latter relation remained when both receptive (BPVS) and expressive language were removed, r (14) = $-.56$, $p <.01$. Given the very small sample size and number of correlations examined here, though, these non-predicted relations must be treated with considerable caution.

Scaffolding of causal talk about emotion

The results so far show that maternal MST input did not differ for children with TD or with SLI, but that children with SLI used less cognitive and less causal talk than the TD group. Furthermore, these features of children's talk predicted children's emotion understanding, although not adjustment, across the groups. However, separation of mother and child talk in a joint conversation is somewhat artificial: a scaffolding approach would suggest that we look at what causal statements children are capable of, with or without support. We next looked at scaffolding of causal utterances of the 3 types identified: emotional, behavioural and deductive. Distribution of these data deviated from normality, and we used non-parametric tests.

Both groups of children were involved in the production of causal statements when scaffolded by mother's talk, with 29 such events for TD children and 25 for SLI children, a non-significant difference, Mann-Whitney $U = 32$, $p = .48$. The picture is quite different for children's unscaffolded production of two-clause causal statements, with a total of 27 for TD children (at least 1 for each child) and only 6 instances for SLI children (2 each for 3 children), a significant difference, Mann-

Whitney $U = 10.5$, $p < .005$. Further, the content of causal utterances in which children took part (whether scaffolded or unscaffolded) differed across groups. Most notably, TD children were involved in 36 causal structures involving emotion, compared with only 13 such structures for SLI (from 4 of the 9 children), Mann-Whitney $U = 14$, $p < .01$. Furthermore, the number of such statements was positively related to higher emotion understanding scores, Spearman's $\rho(16) = .61$, $p < .01$. TD children were involved in 19 deductive causal utterances, compared to only 6 for children with SLI: this was not a significant difference, Mann-Whitney $U = 28.5$, $p = .30$. Behavioural cause utterances appeared on 12 occasions in the SLI group but only once in the TD group: this difference was not significant, Mann-Whitney $U = 25.5$, $p = .19$.

Discussion

This study investigated the links between features of mother - child conversation and children's concurrent understanding of emotion and their emotional adjustment, comparing language-impaired and typically-developing children. As predicted, we found that children with SLI showed poorer emotion understanding and more difficulties in adjustment, in particular for emotion symptoms, inattention and peer problems. Furthermore, we showed that children's emotion understanding was predicted by features of their conversation with their mothers. Mothers of TD and SLI children respectively provided similar amounts of emotion and cognition-focused mental state talk, and causal talk, and the frequency of such talk types did not relate to children's emotion understanding. In contrast, features of children's talk did differ, and predicted their emotion understanding, providing new information about the link between conversation and emotion understanding in children with language impairment. Children with typical language development produced significantly more cognitive and causal talk than children with language impairment, and these higher frequencies predicted better emotion understanding. Children's simple use of emotion terms did not differ between TD and SLI groups, and did not predict children's emotion understanding. In contrast, analysis of how causal talk about emotion was scaffolded showed that

children with SLI virtually never produced causal statements without maternal scaffolding, and participation in causal talk about emotions, scaffolded or otherwise, predicted better emotion understanding.

In relation to existing research, our findings on causal talk and emotion understanding are consistent with those of Dunn & Brown (1993) for TD 2- to 3-year-olds, that child causal talk, but not mother causal talk, predicted children's emotion understanding, and we have extended these findings to children with language impairment in middle childhood. Our results on simple mention of emotion in relation to emotion understanding were not consistent with Aznar & Tenenbaum's (2013) prospective link between maternal emotion label use at child age 4- to 6 years and children's emotion knowledge 6 months later, but fit more closely Cervantes & Callannan's suggestion that maternal causal explanations of emotion are important from the age of 4, in contrast to the greater role of emotion labels in younger children.

Clearly, our results must be treated with appropriate caution, considering the very small sample size, and further work involving children with SLI is needed to test the suggestions we have made here. In particular, our data did not support links between reported adjustment and either emotion understanding or properties of conversation, although such links have been found in other research with typically-developing pre-schoolers. With such a small sample, it is difficult to make definitive statements, so further research with larger samples is needed to establish whether such links exist. Such research could also consider other factors involved in maternal support for social adjustment. It was clear in our transcripts that mothers differed in their apparent goals they had in talking about the pictures with their children. Some mothers focused on supporting conversation about emotions, while others were more focused on using the pictures as a stimulus to discussing rules for behaviour, for example asking children what actions they should take in situations depicting a victim.

The results support the idea that simply having emotion labels in one's vocabulary is a starting point for pre-schoolers, but no longer predicts emotion understanding for school-aged children: causal talk

about emotion appears to have an increasingly important role, including for children with SLI. The children with SLI in this study had sufficient emotion vocabulary to be able to label emotions in pictures readily, but were less likely to produce complex causal utterances about those emotions. Understanding structural aspects of language (e.g. syntax of embedded clauses) has sometimes been pitted against semantic aspects as an explanation of the link between language and ToM, but our analysis of how mothers support causal utterances about emotion shows how these are intertwined. Children with language impairment need to express and comprehend emotion vocabulary, and our results suggest that embedding this vocabulary into sentence structures expressing cause predicts better emotion understanding. Frequency of cognitive and causal talk was similar for mothers in the SLI and TD groups but different for the children. We think this underlines the collaborative nature of scaffolding activity: mothers provided close support for children to discuss causes of emotion, but children with SLI could rarely do so independently; so while they were involved in complex causal utterances about emotion, these utterances had to be supported by the mothers. TD children were more equal partners in these conversations. This seems a classic example of a Vygotskian shift from interpsychological activity – explanations being constructed between mother and child – to intrapsychological – the child independently constructing explanations for emotions. The children with age-typical language skills in this study were at a point where they could, with effort, construct complex causal utterances, but could produce more with the support of mothers' questions. Children with language impairment showed little evidence they could produce two-clause causal utterances and generally could not yet make use of the support provided by mothers. Data from longitudinal studies of SLI could illuminate the effects of these scaffolding processes with more clarity.

A better understanding of the mechanisms whereby adult input supports children's emotion understanding could also inform intervention studies. The conversations recorded here were redolent with structural support from mothers in both groups. The mothers of children with SLI were clearly familiar with the sort of support their children needed to complete the picture task. These

mothers used just as many cognitive terms and causal utterances as mothers of TD children, and this highlights the challenges involved in eliciting emotion-cause talk in children with language impairments. It was common for the mothers of children with SLI to provide persistent stepwise questions leading to causal constructions about emotion, and this was most notable with the child in this group with the highest TEC score:

M: Do you think the boy is happy? C: because he is smiling

M: He's smiling isn't he? Why do you think he is? C: Because maybe he's done some good work [...]

M: How do you think he feels? C: Happy

M: What do you think they might be happy about? C: They've both got the same jumper.

From a conceptual point of view, we suggest that it makes good sense to consider emotion talk in the context of a scaffolded conversation, over and above simply counting frequencies of talk types for mothers and children separately. That approach has clearly been very valuable in large-sample studies, showing the broad consistency and importance of mothers' talk to children in relation to those children's later social understanding and adjustment, and in identifying the different types of talk. Our coding system for conversation provides a reliable, mutually exclusive and exhaustive method of analysing mental state talk that could be used in larger studies to support or challenge our conclusions about the role of cognitive and causal talk. However, to understand the mechanisms of change through which children develop their understanding of emotion, we also need to study the processes of conversation, exactly as Vygotsky suggested in the idea of the zone of proximal development: what the child can do supported today, they can do unaided tomorrow.

The present study does not provide data to study change over developmental time, but our results suggest that scaffolding would be a useful lens through which to view changes in children's developing understanding. Analysing scaffolding of causal talk about emotions in larger samples, and across developmental time, seems an important research strategy if we are to understand

developing emotion understanding in both TD and SLI. For example, do children with SLI follow a similar but delayed pathway to TD children in their causal talk? Our descriptive data showed that causal talk in children with SLI was primarily behavioural, but for TD children almost never was (we found only 1 such example in the TD group), compared with TD children's significantly more frequent involvement in talk about emotional causes. Does this mean that causal talk about behaviour might pave the way for more complex talk about causes of emotions? This is certainly a pattern consistent with Dunn & Brown's (1993) study with younger children, where causal talk about internal states (including emotion) showed a significant increase between 33 and 40 months, whereas behavioural cause talk remained constant across this period. Longitudinal and intervention studies in children with SLI could usefully inform these questions. Seeing how carers, and education professionals, with daily experience of interaction with SLI, provide support for conversations could bring insights into what types of intervention might be developed. Further research could also investigate ways that scaffolding causal talk supports development of emotion understanding. For example, Donaldson et al. (2003) suggest that causal connectives might serve to direct children's attention to specific causal relationships. Intervention studies focusing on cause could illuminate the conversational mechanisms that support children's developing understanding of causes of emotions.

An important consideration for research into family conversation is variability according to the nature of the conversations studied, and a purely descriptive database of the content of and frequency of different talk types is of value. We think that the TIM task we used, discussing pictures out of context, very common in studies of MST and ToM, may yield a high number of cognitive terms, because of the frequency of statements expressing doubt and certainty about what the situations depicted might be. This may be helpful in supporting children's reflective capacity and deductive inference about mental states. Previous studies of conversation with SLI children have involved conversations around toy play (e.g. Lee & Rescorla, 2008; Owen van Horne & Lin, 2011) or an experimenter questioning the child about their life (Johnston et al., 2001) and reported lower levels of cognitive talk than we found. Also, the conversations we recorded appeared highly

connected, in Ensor & Hughes (2008) terms, compared to their conversational context of meal preparation and eating, in which conversation would be more often disrupted. It is therefore important to consider the different contexts of conversation that children experience, and the ways in which context constrains or supports emotion understanding, in the way, for example, that Dunn, Beardsall & Brown identified different patterns for conversation with sibling, parent and peer, and Aznar & Tenenbaum found different patterns for emotion talk with mothers and with fathers. Our context probably samples relatively high-level opportunities for mothers to support complex causal conversation. We know very little about the rate or frequency of conversations needed to support children's developing emotion understanding, though new methods of 'big data' capture might provide information about the amount and mix of input needed to foster such understanding.

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Table 1 Means and standard deviations of characteristics in each participant group

Group	N (M/F)	Chron. age	Receptive	Expressive	CCC composite centile
SLI	9 (5/4)	87.40 (18.36)	86.67 (8.22)	5.67 (2.89)	13.62 (4.54)
TD	9 (4/5)	87.31 (8.87)	108.67 (14.55)	11.56 (2.74)	81.78 (19.25)
<i>t</i>		-.01 (ns)	3.95 (p<.005)	4.45 (p<.001)	6.71 (p<.001)

Notes: M/F = male/female, Receptive = BPVS standard score, Expressive = ACE naming standard score, CCC = Child Communication Checklist composite scaled score

Table 2 Conversation coding scheme (extended from Ruffman et al., 2002)**Mental state talk (MST)**

Desire Want, like, love, hope, wish, dream, prefer, keen on

Emotion Happy, sad, unhappy, feel, cross, angry, grumpy (NOT nice)

MOA Modulations of assertion Might, maybe, perhaps, possibly, probably, could be, must, certainly, definitely, sure, guess, figure, reckon, certain, suppose, wonder, expect, curious, bet, looks like (e.g. he's cross), obviously

TK Think, know, believe Do you know what that is? She knows that's going to happen. They're thinking hard. Let me think. I think it's lovely

OMS Other mental state We went to F, remember? I understand that. He's trying to do it.

DK Don't know I don't know (on its own 'packaged')

PH Physical state or behavioural symptom of emotion Hurt, ill, in pain, sleepy, tired, hungry, thirsty, cry, smile, laugh, giggle

Utterance type (UT)

CT Causal talk questions or explanations that include cause e.g. *because, so, why*

DEscriptions describing content of picture, possibly in response to a Question, or reading text from screen e.g. *She's riding a bicycle*. [person is riding a bicycle in picture]. Use this rather than RO if child picks alternative of 2 suggested by mother and if child agrees with M suggestion (*yes, nod*)

RES Response to previous utterance, e.g. picking one of two alternatives suggested [note this is not coded as RO] , saying or indicating nonverbally *yes, know, don't know*

EOT Elaborations of a theme going beyond content of picture e.g. *What fish will he catch?* [picture of fisherman, no fish visible] Also include evaluations *'that's not very nice', 'what a shame'*

FT Factual talk Providing general factual information in relation to picture e.g. *A stethoscope is for listening to the heart.*

QU Question non-causal e.g. from mother to elicit child talk or from child to get information *'What colour are they wearing?'*

Note how to distinguish from OU (below)

LCL Links to child's life Any reference to child-related past or future actions, interests etc. *We did that when we went to the beach, That looks like Daddy.* Use in preference to QU if mother poses a LCL in QU form (*Is that like you?*)

OU Orienting utterances General utterances functioning to get child's attention or keep them on task, including task guidance, e.g. *'swipe for picture 1' 'Look, what's that?', 'What have we got here?'* If it makes specific reference to the picture, use QU e.g. *'What are they doing?'*

RO Repetitions of other Mother repeats child's utterance –copy of utterance from previous person's turn with or without elaboration

SR Self-repetitions Mother repeats own utterance without an intervening utterance, with minimal change *'What are they wearing?'*

Can you see what they are wearing?'

AP Appraisal Feedback on other's comment e.g. *Yes, that's right, well done* So for example C; *'pointing'* (Des) M: *that's right* (AP), *he's pointing* (RO)

Table 3 Means (standard deviations) of emotion and adjustment scores by group

TEC emotion proportional scores					
Group	TEC external	TEC reflective	TEC mental	TEC total score	
SLI (n=9)	0.77 (.19)	0.22 (0.15)	0.59 (0.28)	4.00 (1.87)	
TD (n=9)	0.97 (.05)	0.56 (0.24)	0.94 (0.12)	7.78 (0.97)	
t (difference)	3.05**	3.50**	3.50**	5.38**	
Strengths and Difficulties Questionnaire (maximum = 10)					
Group	Emotion symptoms	Conduct Problems	Inattention	Peer problems	Prosocial
SLI (n=9)	4.44# (2.45)	2.67 (2.12)	7.00# (2.74)	4.00# (3.12)	6.67 (3.12)
TD (n=9)	1.11 (2.09)	1.78 (2.59)	3.33 (3.28)	1.33 (1.58)	8.22 (2.05)
t (difference)	3.10**	0.80	2.58*	2.29*	1.25

Notes. * p<.05, ** p<.01. # = at or beyond clinical cut-off

Table 4. Inter-correlations of Language, Emotion Comprehension and Adjustment for children in typically-developing (n = 9, shaded background) and language-impaired (n = 9, clear background)

	groups								
	Age	BPVS	ACE	TEC	SDQ-E	SDQ-C	SDQ-I	SDQ-PP	SDQ-PS
Age		-.53	-.52	.55	.06	-.04	-.36	.01	.47
BPVS			.79**	.22	.13	-.04	.17	-.01	-.69*
ACE				-.04	.01	.00	.14	-.22	-.20
TEC					.07	-.32	-.37	-.10	-.10
Age		-.18	.22	.69*	.64*	.50	.13	.43	.01
BPVS			.13	.26	-.10	-.65	.34	.53	.05
ACE				.33	-.14	-.23	.21	-.38	-.11
TEC					.54	-.06	-.29	-.02	-.24

Key: BPVS = receptive language standard score, ACE = expressive vocabulary standard score, TEC = Test of Emotion Comprehension total score, SDQ = Strengths and Difficulties Questionnaire: E emotion, C = conduct, I = inattention, PP = peer problems, PS = prosocial behaviour

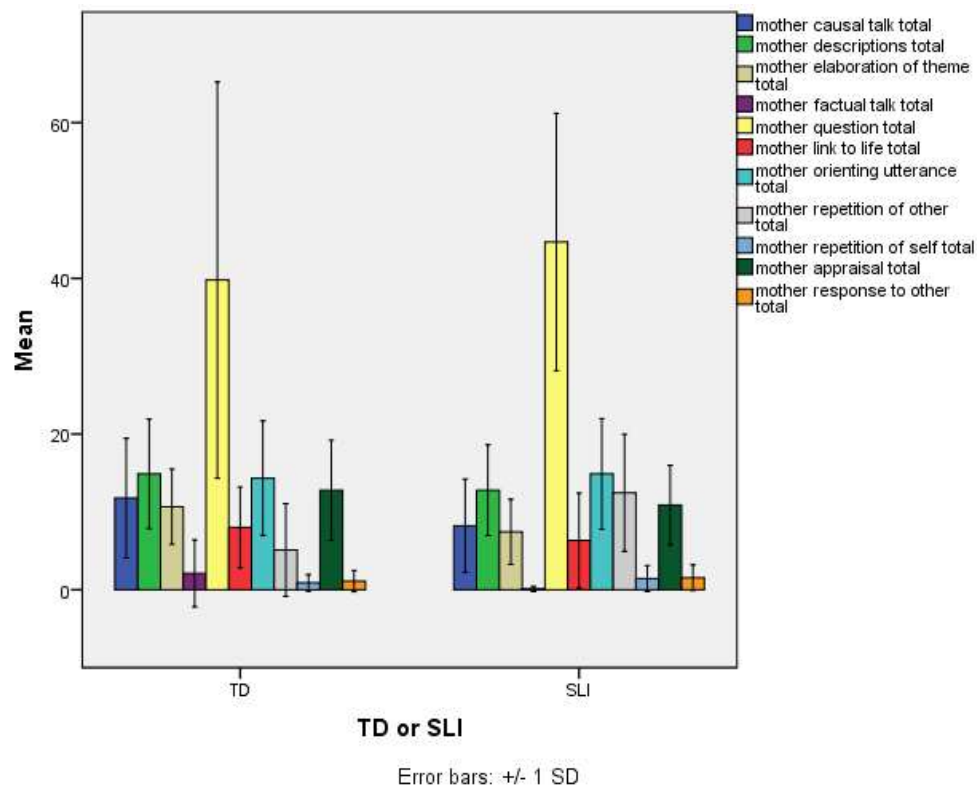
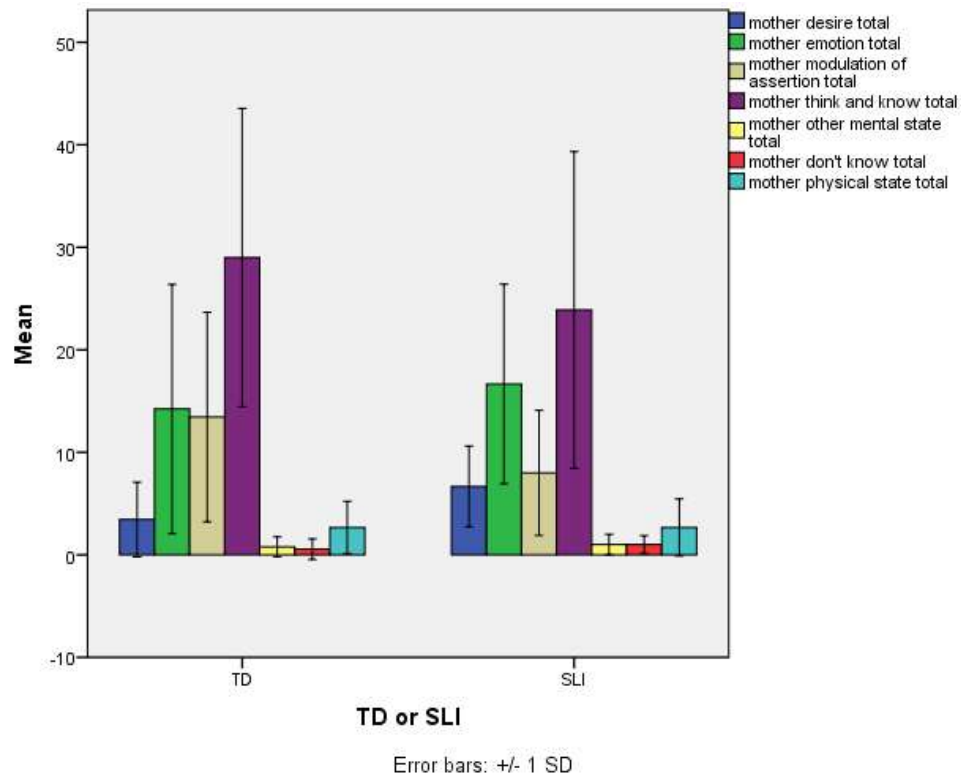


Figure 1: Totals for each category of mother talk: mental state talk types (top), utterance types (bottom) (N = 9)

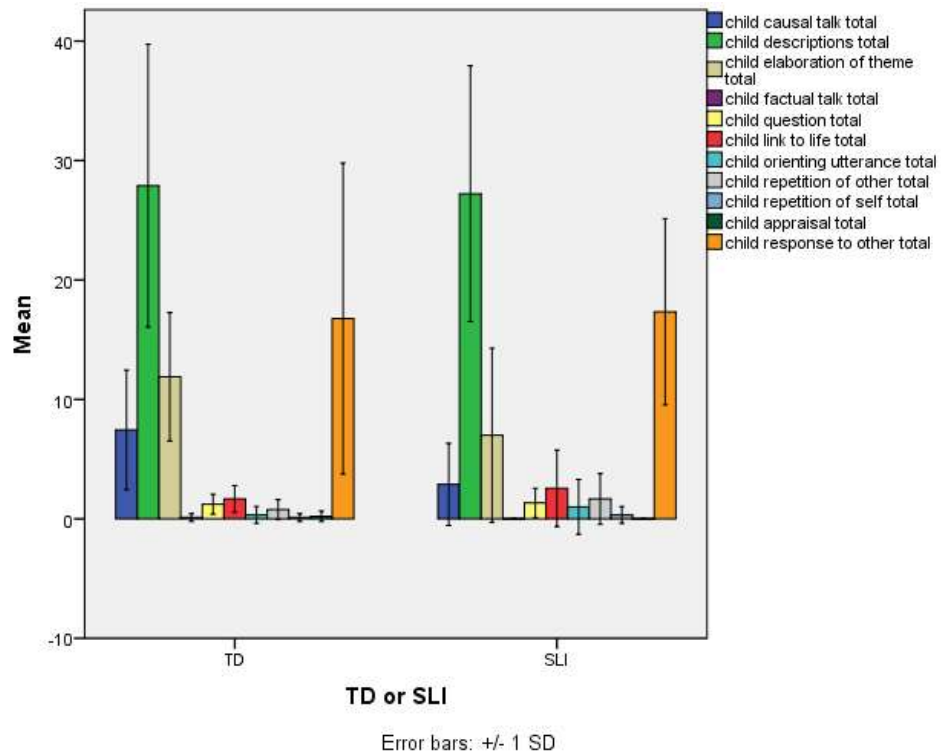
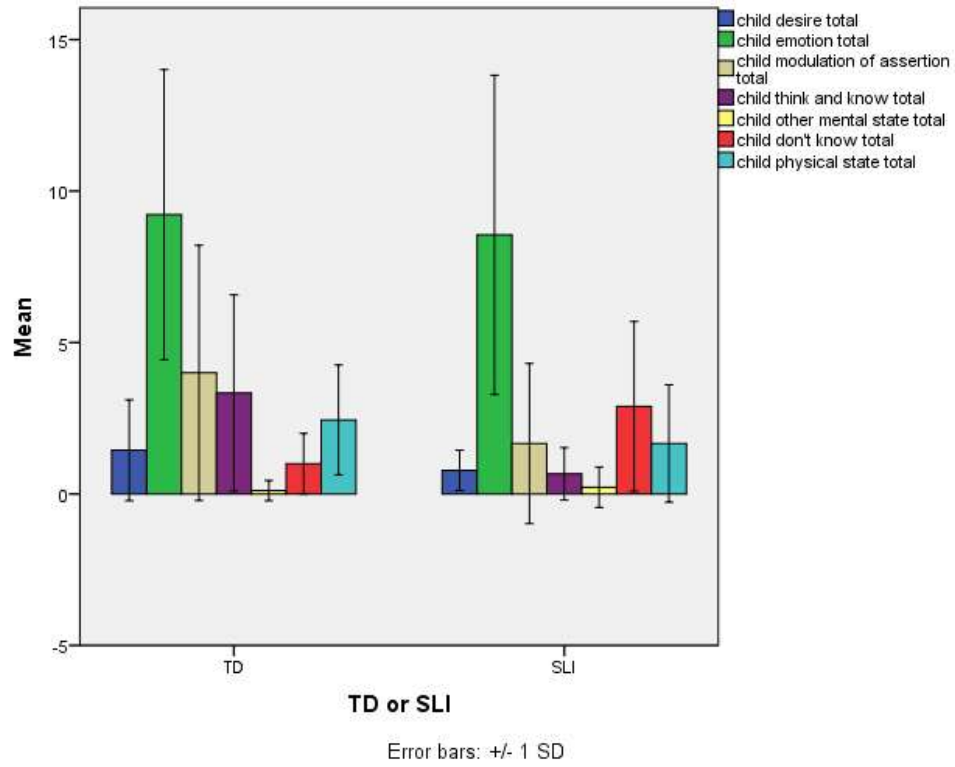


Figure 2: Totals for each category of child talk: mental state talk types (top), utterance types (bottom) (N = 9)