Children's understanding of mental states as causes of emotions

Carolien Rieffe
Developmental Psychology
Leiden University, The Netherlands

Mark Meerum Terwogt
Department of Developmental Psychology
Vrije Universiteit, Amsterdam, the Netherlands

Richard Cowan
School of Psychology and Human Development
Institute of Education
University of London, UK

Address for correspondence:
Carolien Rieffe
Developmental Psychology
Leiden University
PO Box 9555
2300 RB Leiden
The Netherlands

Email address: crieffe@fsw.leidenuniv.nl

Abstract
Theory of Mind studies of emotion usually focus on children's ability to *predict* other people's feelings. This study examined children's spontaneous references to mental states in *explaining* others' emotions. Children (4-, 6- and 10-year-olds, n = 122) were told stories and asked to explain both typical and atypical emotional reactions of characters. Because atypical emotional reactions are unexpected, we hypothesized that children would be more likely to refer to mental states, such as desires and beliefs, in explaining them than when explaining typical emotions. From the development of lay theories of emotion, derived the prediction that older children would refer more often to mental states than younger children. The developmental shift from a desire-psychology to a belief-psychology led to the expectation that references to desires would increase at an earlier age than references to beliefs. Our findings confirmed these expectations only partly, because the nature of the emotion (happiness, anger, sadness or fear) interacted with these factors. Whereas anger, happiness and sadness mainly evoked desire references, fear evoked more belief references, even in four-year-olds. The fact that other factors besides age can also play an influential role in children's mental state reasoning is discussed.

Keywords: emotion understanding, desires, beliefs, theory-of-mind

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Introduction

Emotions are powerful tools in social interaction. As Frijda (1986) pointed out, expressing emotions can create, keep or change relationships. Crying can be intended to provoke a consoling reaction, whereas smiling signals amity or agreement. Understanding and acting on others' emotions play a crucial role in daily life (Denham, 1998; Harris, 1989; Meerum Terwogt & Olthof, 1989; Saarni, 1999). At a very young age, children distinguish between different emotional expressions. Babies of just four months old will smile back at a smiling adult, whereas they will turn away and reach for their caregiver when confronted with a frowning face (Saarni, 1999). When they are one year old, babies use the caregiver's emotional expression as a guide for their own behaviour. They either approach a target or turn away from it and reach for the caregiver instead according to the caregiver's facial expression (Klinnert, Campos, Sorce, Emde & Svejda, 1983; Moses, Baldwin, Rosicky & Tidball, 2001).

A more sophisticated understanding of emotions requires more than just recognizing and reacting to emotional expressions. Knowing what has caused the emotion is important because it places the emotional experience within a socio-cultural context. For example, not knowing why your mother is angry can be frightening. Knowing it is because your father is late identifies the cause and maybe you can comfort her. Dunn (1988) observed an increasing interest in the causes of other people's feelings in the third year. Understanding a direct link between situational elements and emotions is shown among three-year-olds, who predicted happiness when the protagonist received a desired item and an unhappy feeling when the protagonist was denied this treat (Wellman, 1990).

Several studies suggest an early understanding of the prototypical situations that elicit the basic emotions of happiness, sadness, anger and fear (e.g. Barden, Zelko, Duncan & Masters, 1980; Harris, Olthof, Meerum Terwogt & Hardman, 1987; Trabasso, Stein & Johnson, 1981). Yet, children also have to understand that emotions can be a consequence of a person's interpretation of a situation and are not just a mechanical product of the situation by itself. This requires a so-called theory of mind, which refers to the understanding that it is not an objective reality, but people's subjective representations of this reality that guides their emotions and actions. To accomplish this understanding, children first need to realize that this subjective representation of the situation depends on mental states, such as desires and beliefs. Second, they have to recognize that knowledge about the content of other people's desires and beliefs can be necessary for understanding or predicting others' emotional reactions.

Most three-year-olds appear to perceive desires and beliefs as objective features of the world: they think that their ideas about desirability and their beliefs about the true state of affairs apply to everyone. Around the age of five, children appreciate the fact that people have different desires and beliefs, and predict others' emotions accordingly, even if they find those desires undesirable (Rieffe, Meerum Terwogt, Koops, Stegge & Oomen, 2001) or find others' beliefs to differ from their own situational knowledge (Hadwin & Perner, 1991; Harris, Johnson, Hutton, Andrews & Cooke, 1989; Rieffe, Meerum Terwogt, Koops & Hagenaar, 2000; Symons, McLaughlin, Moore & Morine, 1997; Wellman, 1990). Therefore, an important gain in children's understanding of emotions is made at around the age of five when they show understanding that emotions are based on desires and beliefs, which can differ from person to person, irrespective of the content of their own mental states. In sum, it has been argued that children develop from a situationist concept of emotion to a so-called "mentalistic concept" of emotions in which there is an increasing emphasis on mental states as causal factors (Harris, 1989; Meerum Terwogt & Stegge, 1995; Rieffe et al, 2001; Wellman, Harris, Banerjee & Sinclair, 1995).

Several authors (Astington, 2001; Bosaki & Astington, 1999; Rieffe & Meerum Terwogt, 2000; Slomkowski & Dunn, 1996) have stressed the point that theory of mind development should be studied in relation to "real-world consequences" (Astington, 2001, p.685). Most research on theory of mind and

emotions provides participants with explicit information about the protagonist's mental states and children are asked for emotion predictions (Hadwin & Perner, 1991; Harris et al, 1989; Rieffe et al, 2000; Rieffe et al, 2001; Symons et al, 1997; Wellman, 1990). Although there is no question about the theoretical significance of this work and the usefulness for our understanding of children's daily functioning, it is also important to realize that people quite often fail to explicitly express their mental states in everyday life. Consequently, children are frequently confronted with emotional reactions and have to figure out for themselves what has caused these reactions, which can be more or less difficult.

Witnessing a happy face when reaching for a biscuit tin is a scenario from which one can easily figure out the person's desire for a biscuit and the belief that the tin will contain them. However, the link between situations and emotions will not always be so apparent and inferences about others' mental states will often be hypothetical. Therefore, even when children have demonstrated that they can make adequate theory of mind predictions, it is still uncertain whether they are also inclined to use this ability spontaneously and 'invent' more or less arbitrary mental state explanations for emotions they observe in others. The spontaneous formulation of plausible hypotheses and checking on their validity seem essential in order to make sense of the social world around us. The main purpose of this study, therefore, is to explore children's spontaneous references to mental states as causal factors in the explanation of emotional reactions. In addition to age, the present experiment investigates two other factors that may influence this process: the type of mental state and the typicality of the situation-emotion connection; i.e. the psychological distance between the eliciting situation and the consequent emotion.

Previous studies that asked children to explain emotions have found that around the age of six, children rarely make mental state references when asked to explain others' emotions (Harris, 1989; Wellman & Banerjee, 1991), whereas ten-year-olds refer to mental states as causes of visible emotional reactions (Harris, Olthof & Meerum Terwogt, 1981). Moreover, when children are asked to predict other people's emotions, their understanding of the causal relationship between desires and emotions precedes their understanding of the causal relationship between beliefs and emotions (Harris et al., 1989; Rieffe, 1998; Wellman, 1990). Children also appear to talk about desires at an earlier age than about beliefs in their spontaneous speech acts (Bartsch & Wellman, 1995). It could be argued that the conceptual distance between desires and emotions is smaller than the distance between beliefs and emotions, because desires and emotions share the same motivational component, whereas beliefs provide the basis for this attitude but are themselves purely cognitive. This distinction between different mental state references has not been made explicit in the previously mentioned emotion-explanation tasks, but will be considered in this study. It seems likely that references to desires will appear earlier than references to beliefs.

Within a particular sociocultural context, the connections between certain events and feelings are supposed to vary little from person to person, even when it is commonly understood that different people can have different desires or beliefs: one is supposed to be happy with a gift and sad with the loss of a best friend. Explanations of these typical emotional reactions in terms of situational factors are self-evident, because they usually reflect a shared view of the world. The question "Why is he *happy* when he receives a present?" might simply evoke a situational explanation "Well, because he receives a present!" Even if participants acknowledge the underlying mental states – the present is thought to be a desirable object – they might consider them to be self-evident. Therefore, confirmation that participants truly acknowledge mental precursors is absent. Gnepp (1983) suggested another approach. She asked children to explain an atypical emotional reaction, which discouraged children from making simple references to the situation. For example, when asked "Why is he *angry* when he receives a present?" the answer "Because he receives a present" will be insufficient for most people, in the sense that it does not explain the strangeness of the emotional reaction: an angry response to a gift does not reflect a typical scenario. However, imagining that the protagonist has an atypical desire ("He doesn't like presents") or a different belief ("He thinks that it will be something stupid") makes the feeling intelligible. In this study we therefore adopted a similar approach, which allows us to see whether atypical emotions indeed elicit more

mental state references.

Theory of mind research that aims to reveal whether children are able to use beliefs and desires as a reason for behaviour normally focuses on the years between 3 and 6. The acknowledgement that beliefs and desires are also constituents of emotions is expected to appear somewhat later (Harris, 1989). In the present experiment, in which we ask children to explain typical as well as atypical emotional reactions, we therefore questioned three age groups: four-, six- and ten-year-olds, which reflects a time span that goes well into middle childhood.

The main purpose of this study was to explore children's spontaneous references to mental states in explaining the emotions of others. By using rather prototypical scenarios, it was expected that all the children would identify the typical emotional reaction of the protagonist. In accordance with the findings of Gnepp (1983), we expected many would simply refer to the situation in explaining typical emotions. This might hold for all age groups, since situational explanations can reflect either an inability to consider mental states or a belief that the mental states involved are too obvious to mention. This phenomenon might mask the expected developmental increase in the number of mental state references.

After questioning the children about the typical reaction, it was suggested that the protagonist really reacted with a different emotion and they were asked if they could explain that. We hypothesized that atypical emotions would appeal more strongly than typical emotions to children's tendency to refer to mental states as the cause of other people's emotions. Moreover, in explaining these atypical reactions, we expected marked age related differences. In line with earlier findings, we expected that older children would give more mental state references (desires and belief references) than the younger group. Additionally, we expected an increase of desire-references at a younger age, whereas an increase of belief-references was expected to occur later.

Method
Participants
In this study, 43 4-year-olds (mean age 4-7, range 4-0 to 5-0), 42 6-year-olds (mean age 6-3, range 5-9 to 7-2) and 43 10-year-olds (mean age 10-4, range 9-8 to 10-11) participated. Approximately half of the participants in each age group were male. The children came from primary schools located around Amsterdam in the Netherlands and were from middle social-economic backgrounds. Parental consent was sought before children were tested and children were asked if they wanted to participate before they were taken from their class. The participation rate was 100%.

Material
The material consisted of six short stories, which described prototypical emotion-eliciting situations (Appendix 1). To ensure that the youngest group would fully understand the emotion concepts involved, we restricted ourselves to the four basic emotions happiness, anger, sadness and fear (Barden et al, 1980). Moreover, anger and sadness are both plausible reactions to one and the same scenario, because a situation can arouse anger in one person and sadness in the other, depending on whether one concentrates on the cause of the negative outcome or on the negative consequences (Stein & Levine, 1989). These two emotions were therefore placed in one emotion-cluster. Two stories were designed to provoke happiness, two stories were designed to provoke sadness or anger, and two stories were designed to provoke fear (Table 1). Within the first two pairs, one story features a male protagonist and the other a female protagonist. Female characters were used in both fear scenarios as previous studies indicated boys (of all age-groups) often resisted the idea that a boy character may experience fear.

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Table 1 about here

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An example of a (Fear-Angry) story is:

This is Nadia. Nadia is lying in bed, because she is going to sleep. The lights in her room are already switched off. Suddenly, Nadia hears a strange noise. How does Nadia feel now she hears this strange noise? (Q1) And why does Nadia feel...? (Q2) Yes, I would have thought so too. But Nadia doesn't feel [emotion given by the participant]. Nadia feels angry when she hears this strange noise. Why does Nadia feel angry? (Q3)

Procedure

Participants were tested in a quiet room in a session of approximately 10 minutes. To familiarise participants with the emotional concepts that would be used in the stories, they were asked if they sometimes experienced happiness, sadness, anger and fear, and if they could give examples. The experimenter prompted children who had difficulties in providing examples. For example: "When it's your birthday? Do you feel happy then? Okay, and could you think of something else now?" All children who initially failed to provide an example did so successfully after this prompt. The six stories were presented in random order. Sessions were tape-recorded.

After hearing each story, participants were asked how the protagonist would feel and why (Q1 and Q2). If participants failed to identify an emotion, they were asked "Do you think [name protagonist] feels happy, sad, angry or afraid?" The order of the suggested emotions was randomised to avoid biased responses. Once participants had predicted and explained an emotion, the experimenter said that the protagonist felt differently and named an atypical emotion. The atypical emotions (happiness, anger or fear) were fixed for each story as in Table 1. The experimenter then asked participants to explain the atypical emotion (Q3).

Scoring

Explanations were assigned to the following categories if they explicitly referred to mental states: *Beliefs*, if the explanation referred to the protagonist's beliefs, e.g. "she is angry, because she thinks that the noise is her brother coming upstairs and he has woken her up", or *Desires*, if the explanation referred to the protagonist's desires, e.g. "she is angry because she wants to sleep".

Note that the categories for beliefs and desires are not exclusive, because the response: "He thinks it is a car and he really wants a car" refers to a desire and a belief. Such responses were then assigned to both categories. This was the case for 2, 26 and 43 responses by 4-, 6- and 10-year-olds respectively.

Explanations that referred just to the situation and did not include reference to mental states were categorised as *Situational,* e.g. "because Linda's parents had promised her that they would go to the zoo and now they are staying home" (10-year-old) or "because she can't go to the zoo" (4-year-old).

Answers were coded as missing if i) the participant had not predicted the typical emotion; ii) the participant could not think of an answer; or iii) the answer was missing on the tape. The responses of 6 participants (3 4-year-olds and 3 6-year-olds) were excluded from further analyses, because they had two missing values on one emotion-cluster (two Happiness, Anger/Sadness or Fear stories). When participants had one missing value per emotion-cluster, the remaining score was included in the analysis.

Two raters coded all responses. The interrater agreement was 97.5% and disagreements were resolved by discussion.

Results

Predictions of typical emotions

Correct predictions of the typical emotion were frequent. Table 2 shows that for most stories, correct predictions ranged from 92% to 100%. One story differed (Table 1, story 2) This concerned a girl who goes outside to play with other children. Overall, 81% predicted the expected emotion of happiness, but several predicted a negative emotion, such as sadness (12%), anger (2%), or fear (4%). An analysis of variance showed no effect for Age.

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Table 2 about here

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Explanations of emotions

Across the 12 requests for explanation of emotions, situational explanations were given more often by 4-year-olds (M = 8.10, SD = 2.13) than by the other two age groups (M = 5.97, SD = 2.44 and M = 5.77, SD = 2.35 respectively for 6- and 10-year-olds). A one-way analysis of variance confirmed a significant main effect for age ($F_{(2,119)}=12.63$, $p<.001$, $\eta^2 = .18$). Post-hoc comparisons using the Ryan-Einot-Gabriel-Welsch Q (REGWQ) procedure with $\alpha = .05$, as recommended by Howell (2002) when variances are homogeneous, confirmed the observed difference between 4-year-olds and the two older age groups, which did not differ.

Analyses of desire and belief

For the analysis of children's references to mental states, we carried out analyses of variance (ANOVA) with Age (4-, 6- or 10-year-olds) as a between-subjects variable and Emotion (happiness, anger/sadness and fear), and Typicality (atypical and typical) as within-subjects variables. These analyses were done separately for two dependent variables: the proportions of explanations that referred to desires and the proportions of explanations that referred to beliefs. As these are proportional data, they were also transformed as recommended by Winer (1970) using the following transformation to stabilise variances: $X'_{ijk} = 2 \arcsin\sqrt{X_{ijk} \pm \boxed{} / 2n}$. All main analyses were conducted both on untransformed and transformed data. The results were the same. To facilitate understanding of the trends, the means reported in Tables 3 to 6 are of the untransformed proportions.

Desire references

Table 3 shows how the proportion of desire references for each emotion cluster varied with age. To analyse the results a three-way ANOVA on the proportions was conducted with Age (4-, 6- or 10-year-olds) as a between-subjects variable, and Emotion (happiness, anger/sadness and fear), and Typicality (atypical and typical) as within-subjects variables. As Table 3 suggests, there is a substantial increase in desire references to the happiness and anger/sadness stories with age but references to desire were uncommon in explaining fear for all age groups. The ANOVA confirmed significant main effects for Age ($F_{(2,119)} = 8.46$, $p<.001$, $\eta^2 = .12$) and Emotion ($F_{(2,238)} = 40.12$, $p<.001$, $\eta^2 = .25$) and a significant interaction between Age and Emotion ($F_{(4,238)} = 3.64$, $p<.01$, $\eta^2 = .06$). Separate comparisons of age group for each emotion cluster with Games-Howell post-hoc tests revealed that both 6- and 10-year-olds made more desire references when explaining happiness and anger/sadness than the 4-year-olds but the older age groups did not differ from each other. Explaining fear by referring to desire did not vary with age. Separate comparisons of emotion for each age group using post hoc paired t-tests with a Bonferroni correction (Howell, 2002) showed that all age-groups made more references to desire when explaining anger/sadness than when explaining fear. In addition, both 6- and 10-year-olds made more references to

desire when explaining happiness than when explaining fear.
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Table 3 about here
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Overall, children referred more to desires in explaining atypical emotions than when explaining typical ones, but this was due mainly to explaining why someone felt angry or sad when this was not the typical emotion: Table 4 shows how desire references varied with emotion and typicality. In the ANOVA there were significant effects for Typicality ($F_{(1,119)}$ = 22.30, p < .001, η^2 = .16) and the interaction between Emotion and Typicality ($F_{(2,238)}$ = 10.44, p < .001, η^2 = .08). No other interactions were significant. Post-hoc paired t-tests with a Bonferroni correction confirmed that desire references only varied with Typicality for anger/sadness.

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Table 4 about here
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Belief references

First, explanations that referred to beliefs increased with Age (Table 5), although there was little change from 4- to 6-year-olds for anger/sadness and happiness, and little difference between 6- and 10-year-olds for fear. Second, fear stories evoked more explanations that referred to belief than the other two emotion clusters. Many children referred to beliefs that reflected the protagonist's lack of knowledge in fearful situations "Because she doesn't know who is making that noise" or to fearful expectations "because she thinks it is a monster or a scary man" (Table 5). The proportions of references to beliefs were analysed by a 3 (Age) x 3 (Emotion) x 2 (Typicality) ANOVA, which confirmed significant main effects for Age ($F_{(2,119)}$ = 15.05, p < .001, η^2 = .20) and Emotion ($F_{(2,238)}$ = 57.28, p<.001, η^2 = .33) and an interaction of Age x Emotion ($F_{(4,238)}$ = 2.89, p <.03, η^2 = .05). Separate comparisons of age group for each emotion cluster with Games-Howell post-hoc tests confirmed that 4-year-olds made fewer references to beliefs than 10-year-olds for each emotion and fewer references to beliefs in explaining fear than 6-year-olds. Separate comparisons of emotions for each age group using post hoc paired t-tests with a Bonferroni correction showed that in each age group children explained fear more often by referring to beliefs than for Happiness and Anger/Sadness.

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Table 5 about here
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Typicality showed a different pattern for all three emotions with respect to children's belief references. Children made more references to belief when explaining atypical anger and sadness than when explaining typical anger/sadness, as expected. Typicality had less effect on explaining happiness and the opposite effect on explaining fear; typical fear evoked more references to belief than atypical fear. The Emotion x Typicality interaction was significant ($F_{(2,238)}$ = 10.70, p < .001, η^2 = .08) and post-hoc paired-sample t tests with Bonferroni corrections confirmed the apparent pattern of variation. The results in Table 6 are collapsed over Age, because Age was not influential with respect to Typicality.

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Table 6 about here
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Discussion

The main purpose of this study was to explore children's spontaneous references to mental states as causal factors in the explanation of emotional reactions in others. Consistent with other research (Harris et al., 1981), this study found these kinds of references increased with age. Four-year-old children tended

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just to mention situational factors, either neglecting or not making explicit the role of a person's mental experience. For example, "He is angry with his present, because it is something for girls" (instead of 'he *thinks* that it is something for girls'). Six- and ten-year-olds' explanations of others' emotions showed an increasing consideration of the subjective character of emotions by their explicit references to the protagonist's desires and/or beliefs "He is angry, because he wanted something else".

Yet, a different pattern was found for desire- and belief-references. Desire-references increased from four- to six-year-olds for happiness, anger and sadness, and then stabilised. Fear, on the other hand, evoked fewer desire-references, which did not increase with age at all. Belief-references increased for happiness and fear between the 4- and 6-year-olds, but not for anger/ sadness. Between the 6- and 10-year-olds, however, belief references increased for happiness, anger and sadness, but not for fear. The fact that children's desire references in the explanation of others' basic emotions such as happiness, anger and sadness peaked at six years of age is in line with other findings that children's understanding of desires precedes their understanding of beliefs (Bartsch & Wellman, 1995; Harris et al., 1989; Rieffe, 1998; Wellman, 1990). Yet, the fact that even 4-year-olds seem to make a considerable number of belief references in order to explain fear, seems to undermine the suggestion that children's ideas about emotions develop from a simpler drive theory – in which emotions and desires are comparable -, to a naïve kind of cognitive emotion theory, in which emotions also depend on the subjective appraisal of the situation.

A factor that clearly affected children's responses was the nature of the different emotions. Although unanticipated, it is not difficult to explain why children's explanations of fear differed from those of other emotions. Happiness, sadness and anger are emotions that clearly focus on the outcome: did one receive what was desired? In the literature, these emotions are referred to as desire-based emotions (Hadwin & Perner, 1991; Wellman & Bartsch, 1991). Harter and Whitesell (1989) asked for the causes of these emotions and children typically referred to "getting what was wanted" for happiness, and to undesirable outcomes for anger and sadness. Fear, however, is an anticipatory emotion (e.g. Izard, 1991) and is referred to as a belief-based emotion. Fear is based on the *thought* that something bad might happen. This explains why happiness, anger and sadness elicited mainly desire references, whereas fear produced mainly belief arguments.

As expected, atypical emotions elicited more desire and belief references than typical ones, but only in the case of anger and sadness, and not for happiness or fear. Unexpectedly, participants even referred more often to beliefs when asked to explain a typical fear reaction than an atypical fear reaction. This may be caused by a difference in level of abstraction that appeared between typical and atypical fearful situations. The atypical fear stories concerned social situations in which the fearful element was easy to point out. One story, for example, referred to fear of possible peer rejection in a social situation. In both typical fear stories, the protagonist was in a dark room or house and heard a strange noise or saw a strange person. These scenarios were more obviously sources of fear-evoking uncertainty, and many children responded that the girl in the story was scared, because "she does not know who [what] it is". Therefore, it seems as if another factor can be identified that influences children's mental state reasoning: one's familiarity with certain emotion scripts.

In conclusion, the results of the present study show that age is not the only factor that affects mental state reasoning. Elements, such as the nature of the emotion, or the distance between the emotional impact of the situation and the emotion reaction (here, typical versus a-typical), not only influence the frequency of mental state references, but also have a differential effect in the choice of belief or desire arguments. This strengthens the point made by Astington (2001) that theory of mind research should not be limited to belief tasks, but should provide more room for the study of desire elements as well. Astington argues that even though desires and beliefs are both important guides for human behaviour, people's motivational

states usually play a dominant role in their everyday social interactions.

Earlier on we suggested that acknowledgement of beliefs is essential for developing from a naïve drive theory into a lay cognitive emotion theory. However, within the latter theory, understanding the motivational nature of desires is still equally important. Whereas the belief aspect lies at the basis of understanding that emotions can be changed, the desire aspect represents the idea that several emotions are also resistant to change. Sometimes a simple thought (e.g. "He did not do it on purpose") can quickly change an acute emotion, whereas emotions can appear as autonomous and uncontrollable processes in other cases (e.g. "I know I shouldn't be jealous, but I can't help it"). Even professional theorists in the area of emotions usually need two, more or less separate, circuits (a basic emotion program and a cognitive control circuit) for a cognitive emotion theory with some explanatory power (e.g. Lazarus, Coyne & Folkman, 1982; Levenson, 1999).

A lay theory of emotion not only requires the acknowledgement of the basic theory of mind premises that people do not react to the situation per se, but their own mental representation of that situation; it also requires some understanding of the mutual effect of thoughts and feelings. Thoughts can change the way we feel about the situation. But, it is equally true that our feelings more or less automatically affect our reasoning process in a way that inhibits change (Meerum Terwogt & Stegge, 2001). Negative feelings tend to strengthen the saliency of negative information. Happiness, on the other hand, blinds one to possible dangers and tends to elicit optimistic appraisals. A basic understanding of this interaction seems to be one of the corner stones of emotional competence and emotional control (Denham, 1998; Meerum Terwogt & Stegge, 1998; Saarni, 1999). Knowing how beliefs affect your feelings facilitates all kinds of mental strategies (Meerum Terwogt & Stegge, 1995). Vice versa, understanding that feelings tend to bias the reasoning process in an automatic and predictable way, allows one to correct for this bias (Meerum Terwogt, 1986) and stimulates socially important considerations, such as "My friend should not suffer from the fact that I am angry". The present experiment illustrated how children start to adapt their theory of mind reasoning to a number of situational determinants, which very well might be one of the prerequisites of further developments in emotional competence. Further research can give more information about other possible determinants in this respect.

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Table 1. Six stories with typical and atypical emotions

Story content	Typical emotion	Atypical emotion
1. Boy receives present from his mother	happy	angry
2. Girl goes outside to play hide and seek	happy	afraid
3. Girl cannot go to the zoo, but has to stay home	angry/sad	happy
4. Boy has a dog that is not very well	sad	afraid
5. Girl sees unknown person in dark living-room	afraid	happy
6. Girl lies in bed and hears a strange noise	afraid	angry

Table 2. Percentage of correct emotion predictions as a function of Age and Story

	Happiness		Anger/Sadness		Fear	
	story 1	story 2	story 3	story 4	story 5	story 6
4-year-olds	93	78	97	95	92	95
6-year-olds	95	72	92	100	97	95
10-year-olds	100	86	100	95	98	100

Table 3. Proportion of desire references as a function of Age and Emotion

	Happiness	Anger/Sadness	Fear
	N_____		
4-year-olds	40		
M	.10	.16	.06
SD	.18	.22	.14
6-year-olds	39		
M	.22	.37	.08
SD	.23	.27	.14
10-year-olds	43		
M	.27	.33	.10
SD	.22	.27	.18
Total	122		
M	.20	.28	.08
SD	.22	.27	.16

Table 4. Proportion of desire references as a function of Typicality

	Typical	Atypical
Happiness		
M	.18	.22
SD	.29	.28
Anger/Sadness		
M	.18	.38
SD	.30	.36
Fear		
M	.07	.09
SD	.19	.22
Total		
M	.14	.23
SD	.19	.19

Table 5. Proportion of belief references as a function of Age and Emotion

	N	Happiness	Anger/Sadness	Fear
4-year-olds	40			
M		.03	.04	.15
SD		.09	.10	.20
6-year-olds	39			
M		.11	.06	.33
SD		.20	.14	.31
10-year-olds	43			
M		.19	.15	.40
SD		.22	.21	.23
Total	122			
M		.11	.09	.30
SD		.19	.16	.27

Table 6. Proportion of belief references as a function of Typical and Emotion

	Typical	Atypical
Happiness		
M	.09	.14
SD	.22	.25
Anger/Sadness		
M	.05	.12
SD	.15	.25
Fear		
M	.36	.23
SD	.41	.32

Appendix 1, Translation of the six emotion evoking stories from Dutch

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1. This is Joost. Joost comes home from school and his mother says: "Joost, I have a surprise for you" and she gives him a little present. He does not know what is inside the package. How will Joost feel when he gets the package?

2. This is Saskia. Saskia sees that the children outside are playing hide and seek. Saskia goes outside to join them. How will Saskia feel when she walks outside?

3. This is Linda. Linda's parents had told her that they would be going to the zoo today. But now, Linda's mother says that they can't go, but will have to stay home. How will Linda feel when she is told that they won't be going to the zoo anymore, but will be staying at home?

4. This is Walter. Walter has a dog that he usually plays with. But today, Walter's dog is not very well and he lies in his basket. How will Walter feel when his dog is not very well?

5. This is Madelein. Madelein comes home from school. It is already dark outside, but the lights in the house are not turned on yet. Suddenly, Madelein sees someone standing in the living room. It is too dark for Madelein to see who it is. How will Madelein feel when she sees this person?

6. This is Nadia. Nadia is lying in bed, because she is going to sleep. The lights in her room are already switched off. Suddenly, Nadia hears a strange noise. How will Nadia feel when she hears this strange noise?