

Children's understanding of the connection between thinking and emotion: Cognitive cueing
as a means of emotion induction

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Abstract

Children's developing understanding of the connection between thinking and emotion forms a significant part of Theory of Mind (ToM) development. ToM refers to the ability to understand other people's mental states, and to recognize that these mental states influence their behaviour. Several studies have shown that ToM develops rapidly between the ages of 3 and 11 years old. Certain areas of development are still unclear however; in particular, children's understanding that emotions are not only a consequence of current situational states but also of past experiences. The main aim of this research was to investigate the development of children's understanding of the connection between thinking and emotion. Using an emotion attribution task, this understanding was examined in a cross-sectional design, comparing three specified developmental age bands: 4-5-years old, 6-7-years old, and 9-11-years old. Children's performance on these measures increased significantly with age, indicating a better understanding of the connection between thinking and emotion with increasing age. Furthermore, children more readily gave cognitive cueing responses for a character's negative emotions than for positive emotions, particularly when the character's emotion did not match the current affective context.

Keywords: thinking and emotion, cognitive cuing, child development, mental reasoning, theory of mind

Introduction

Human beings are socially orientated. Most of our daily activities involve talking to, interacting with, and thinking about people (Lagattuta & Wellman, 2001). Emotions, especially, are an essential part of guiding these everyday social interactions. They influence the way in which we perceive and respond to people and events, they reinforce and prevent certain behaviour, and they inform or disrupt social bonding (Lagattuta & Wellman, 2002).

Given that feelings¹ are a ubiquitous part of everyday social interactions, children are encouraged from a young age to interpret and make sense of their own and others' affective reactions (Adams, Kuebli, Boyle, & Fivush, 1995). This requires an understanding that thoughts, emotions, and actions are not only a consequence of current context, but are also influenced by desires, beliefs, intentions, and past experience (Lagattuta & Wellman, 2001; Lagattuta, Wellman, & Flavell, 1997). Faced with a number of constantly changing environments, individuals often experience emotions that are not related to the environment per se, but are rather caused by thoughts elicited from environmental stimuli, including thoughts about past experiences (Harris, 1983). Thinking and emotions are thus powerful regulators of social encounters. For instance, thinking about positive events can stimulate feelings of joy and peace whereas thoughts about negative events can elicit feelings of depression and sadness (Lagattuta & Wellman, 2002).

Theory of Mind and Emotion

Social interactions are critically guided by our ability to understand and predict other people's mental states: Theory of Mind (ToM). We generally understand people as intentional, and goal-directed beings, and therefore we interpret their actions, and emotional states with reference to what we understand to be their desires, beliefs, thoughts, and intentions (Lagattuta & Wellman, 2001; Wellman, Phillips, & Thomas, 2000).

Thinking-emotion reasoning in children is logically related to ToM development, although these two constructs have typically been studied independently of each other. Findings from several studies have supported this claim (Ketelaars, van WeerdenBurg, Verhoeven, Cuperus, & Kino, 2010). For instance, from as early as 4 years of age, children come to understand that beliefs, perceptions, and desires about an event influence one's emotion about the event. For example, children understand that if an event occurs which is

¹ Note. The terms 'emotion' and 'feeling' are used synonymously.

contrary to their belief, they are likely to feel surprise; however, if they falsely believe that the event will occur as anticipated, they are likely to feel happy (Baron-Cohen, 1991). Moreover, studies have shown that individual difference in children's performance on ToM measures is significantly related to their understanding of emotion (Cutting & Dunn, 1999; Hughes & Dunn, 1998). By implication then, emotion understanding in children is related to the ToM construct.

Although the main focus of this research is on children's understanding of thinking and emotion, because this understanding is related to ToM development, it is first necessary to understand the typical development trajectory of ToM.

Theory of Mind development in children

ToM refers to the ability to infer the mental states of others (Baron-Cohen, Leslie, & Frith, 1985). Developing predominantly during childhood, ToM encompasses a range of abilities' including false belief and emotion understanding. Concepts of ToM have been voluminously described in the literature, largely with the use of false belief paradigm (Ketelaars et al., 2010). The classic false belief paradigm conducted on children by Baron-Cohen and colleagues (1985), known as the 'Sally-Anne test', shows Sally placing a marble in her basket and then leaving the room. While she is away, Anne removes the marble from Sally's basket and hides it in her box. Participants are then required to infer where Sally will look for her marble when she returns to the room. If participants answer the question correctly (i.e., 'Sally will look for her marble in her basket'), they display an understanding that Sally's belief does not represent the reality of the situation. The ability to infer this mental state in Sally is known as ToM. In particular, this understanding of another person's mental state is called first-order belief attribution, developing in children typically at around 4 years of age (Baron-Cohen, 2001; Wellman, Cross, & Watson, 2001). False belief paradigms have also included second-order false belief tasks: an understanding that people can have beliefs about other people's beliefs (eg. 'Sally thinks Mary thinks X'). Children between the age of 5 and 7 years have been shown to effortlessly understand this task, demonstrating second-order belief attribution (U. Frith & C. D. Frith, 2003).

As these findings suggest, false belief paradigms have been shown to measure specific developmental milestones in ToM, hence their consistent and widespread use. While first-order belief attribution represents mental state reasoning and ToM development in 3-to-5-year-olds, second-order belief tasks illustrate even further developmental changes that

occur in normal children's mental state reasoning and ToM skills (Baron-Cohen, 2001; U. Frith & C. D. Frith, 2003).

However, ToM is a complex construct, and various ToM abilities continue to develop beyond seven years of age. This more complex development has been demonstrated in children's ability to recognize and understand social faux pas. For instance, someone turns to a person in a coffee shop and says 'I've spilt my coffee, can you please mop it up' mistaking that person for a waiter when in fact they are simply another customer. Children have typically been shown to develop this ability between the ages of 9 and 11 years (Baron-Cohen, O'Riordan, Stone, Jones, & Plaisted, 1999).

In sum, both false belief and social faux pas experimental paradigms have served as important indicators of developmental milestones in ToM between the ages of 3-to-11-years old, contributing tremendously to our understanding of ToM in children. However, because ToM consists of a host of abilities, researchers have in recent years embraced a number of other paradigms such as those used in the studies of thinking-and-emotion, to test for a wide variety of abilities connected to cognitive development and ToM (Ketelaars et al, 2010). Because thinking-emotion reasoning forms a part of ToM development, these studies have not only contributed to our understanding of ToM but also to that of social interaction in general (see Lagattuta et al., 1997; Lagattuta & Wellman, 2001).

Thinking and emotion in children

Children express emotions very early in life. As early as 18-to-24 months children express emotional-descriptive utterances with reference to current affective state, whereas from 2-to-5-years old, children's emotion utterances include past, present, and recurrent feelings (Dunn, Bretherton, & Mun, 1987; Harris, 1993; Hughes & Dunn, 1998). However, it is only in later development that children are able to understand their own emotional reactions and attribute emotions to others. As children's understanding of emotion develops, they initially predict a single emotion most plausible for a given situation (Perlman, Kalish, & Pollak, 2008). For instance, preschoolers readily assert that birthday gift make one feel happy (Lagattuta et al., 1997). However, through ToM development, prior experience, and learning children come to realize that situations may result in more than one emotional response and that a number of reactions may be plausible for any given situation, due to the subjective nature of emotions (Hughes & Dunn, 2002; Perlman et al., 2008). By implication, children develop an understanding that prior experience and individual histories with a given situation will influence their appraisal of the current affective context (Lagattuta & Wellman, 2001).

This understanding is often fostered by early parent-child conversations about emotions. Parent-child talk on emotions covers a host of issues including drawing out the child's feelings, emphasizing the causes and consequences of those feelings, drawing attention to the emotional implications of their behavior, and by elaborating on the emotions of story characters (Harris, 1993). Family discourse on the causes and consequences of emotion not only enables children to vicariously learn about their own emotional reactions but also influences children's later understanding and ability to attribute emotion in others (Dunn et al., 1987; Dunn, Brown, & Beardsall, 1991). Moreover, parents' discourse on emotions frequently highlights negative emotions more than positive emotions. Although parents' refer equally to both positive and negative emotions they often speak of negative emotions in a different way, emphasizing and elaborating the causes and consequences of negative emotional reaction. Lagattuta and Wellman (2002) suggest that this negativity bias provides a cogent framework upon which children later come to understand the connection between prior experience, mental states, and emotion, in both positive and negative valence situations. Therefore, by virtue of these conversations, children become more aware of the connection between thinking and emotion, and that past emotions can be reactivated by cues in the appraisal of the current affective context (Harris, 1993).

Children's understanding of thinking-and-emotion. The development of children's understanding of the *connection* between thinking and emotion is said to occur in a stepwise fashion. Firstly, children discover that objective experiences are followed by emotional states appropriate to those experiences. For instance, children recognize that external experiences that are pleasant will produce appropriate and corresponding internal emotions of happiness. Secondly, children develop an understanding that certain environmental cues can prompt thinking about prior experiences, and that the memory of those experiences can in turn elicit the appropriate emotion associated with that past experience. This understanding, importantly, displays the development of a connection between thinking and emotion, which is the main focus of this research. Lastly, children acquire the knowledge of ongoing states of mentation being accompanied and elicited by certain emotional responses, with or without the presence of external cues (Flavell, J. H., Flavell, E. R., & Green, 2001).

Emotion attribution tasks. The emotion attribution tasks reported by Lagattuta et al. (1997) typically investigates children's understanding of the mental rather than situational causes of emotion induction. In doing so, children's understanding of the connection between past experience, thinking, and emotion is examined. These researchers posit that a number of related concepts are necessary for performance on these tasks, including: i) acknowledgement

that emotions are affected by thinking, prior experience, beliefs, desires and intentions; ii) the ability to infer mental states in others; iii) a subsequent understanding of how mental states can influence emotional reactions; iv) and an awareness of cognitive cueing as a source of thought-inducing emotional reaction.

In order to appreciate a developmental understanding of the link between cognitive cueing, thinking and prior experience as precursors for emotion induction, researchers commonly present child participants with a series of emotion attribution vignettes coupled to appropriate illustrative diagrams. In these stories, characters experience negative or positive emotionally loaded events. Subsequent to the event, characters are exposed to cognitive cues as a reminder of the prior experience. The presence of the cognitive cue induces the reoccurrence of the character's earlier affective state. For instance, if a dog trampled a garden of roses on one occasion, then subsequently seeing that same dog later will trigger thoughts and emotions about the trampled roses. This remembering of the past experience therefore causes a reoccurrence of those earlier feelings of sadness. Researchers question participants on their understanding of the causes of the character's current emotional state and examine the degree to which children's explanations of emotional responses are attributed to the cue and thoughts of prior experience as opposed to objective situational factors (Lagattuta et al., 1997; Lagattuta & Wellman, 2001)

Lagattuta and Wellman (2001) used these emotion-cueing measures to examine understanding in children ranging from 3 to 7 years old. The results revealed that with increasing age, preschool children are capable of attributing the character's current emotional state to thoughts about past experiences, and in addition, relate the source of their thinking to cognitive cues within their environments. While 3-4-year-olds seldom showed an appreciation for cognitive cueing as a source of emotion induction, 5-7-year-olds increasingly displayed knowledge of this understanding by explicitly linking the cue to past experience in their accounts of emotion reactivity. Consistent with these findings, Gnepp and Gould (1985), using a similar protocol, reported that 3-, 4-and-5-year-olds are commonly capable of explaining emotional reactions based upon characters' current desires, beliefs and even intentions; however, 3-year-olds in particular show difficulty understanding current emotional states in relation to cognitive cues and past experiences, hence their tendency to attribute emotional reactions to observable situational factors. These findings are not only restricted to hypothetical vignettes; good evidence shows a strong correlation of 3-year-olds' performance in understanding thinking and emotion to real life social interactions (Hughes & Dunn, 2002). This could imply that 3-year-olds simply do not have enough prior experience

to rely on, or that their emergent understanding of thinking and emotion is inadequately developed for them to appreciate a connection between thinking and emotion (Harris, Johnson, Hutton, Andrews & Cooke, 1989). Moreover, although children's overall cognitive cueing response explanations increased with age, children of all ages provided significantly more cue-to-past event response explanations for negatively valenced emotion events, particularly when the emotion mismatched the current affective context. For example: "Mary feels sad when the black spotted dog tramples all her roses. Many days later Mary sees the same black spotted dog, who walks over to her, sits down, and wiggles his tail 'real friendly' and Mary starts to feel sad." This scenario constitutes a negative mismatched emotion response, where the character's negative emotion valence mismatches the current affective context (Lagattuta & Wellman, 2001). By implication, conversations about negative emotions offer children insight into understanding the connection between thinking and emotion, and understanding that one's current emotion is not always tied to the current context but rather markedly influenced by thoughts and reminders of prior experiences (Harris, 1993).

These studies on emotion attribution have exhibited a significant transition in ToM development in preschool aged children, consistent with that found when using traditional ToM paradigms. Because children's ToM development shows major improvement between the ages of 3 and 11 years olds it is to be expected that a related developmental increase will be seen in children's understanding of the mental attribution of emotion (Hughes & Dunn, 2002). However, studies using these emotion attribution tasks have yet to demonstrate this extended developmental trajectory of the growing understanding of this connection, as to date they have largely focused on preschool children age 3 to 7 years old (Lagattuta et al., 1997; Lagattuta & Wellman, 2001).

The consensus in the literature reveals that children between the ages of 3 to 7 years display increasing understanding of the relationship between mind and emotion, in accordance with increasing development of ToM abilities (Ketelaars et al., 2010). Moreover, it is evident that the research area of thinking and emotion shares a common ground with that of ToM - however, these areas have not been traditionally linked.

Because ToM abilities continue to develop throughout childhood, and include thinking-emotion reasoning, it is well warranted to investigate children's growing understanding of the connection between thinking and emotion. Therefore, examining children's performance on emotion attribution tasks, in age ranges extending beyond preschool ages will not only inform a more nuanced picture of children's developing

understanding of the connection between thinking and emotion, but also that of ToM development in general (Dunn & Hughes, 2002; Ketelaars, 2010).

Specific aims/ Hypothesis

It is still unclear whether children's understanding of the connection between thinking-and-emotion develops beyond age seven years. To investigate the developing understanding of a connection between thinking and emotion, a cross-sectional study was conducted comparing three specified developmental age bands between 4 to 11 years old. This understanding was examined using the emotion attribution tasks reported by Lagattuta et al., (1997).

In particular, the following hypotheses were tested:

- (1) Children should perform better on tasks of thinking and emotion with increasing age, thereby displaying a better understanding of the connection between thinking, prior experience and emotion.
- (2) Children's performance on negative valence emotion measures should differ from their performance on positive emotion valence measures.

These findings aim to inform a broader knowledge of children's developing understanding of the connection between thinking and emotion.

Methods

Design and Setting

This study was a cross-sectional comparison of three developmental age bands: 4-5-years, 6-7-years, and 9-11-years ($n = 15$ each). Testing took place in day care centers and primary schools, in a quiet room, free from any distractions.

Participants

This study adhered to the ethical guidelines for research with human subjects as stipulated by the Health Professions Council of South Africa (HPCSA) and the University of Cape Town (UCT) Codes for Research. Ethical approval was obtained for this study from the UCT Department of Psychology Ethics Committee and from the Western Cape Education Department, as part of a larger research study in ToM development. Permission was also obtained from the relevant primary schools and day care centers to recruit their students for the study. Informed assent and consent was then obtained from participants and their parents before testing (see Appendices A and B for examples).

Forty-five typically developing children between the ages of 4 and 11 years took part in this study. These participants were recruited from day care centers and primary schools in the Cape Town area, drawn from an existing participant pool used by researchers at UCT. Participants were matched, across each age band, as closely as possible, on sex, socio-economic status, ethnicity, and home language. Furthermore, all participants were fluent in English (see Appendix C).

Table 1
Demographic characteristics by age group

	Age		
	4-5 (<i>n</i> = 15)	6-7 (<i>n</i> = 15)	9-11 (<i>n</i> = 15)
Demographic Information			
Age Range (Years: Months)	4:1-5:10	6:0-7:11	9:3-11:1
Age (Years)			
<i>Mean (SD)</i>	5.19 (0.51)	6.95 (0.58)	10.27 (0.60)
Sex			
<i>Male: Female</i>	6: 9	7: 8	6: 9
Language			
<i>English: Afrikaans: Xhosa</i>	13: 1: 1	10: 0: 5	8: 0: 7
Ethnicity			
<i>White: Black: Coloured</i>	4: 2: 9	7: 5: 3	4: 6: 5
Socio-economic status			
<i>High: Medium: Low</i>	5: 5: 5	5: 5: 5	4: 4: 4 ^a

^a*Note.* Income information missing for three participants from the 9-to-11-year old age group.

Inclusion and exclusion criteria. Children presenting with any neurological disorders such as Autism Spectrum Disorder (ASD) or with a history of any such disorders, head injury, or infantile meningitis were excluded from the study. In addition, children with any serious social or developmental deficits such as attention-deficit hyperactive disorder (ADHD), conduct disorder (CD), oppositional defiant disorder (ODD), communication disorder, or any other pervasive developmental disorder, or a history thereof were excluded from the study.

Measures

Two story trials were administered consisting, in total, of 16 thinking-and-emotion cueing stories. These story trials were adapted from those used by Lagattuta and Wellman (2001), and similarly to theirs, were divided into two categories: emotion-situation fit and emotion-person fit. The emotion-situation fit story trials examined children's understanding of the connection between prior experience, thinking, and current emotions, based upon the degree to which the story characters' emotion matched the current affective situation. The

emotion-person fit category was used as a control measure in order to examine children's understanding that the same situation can elicit different emotional responses in different people.

Emotion-situation fit stories. Children were exposed to six emotion-cueing stories, featuring three positive and three negative emotion valence situations, which were further subdivided into emotion-situation match and emotion-situation mismatch endings. Each story presentation featured eight colourful picture cards, which were presented to the child one-by-one as the story unfolded. The emotion-cueing stories featured a character that experiences an affective event (happy, sad, etc.) paired with a particular visual cue. Many days later, the same character would see an identical object (cognitive cue) from this past experience and re-experience the same emotion. In emotion-matched endings, the story character's emotion, after having encountered the cognitive cue, matched the current affective context. In emotion-mismatched endings, the story character's emotion, after having encountered the cognitive cue mismatched the current affective context (see Appendix D for examples).

Emotion-person fit stories. This story trial was used as a control in order to examine children's understanding of the individuated nature of emotional response within a given context. Children were exposed to one positive and one negative emotion cueing story. These story trials were also divided into emotion-person match and emotion-person mismatch endings. These emotion cueing story trials included an additional character naïve to the original affective event experienced by the target character. Each story presentation featured eight colourful picture cards, which were presented to the child one-by-one as the story unfolded. In emotion-person matched story endings, the target character's emotion, after having encountered the cognitive cue, matched the current affective situation and the additional character's emotion. In emotion-person mismatched story endings, the target character's emotion, after having encountered the cognitive cue mismatched the current affective context, and the additional character's emotion. These emotion-person cueing stories were used to examine children's ability to infer that the target character and the additional character would demonstrate different affective states depending on their unique connection with the cognitive cue and prior affective experience (see Appendix E for examples).

In order to ensure that children remembered the events following each story, two procedures were followed. Firstly, after the initial happy or sad event, a control question was included, which asked participants to explain why the story character felt happy or sad

Secondly, subsequent to being cognitively cued to the past event, participants were asked why the character started to experience the particular emotion of say, happiness or sadness: “Why does [character] start to feel [happy/mad/sad] right now?” In addition a supplementary test question was asked if the participant explained that the character was remembering the past experience but failed to mention the cue: “What made the [character] think about the [past event] right now?” If the participant explained the character’s emotion with reference to the past experience but failed to use mental language such as ‘thinking’ and ‘remembering’ a *thinking prompt* was used such as: “Is [character] thinking about the [past experience] right now?”, if children responded, ‘yes’, then they were required to validate the reasons causing the character to think about the past event, such as: “Did the [character] just start to think about the [past event] or did something make them start to think about it?”, in which case children were required to make reference to the cue. In order to ensure that children provided detailed explanations for the character’s emotional responses, rather than simple yes/no judgments, I encouraged further explanation by clarifying, extending, and paraphrasing their responses. Only after the child continued to provide no response or repeatedly answered ‘I don’t know’ did I continue with the next story measure. These procedures were followed in both emotion-cueing story measures (see Appendices D and E for examples).

Control measure. In addition to the story trials administered during testing, three explanation of action stories were administered. These stories served as a control measure in order to examine children’s ability to articulate explanation of actions. For instance, a story may have featured a character that spilt milk on the floor and had to then wipe up the mess. In these scenarios, children were asked why the character is wiping up the mess, as a means to assess their ability to articulate behavioural explanations for the character’s action response. This measure was meant to control for potential confounds, ensuring that children’s poor performance on the emotion-cueing measure was due to their immature development of understanding cognitive cueing and emotion, rather than their immature ability to articulate explanations.

Each story was introduced as follows: ‘Okay, now I am going to tell you a story and I need you to listen to me very carefully, because afterwards, I am going to ask you some questions. Are you ready?’ The illustrative diagrams coupled to each story were left in front of the child during testing in order to minimize memory demands.

Coding of responses. Children’s response explanations on the emotion cueing story trials were coded into four categories as defined by Lagattuta and Wellman (2001). These response explanations were given a score of zero or one for each of the following categories,

with four being the maximum score that could be obtained. If a child gave a cognitive cueing response, he or she was automatically credited for the second and third category response types. In addition, response categories were marked with an asterisk where *thinking prompts* were required.

1. Situational and current experience response: This category includes children who either attributed the character's emotion reactivity to current situational factors or gave uninformative responses. For instance, the child might have made up something from the current situation in order to explain the characters' sadness. (eg. 'Because she doesn't like clowns,' 'Because she hates red balloons') or the child said: 'I don't know' as their only response.
2. Past event responses: The child attributed the character's emotional reaction to the past event. For instance, the character is sad 'because her rabbit ran away'
3. Thinking responses: The child attributed the characters emotional reaction to thinking about prior events; however, in response to the question, 'What makes X think of Y right now?' the child made no reference to the cue as the elicitor of those thoughts and feelings (eg. child said, 'Because she likes her rabbit', or nothing at all).
4. Cognitive cueing responses: The child attributed the character's emotional reaction to cognitive cueing of thoughts about past experiences. Children may made use of any correlates or associates to represent their understanding of the connection between the cue and the past experience. However, the answer consists of three components: 1) the cognitive cue as an elicitor of 2) thinking about 3) the past experience.

In addition, the control measure received a score of zero or one for each explanation of action provided, with three being the maximum score that could be obtained.

Procedure

Story trials were piloted on children within the relevant age bands beforehand ($n = 5$) in order to ensure that the measures were culturally appropriate and that children's response explanations satisfied the coding response categories, as defined by Lagattuta and Wellman (2001). Written informed consent was obtained from participants' parents or guardians beforehand. In addition, parents or guardians completed a demographic questionnaire in which they were also required to provide information on their child's development in order to identify any children who met with the exclusion criteria. Information such as the child's gender, grade, ethnicity, language of schooling, and home language were provided using the demographic questionnaire. Furthermore, informed assent was obtained from the participant on the day of testing.

Testing took place in two sessions for the 4-5-year old age group due to the increased time required to narrate the stories and obtain coherent responses from children of this young age. These sessions were approximately 30 minutes each, with both emotion cuing story types equally administered across the two sessions. For the 6-7 and 9-11-year-old age groups, testing took place in one session of approximately 45 minutes. During this session, the emotion-situation fit story trial was approximately 30 minutes in duration. The emotion-person story trial was approximately 10 minutes in duration. In addition, the explanation of action tasks took approximately 5 minutes.

I tested each child individually, with the presentation of each story, within each story trial, counterbalanced, to control for sequence effects. Participants emotion-explanation responses were categorized and coded according to the coding system described above (see Lagattuta et al., 1997; Lagattuta & Wellman, 2001).

Data Analysis

Because the cognitive-cueing explanation has been shown to reveal children's understanding of the connection between thinking and emotion, my analysis focused largely on this response explanation category, comparing children's performances across the three developmental age bands within the dataset. I looked at children's cognitive cueing response explanation scores on the emotion-cueing story measures using descriptive statistics. Children's cognitive cueing performance for both positive (matched and mismatched) and negative (matched and mismatched) valence conditions were compared across all three age bands using a 3 x 4 (Age x Story type) mixed design ANOVA with the repeated measure being story type.

All statistical analyses were conducted using SPSS version 18 (PASW, 2010). I had equal sample sizes in each age group and my assumptions of normality were met; but my assumptions of homogeneity of variance and sphericity were violated. However, ANOVA is relatively robust to violations of homogeneity of variance, especially considering that my sample sizes were equal and normality was maintained. I therefore proceeded with the analysis, and used Greenhouse-Geisser figures to correct for the violation of sphericity. Effect size estimates for overall ANOVA statistics are indicated by partial η^2 while for post hoc comparisons, effect size r -values were calculated, using the within-subject contrast data, according to the equation provided in Field (2009). To correct for increased Type I errors across multiple post hoc comparisons, alpha was set at 0.01 on these contrasts.

Results

Emotion situation-fit stories

Children were scored on the positive and negative valence, matched and mismatched emotion, story measures, as described above, and were also given a total cognitive cueing score. Emotion valence and match type were combined for purposes of analysis into 4 story type conditions: positive matched, positive mismatched, negative matched and negative mismatched. It was hypothesized that children would provide more cognitive cueing response explanations with increasing age, evidencing a developmental understanding of the connection between thinking and emotion. It was also hypothesized that children's performance on positive versus negative valence emotion measures would differ.

A mixed design 3 x 4 (Age x Story type) ANOVA was conducted in order to investigate these hypotheses. The results revealed a significant main effect for age, a significant main effect for story type and a significant interaction effect for Age x Story type. Because the main effect for age is the focal point of this research, it will be addressed first.

Age impacted significantly on the total cognitive cueing response explanations provided, $F(2, 42) = 37.76$, $p = .0001$, partial $\eta^2 = .643$, with 64,3% of the variance in cognitive cueing explanations being accounted for by differences in age. Post hoc analysis further revealed that significant differences in cognitive cueing response explanations lie between all three developmental age bands, with 9-11-year olds significantly outperforming 6-7-year olds, who in turn significantly outperform 4-5-year olds on all emotion-cueing story type conditions, ($p = .0001$ for both pairwise contrasts). Furthermore, children clearly required fewer thinking prompts, used to elicit cognitive cueing explanations, with increasing age (see Table 1). This implies that with increasing age, children perform significantly better on cognitive cueing tasks of thinking and emotion, thereby displaying a better understanding of the connection between thinking and emotion with age, as was hypothesized.

Table 1

Descriptive statistics for children's prompted, unprompted and total cognitive cueing scores

	Age		
	4-5 (n = 15)	6-7 (n = 15)	9-11 (n = 15)
Cognitive cueing explanations			
Unprompted	0.20 (0.56)	3.73 (3.47)	6.30 (2.87)
Prompted	0.73 (1.16)	1.53 (0.83)	2.86 (1.64)
Total ^a	0.93 (1.48)	5.13 (3.50)	9.20 (2.42)

Note. Means are presented with standard deviations in parenthesis.

The maximum cognitive cueing explanation score for all emotion attribution tasks is equal to 12.

^aFurther statistical analysis was conducted on children's total cognitive cueing score only (consisting of both prompted and unprompted response explanations).

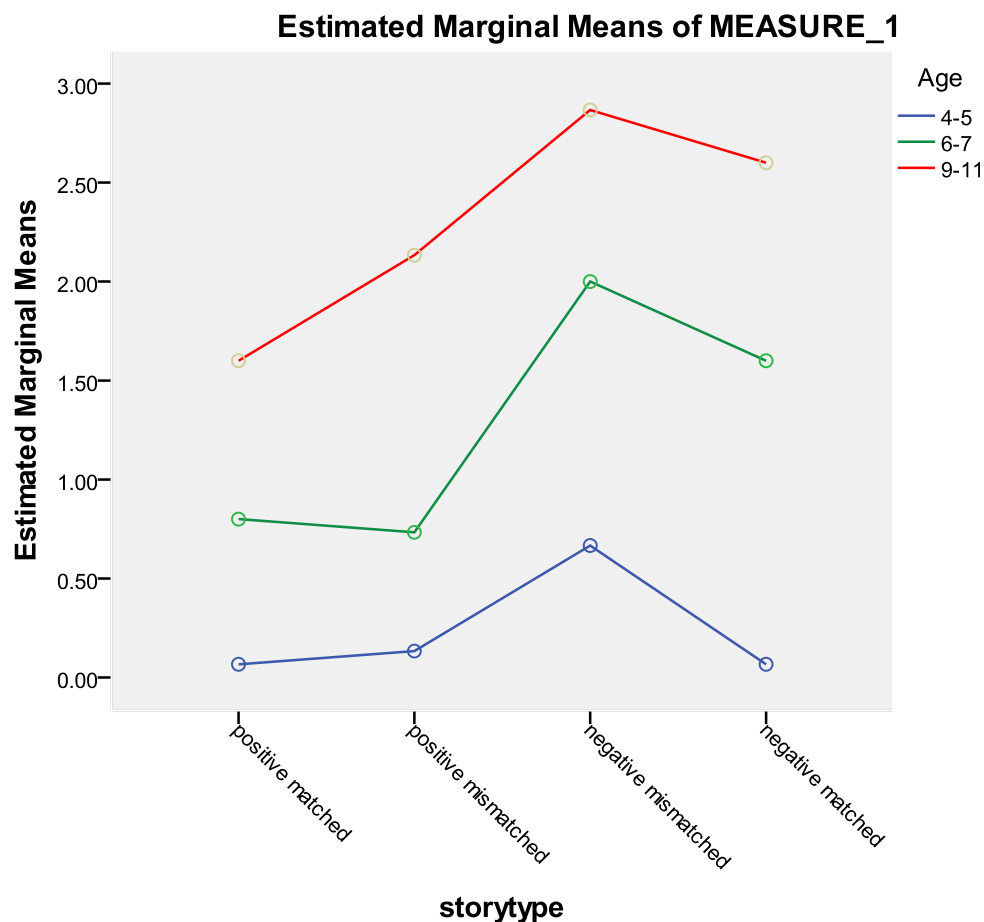


Figure 2. Children's mean cognitive cueing performance across story types.

Story type endings impacted significantly on children's cognitive cueing response explanations, $F(3, 126) = 28.19, p = .0001$, partial $\eta^2 = .38$, with 38% of the variance in cognitive cueing responses being accounted for by the difference in story type endings. Post

hoc, focused effect analyses were conducted using within-subject contrasts in order to compared children's cognitive cueing responses for positive matched versus positive mismatched, positive mismatched versus negative mismatched, negative mismatched versus negative matched, and negative matched versus positive matched (see *Figure 1*). Across all age groups there was no significant difference in children's cognitive cueing performance on positive matched versus positive mismatched story endings, $p = .119$, $r = .24$. Children's performance for positive mismatched versus negative mismatched were significantly different, $p = .00001$, $r = 0.698$, with negative mismatched story endings receiving the highest cognitive cueing score. Cognitive cueing scores for negative mismatched versus negative matched were also significantly different, $p = .0001$, $r = 0.47$. Cognitive cueing scores for positive matched versus negative matched story endings were significant, $p = .0001$, $r = 0.602$. Overall, children's cognitive cueing scores for positive valence (matched and mismatched) story endings were significantly lower compared to their scores on negative valence (matched and mismatched) story endings,(see Table 2, *Figure 1*).

Table 2
Descriptive statistics of children's cognitive cueing performance on positive and negative, matched and mismatched story endings

Emotion-cueing story type	Age			Mean Total
	4-5 ($n = 15$)	6-7 ($n = 15$)	9-11 ($n = 15$)	
Positive matched	0.07 (0.26)	0.80 (0.94)	1.60 (0.91)	0.82 (0.98)
Positive mismatched	0.13 (0.35)	0.73 (0.96)	2.10 (0.99)	1.0 (1.16)
Negative matched	0.07 (0.26)	1.60 (1.18)	2.60 (0.91)	1.40 (1.35)
Negative mismatched	0.67 (0.98)	2.0 (1.10)	2.90 (3.50)	1.8 (1.20)
<i>Mean Total</i>	0.23(0.29)	1.28(0.62)	2.30(0.57)	1.27

Note. Means are presented with standard deviations in parenthesis.

The cognitive cuing emotion explanation for each story type has a maximum score of 3.

Furthermore, a significant ordinal interaction effect was obtained for Age x Story type, $F(6, 126) = 3.149$, $p = .007$, partial $\eta^2 = 0.13$, with 13% of the variance in cognitive cueing response explanations being accounted for by the interaction between age and story type endings. Post hoc pairwise comparisons were conducted in order to analyze the significant interaction.

As seen from the cell mean plot, negative mismatched scores are high in all three age groups (see *Figure 1*).

In the 4-5-year age group, children's scored significantly better on negative mismatched than negative matched ($p = .007$), or positive matched ($p = .01$) story types. Although they scored better on negative mismatched than positive mismatched, this difference is not significant at the adjusted alpha level ($p = .026$).

In the 6-7 and 9-11-year age group there was no significant difference in children's performance on negative mismatched and negative matched ($p = .065$; $p = .214$, respectively). For both age groups the difference between negative mismatched and positive mismatched was significant ($p = .00001$; $p = .003$, respectively).

Emotion person-fit stories

This measure was adopted from the protocol used by Lagattuta and Wellman (2001). They included this measure to serve as a control in order to examine children's response explanations for the target character, for whom relevant cue-to-past history information was given, compared to an additional character, for whom such past history information was lacking. Children were required to differentiate with reason between the target and additional character's emotional reactions. However, because the additional character's lacked relevant past history information, children of all ages gave 100% situational response explanations for this character's current emotional reaction (see Table 3). Consequently, this measure served as a poor discriminator between the target and additional character's emotional reaction. This measure was therefore only referred to descriptively, and no further analysis was conducted, as it needs to be modified for comparison. See the discussion section for limitations of the measure.

Table 3

Children's cognitive cueing and situational response explanation score for target character and additional character, respectively, by age and story type ending

	Age	Negative Emotion				Positive Emotion			
		^a MP	^b MSP	MP	MSP	MP	MSP	MP	MSP
		Situational		Cognitive cueing		Situational		Cognitive cueing	
Target character ^a	4-5	—	—	2	4	—	—	1	4
	6-7	—	—	8	9	—	—	1	10
	9-11	—	—	13	14	—	—	3	15
Additional character ^b	4-5	15	15	—	—	15	15	—	—
	6-7	15	15	—	—	15	15	—	—
	9-11	15	15	—	—	15	15	—	—

Note. ^aIf children gave cognitive cueing response explanations for the target character, they were not coded for situational response explanations. ^bChildren of all ages only gave situational response explanations for the additional character.

^aMP = Target character's emotion matches the current affective context and the secondary character's emotion.

^bMSP = Target character's emotion mismatches the current affective context and the secondary character's emotion.

Explanation of action control measure

This measure served as a control, examining children's ability to articulate explanations of scenarios. Children across all age groups provided 100% correct explanation of action responses for all three control measures. This implies that younger children's poor performance on the emotion-cueing test measures cannot be attributed to their inability to articulate a narrative explanation of a scene, but rather, their inability to link the cue -to -past experience, therefore displaying an inability to understand the connection between thinking and emotion. Although this understanding may at times be present, they fail to articulate their understanding explicitly, using cognitive cueing response explanations.

Discussion

Emotion-cueing story measures

Children's overall performance across all emotion-cueing measures increased significantly with age, as was hypothesized, thereby displaying a developing understanding of the connection between past experience, thinking, and emotion with increasing age. Whereas a minority of 4-5-year olds provided cognitive cueing response explanations, the majority of 6-7-year olds, and nearly all 9-11-year olds provided cognitive cueing response explanations in their appraisal of the character's current emotional reaction. Based upon children's performance on the explanation of action control measure it is evident that their performance on the emotion-cueing measure cannot be attributed their inability to articulate explanations per se but rather their immature ability to make a complete cognitive cueing response explanation, particularly in the case of 4-5-year olds.

While 9-to-11-year olds generally described the story character's emotional response with reference to the cue as a reminder of the past experience, 6-to-7-year olds made reference to thinking about the past experience but often failed to mention the cue as the elicitor of those thoughts. In contrast, 4-to-5-year olds largely used situational factors in the environment to account for the character's current emotional reaction. They seldom mentioned the cue or the past experience as the source of the character's emotions, however, when they made mention of the cue or the past experience they did so with reference to current situational factors. For instance, when children were asked why "Anne would be mad at Bozo the clown when she sees him many days later" (see Appendix). Nine-to-11-year olds would respond: "Seeing Bozo the clown reminds Anne of her doll Mitsy which he broke the

other day”. By so doing they would satisfy the complete cognitive cueing response category by making mention of the cue (*Bozo the clown*) as a reminder of the past experience (*when he broke the doll*), and the character’s current emotion (*mad*). Moreover, 9-11-year olds often went beyond cue-to-past event response explanations, they often combined past information and present situational factors in the mental attribution of emotion (eg. “Mary is mad because the clown wet her dress, and seeing the clown reminds her of her doll which he stole). In comparison, 6-to-7-year olds would say: “Anne’s cross with him from the last time, he broke her doll”, by so doing they would make mention of the cue and the past experience but fail to link the cue as the elicitor of those thoughts about the past experience. Four-to-5-year olds however, would typically respond: “Anne’s mad because she doesn’t like clowns” or they would simply say: “I don’t know”.

Negative and positive emotion valence. Children’s performance on positive valence emotion-cueing measures differed significantly from their performance on negative valence measures, as was hypothesized. In particular, children of all ages provided significantly more cognitive cueing response explanations for negative emotions which mismatched the current affective context in comparison to negative matched, positive matched, and positive mismatched conditions. Indeed when asked to explain why the character started to feel mad or sad in a currently positive affective situation, even 4-5-year olds, who generally performed poorly on these emotion-cueing measures, demonstrated a rudimentary understanding that the character’s mismatched negative emotion was caused by thinking about the past experience (eg. “Ben doesn’t like that man in the sports car, he rode over his bike”). Moreover, outside of the context of negative mismatched emotions, 4-5-year olds typically centered their response explanations with reference to current situational factors or gave uninformative answers.

Similarly, 6-7-year olds demonstrated a sophisticated understanding of the connection between past experience, thinking, and emotion during mismatched negative emotion conditions. Strikingly the pattern of cognitive cueing response explanations observed during mismatched negative emotion conditions was not evident in positive mismatched emotion conditions. Seldom did 4-5-year olds and 6-7-year olds explain the character’s positive emotion, especially in the current negative affective context (eg. “Jesse feels happy when he trips and falls to the ground”), as caused by remembering positive past experiences. That is not to say that children’s response explanations were not valid or sensible, rather that they failed to frame their explanations with reference to the cue and the past experience. These findings are consistent with previous research (Lagattuta et al., 1997; Lagattuta & Wellman,

2001). One explanation for this is that despite children's understanding that negative rumination can engender negative feelings in the presence of a positive affective context, they lack complimentary knowledge that positive rumination can engender feelings of happiness in the presence of a negative affective context (Harris, 1993).

While 4-5-year olds are able to make cognitive cueing response explanations, at times, in response to negative mismatched story conditions, 6-7-year olds readily provide such cue-to-past event explanations in response to negative mismatched emotion conditions. In contrast, 9-11-year olds not only provide cognitive cueing response explanations in response to negative mismatched conditions, they also demonstrate the ability to connect past experience, thinking, and emotions for nearly all positive and negative emotions, regardless of whether that emotion is a match or a mismatch to the current affective context. By implication then, mismatched negative emotions are significant for an early developmental understanding of the connection between prior experience, thinking, and emotion. This understanding is initially fostered in terms of negative emotions, however, children later come to understand this connection in terms of negative and positive emotions. (Lagattuta & Wellman, 2001). By combining the findings from 4-to-7-year olds performance on these measures as observed in previous studies, with 9-to-11-year olds, a more complete developmental picture emerges - as children's performance on these tasks demonstrates significant developmental changes in their ability to understand the connection between thinking and emotion.

Researchers who previously examined this understanding in children speculated on the legitimacy of children's cognitive cueing responses. They posited that the mere fact that extensive questioning and paraphrasing was adopted during the procedure, may have cued children to provide extended explanations, mentioning the cue, the past experience and the current emotion, whereas they may have mentioned situational factors, had other questioning strategies been used. Moreover, they suggested that children provided cue-to-past event response explanations simply because relevant past history information was provided. Furthermore, children may have been "cued" by the emotional events themselves, and then empathically gave cognitive cueing response explanations for the character's emotional reaction, on the basis of their own thought and feelings (Lagattuta & Wellman, 2001). However, the fact that cognitive cueing response explanations were given under certain story type conditions only, strongly suggests that these arguments are incorrect. These questioning techniques, and relevant past history information was provided for all story conditions, and yet younger children provided more reliably provided cognitive cueing explanations only in

negative mismatched conditions. This surely indicates that their developing understanding of the connection between thinking and emotion is most notably revealed under mismatched negative conditions. The interesting questions are how does this negativity bias come about? Furthermore, what is the significance of this bias in children's developing understanding of the connection between thinking and emotion?

Negativity bias

From as early as 12 months of age, infants learn about their social environments by "checking back" with their caregivers - a phenomenon known as social referencing. Children use their caregivers response to or interpretations of the environment to inform their own. In so doing, they vicariously learn how to process negative and positive emotional information in their surroundings (Baldwin & Moses, 1996). This suggests that caregivers play an important role in guiding children's understanding of the emotional information in their social environments.

There is currently ample evidence to suggest that adults are biased in their attention to negative information in their surroundings (Vaish, Grossman, Woodward, 2008). By implication, infants who model their understanding of the social environment, with reference to their adult caregivers, would display the same negativity bias. Hornik, Risenhoover, and Gunnar (1987) examined 12-month-old infants for the presence of a negativity bias in response to the emotional information in their environment. Infants were examined on their response to a new toy subsequent to having watched their mothers' emotional response to the same toy. Mothers' displayed either positive feelings, feelings of disgust, or a neutral response. Consequently, under "disgust" conditions infants played significantly less with the toy in comparison to positive and neutral conditions. By implication, these findings demonstrate the beginning of a negativity bias in children's understanding of the emotional aspect of their environment, set in place as early as 12 months of age.

This bias is further reinforced in parent-child discourse. Positive and negative valence emotion words such as happy, sad, and mad, first appear in children's conversations around 20- to- 24-months of age; whereas more descriptive emotion states, explanations, and reasoning appear in children's speech by 2 to 3 years of age (Dunn et al., 1987). When examining early parent-child discourse on positive and negative emotions Lagattuta and Wellman (2002) found that the topic, features, and theme of conversations about negative emotions were significantly different from positive emotions. Although both emotion valences were equally referred to, discourse on negative emotions involved significantly

more elaborate, extensive, and reflective discussion about the causes of emotion, the connection to past experience and the mental state attribution of others'. In contrast, when talking about positive emotions, children and adults focused mainly on people's current affective attitudes such as what they "liked" or "loved" and made no reference to the causes of emotion, the connection to past experience, or the mental state attribution.

Similarly, Fivush (1991) found that mothers were more likely to emphasize the causes and consequences of negative emotions compared to positive emotions, when discussing past emotional experiences with their children. By virtue of the fact that negative emotions are disruptive, unpleasant, and frequently involve goal failure, parent-child discourse may emphasize these negative emotions, especially with reference to past experience, in order to prevent their reoccurrence. That is, by emphasizing past negative experiences in conversation, children may re-experience the same negative emotion, which in the presence of a currently positive affective situation may prompt children to consult past history information (Lagattuta & Wellman, 2002).

Several studies have revealed that parent-child discourse on negative emotions is significantly correlated with children's later performance emotion attribution tasks (Cutting & Dunn, 1999). By implication, the negativity bias in parent-child talk on emotion forms a cogent framework upon which children later come to understand the connection between past experience, mental states, and emotion, in both negative and positive situations.

Limitations and recommendations for future research

On the one hand, studies on the negativity bias in parent-child discourse have offered insight into children's developing understanding of the connection between thinking and emotion. On the other hand, these natural language data on parent-child conversations is based largely on English speaking people from Western nations (Lagattuta & Wellman, 2002). This raises concerns about cultural differences in parent-child conversations on the causes and consequences of emotions in everyday social interactions. Therefore, future research can perhaps investigate the developing understanding of thinking and emotion in children from different cultural backgrounds, who speak different languages.

Emotion-person fit measures. This measure was adopted by Lagattuta and Wellman, (2001) as a control measure in order to examine whether children understood that the same situation could elicit different emotions in different people. The focus of the research thus far had been on children's understanding of the emotional reactions of the target character, for whom relevant cue-to-past history information is known. The purpose of this

measure was to determine whether children could differentiate, with reason, between the target character and additional character's emotional response, given that the additional character was lacking such cue-to-past history information. Children's performance on these measures was used to glean more nuanced insight into their understanding of the connection between thinking and emotion, by determining whether their responses for the target character's emotion would differ in light of an additional character being present. As with the emotion situation-fit stories, children provided increasing cognitive cueing explanations with increasing age, regardless of the secondary character's emotional reaction (see Appendix). However, it goes without saying that when relevant past history is unknown, children will be unable to provide cognitive cueing response explanations for the secondary character's emotional reaction. Therefore, although this measure once more provided evidence for children's increasing understanding of the connection between thinking and emotion with reference to the target character, it served as a poor discriminator between target and additional character's emotional reactions, as related to cognitive cueing response explanations. In contrast to the emotional reaction for the target character, there was no difference in children's explanations for additional character's emotional reaction. Children of all ages provided 100% situational responses with reference to the additional character's emotional reaction. For instance, "Jane's sad because she's jealous of Susie's award" or "Luke's mad because the girl knocked down their block tower" (see Appendix for examples).

Perhaps future studies can examine this understanding in children, by providing relevant past history information for both the target and additional character. Also, as opposed to blatantly stating the additional character's emotions, future studies can perhaps ask children to predict how an additional person might feel who has no cue-to-past event history information to the current affective context.

Conclusion

These findings have revealed significant developmental changes in children's understanding of the connection between thinking and emotion, between the ages of 4 and 11 years. With increasing age children are able attribute emotional outcomes not only to situational factors but also to mental activity, thereby displaying an understanding of the connection between thinking, past experience, and emotion, with increasing age. This understanding in particular is cultivated largely in the presence of negative emotions which mismatch the current affective context. Moreover, these findings have not only revealed

useful insight into children's developing understanding of thinking and emotion, but also that of ToM in general (Ketelaars et al., 2010).

The ability to understand, predict, and explain individual behaviour, feelings and mental states forms a major part of child development and is necessary for guiding social interactions. Acknowledgment of the continuity between current emotional states, thinking and prior experience is crucial for mental development and thinking-emotion reasoning. Throughout our daily activities, we frequently predict or explain individual emotional reactions or behaviours not only with reference to current objective situations but also through past experiences, thinking, desires, and beliefs, hence appreciation of this continuity is vital for understanding social interactions in general (Lagattuta et al., 1997; Lagattuta & Wellman, 2001).

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Appendix A

Consent form



UNIVERSITY OF CAPE TOWN
 IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

DEPARTMENT OF PSYCHOLOGY Empathy and Social Understanding Research

Dear parent(s),

Your child is invited to take part in a research study. If you would like to participate, please return the attached consent form and demographic questionnaire to your child's school, you may keep the information slip.

This Study:

Children's understanding of the connection between thinking and emotion: cognitive cuing as a means of emotion induction.

Principal Researcher:

Susan Malcolm-Smith
 Lecturer
 Department of Psychology
 University of Cape Town
 021-650-4605

As human beings we spend most of our day talking to, interacting with, and thinking about people. Emotions are especially important in regulating these everyday social interactions. Children's understanding of thinking and emotion is said to be apart of Theory of Mind development. Theory of Mind is the ability to understand that other people may want, feel, and believe different things to oneself and being able to predict people's actions based on this knowledge. Therefore, Theory of Mind is very important for everyday social interactions.

This study will look at children's understandings of thinking and emotion as it relates to their developing Theory of Mind. Approximately 50 children between the ages of 4 to 11 years will participate in this study.

A number of studies have been conducted on Theory of Mind development in South African children. However, none of these studies has looked at Theory of Mind development, as it relates to thinking and emotion in children. Therefore, this study will aim to look at Theory of Mind development in children by focussing specifically on their understanding of thinking and emotion.

Procedure

Should you consent to your child participating in this study, he or she will be involved in a cognitive assessment task (approximately 30 minutes long) where abilities such as listening skills, language, and memory will be assessed. These abilities will be assessed through several simple story telling tasks requiring verbal responses to questioning.

You, or another caregiver, may be present at the testing session, which will take place at your child's school/ day care centre. In addition, written feedback will be provided for your child's performance on these tasks.

There are no risks or harm involved in participating in this study. If at any time during the study you or your child finds any of the procedures uncomfortable, you are free to discontinue participation without penalty. Also, should your child feel tired during testing, s/he may feel free to take short breaks.

We will take strict precautions throughout the study to keep your personal information, and that of your child, safe and confidential. Your child's information will be kept without his or her name or other personal identifiers, only a code, in a locked file cabinet or on a password-protected, secure computer. The data gathered from this research may be published, but your child's contribution and personal information will remain anonymous.

Should you have any questions or queries about the research or your participation, please do not hesitate to contact Loren Joseph: (cell) 0792725640, (email) loren_joseph@hotmail.com

In addition, feel free to contact:

The Department of Psychology, Research Ethics Committee

Dr Kevin G. F. Thomas

Tel: +27 21 6504608

Fax: +27 21 6504104

UCTPsychEthics@gmail.com

Consent Form

The study has been explained to me, and my questions have been answered.

I understand that participation in this study is voluntary, and that I may withdraw my child at any point.

I understand that my child will not be identified except by an initial, and that this anonymity will be maintained throughout the study and when the research is published.

I hereby consent to my child's participation in this study

Child's name _____

Signature of parent/guardian _____

Date _____

Signature of researcher _____

Date _____

Future research

If you would like to be notified of research projects in which you or your child might participate in future, please complete the details below.

Phone number: _____

Cell phone number: _____

E-mail address: _____

Mailing address: _____

Appendix B**Assent form**

UNIVERSITY OF CAPE TOWN
DEPARTMENT OF PSYCHOLOGY

Assent Form

Hello! Can I tell you about a research study I am doing? A research study is a way to learn more about something. I would like to find out more about how people understand how other people are feeling.

If you agree to join this study, you will be asked to listen to a few stories that I will tell you. And then afterwards you need to tell me about what the character in the story was thinking and feeling.

There will only be one session. This session will take about 45 minutes. If you get tired, we can take a break at any time. You can also have a parent with you if you want.

You do not have to join this study. It is up to you. No one will be angry with you if you don't want to be in the study or if you join the study and change your mind later and stop.

Do you have any questions?

If you sign your name below, it means that you agree to take part in this study.

Child's signature

Date _____

Researcher's signature

Appendix C
Demographic Questionnaire

Participant no.: _____ Date: _____

DEMOGRAPHIC QUESTIONNAIRE

A. Child's Information:

1. Name: _____
2. School: _____
3. Age: _____
4. Date of Birth (dd/mm/yy): _____
5. Sex (circle one): Male Female
6. Ethnicity: White Black Indian Coloured
 Asian
 Other If other please specify: _____
7. Home Language: _____
8. Handedness (circle one): Left Right Ambidextrous
9. Number of siblings: _____
10. Number of **older** siblings: _____
11. How often does your child use a computer?
 Never ____ A few times a year ____ Once a month ____ Once a week ____
 Every day ____
12. Has your child ever experienced a head injury? (e.g., being hit on the head with an object and losing consciousness as a result)
 YES NO
 If yes, please give
 details: _____

13. Has your child ever experienced any of the following medical conditions:

a. Neurological problems (e.g., **epilepsy**, meningitis, cerebral palsy, encephalitis, Tourette's syndrome, brain tumour)

YES

NO

If yes, please specify:

b. Depression

YES

NO

If yes, please specify:

c. Memory problems

YES

NO

If yes, please specify:

d. Problems with their vision

YES

NO

If yes, please specify:

e. Problems with their hearing

YES

NO

If yes, please

specify: _____

f. Is he/she currently taking any prescription medication?

YES

NO

If yes, what medication(s)?

11. Has your child ever been diagnosed with a social disorder such as conduct disorder or oppositional defiant disorder (ODD)?

YES

NO

If yes, please

specify: _____

12. Has your child ever had a communication disorder? (For example: Having problems with understanding or producing speech, slow vocabulary development, difficulties recalling words or problems with producing sentences appropriate for his/her age.)

YES

NO

If yes, please

specify: _____

13. Has your child ever been diagnosed with a pervasive developmental disorder (PDD) such as autism, Asperger's syndrome, Rett's disorder or childhood disintegrative disorder? (Tick the appropriate block).

No developmental disorder _____

Autism _____

Asperger's Syndrome _____

PDD – Not Otherwise Specified _____

Other (please

specify): _____

14. Has your child ever experienced learning difficulties such as dyslexia or attention-deficit / hyperactivity disorder (ADD/ ADHD)?

YES

NO

If yes, please

specify: _____

B. Parent Information:**1. What is the total yearly income of the household in which you live? (Tick the appropriate block):**

[NOTE: This should be total household income, not personal income.]

0-35000: _____ 36000-75000: _____ 76000-125000: _____ 126000-175000: _____

176000-225000: _____ 226000-275000: _____ 276000-325000: _____ 326000-375000: _____

376000-425000: _____ 426000-475000: _____ 476000-525000: _____ more than 526000: _____

2. Highest level of education reached for mother, father and/or guardian (please circle appropriate number).

	Biological mother	Biological father	Guardian
1) 0 years (No Grades / Standards) = Never went to school	1.	1.	1.
2) 1-6 years (Grades 1-6 / Sub A-Std 4) = Didn't complete primary school	2.	2.	2.
3) 7 years (Grade 7 / Std 5) = Completed primary school	3.	3.	3.
4) 8-11 years (Grades 8-11 / Stds 6-9) = Some secondary education (didn't complete high school)	4.	4.	4.
5. 12 years (Grade 12 / Std 10) = Completed high school	5.	5.	5.
6. 13+ years = Tertiary education Completed university / technikon / college	6.	6.	6.
7. Don't know	7.	7.	7.

3. Parental employment: (Please circle appropriate number)

	Biological mother	Biological father	Guardian
1. Higher executives, major professionals, owners of large businesses	1.	1.	1.
2. Business managers of medium sized businesses, lesser professions (e.g. nurses, opticians, pharmacists, social workers, teachers)	2.	2.	2.
3. Administrative personnel, managers, minor professionals, owners / proprietors of small businesses (e.g. bakery, car dealership, engraving business, plumbing business, florist, decorator, actor, reporter, travel agent)	3.	3.	3.
4. Clerical and sales, technicians, small businesses (e.g. bank teller, bookkeeper, clerk, draftsman, timekeeper, secretary)	4.	4.	4.
5. Skilled manual – usually having had training (e.g. baker, barber, chef, electrician, fireman, machinist, mechanic, painter, welder, police, plumber, electrician)	5.	5.	5.
6. Semi-skilled (e.g. hospital aide, painter, bartender, bus driver, cook, garage guard, checker, waiter, machine operator)	6.	6.	6.
7. Unskilled (e.g. attendant, janitor, construction helper, unspecified labour, porter, unemployed)	6.	6.	6.
8. Homemaker			
9. Student, disabled, no occupation	7.	7.	7.
	8.	8.	8.
	9.	9.	9.

4. Material and financial resources (please circle appropriate number).

Which of the following items, in working order, does your household have?

Items	Yes	No
1. A refrigerator or freezer	1.	1.
2. A vacuum cleaner or polisher	2.	2.
3. A television	3.	3.
4. A hi-fi or music center (radio excluded)	4.	4.
5. A microwave oven	5.	5.
6. A washing machine	6.	6.
7. A video cassette recorder or dvd player	7.	7.

Which of the following do you have in your home?

Items	Yes	No
1. Running water	1.	1.
2. A domestic servant	2.	2.
3. At least one car	3.	3.
4. A flush toilet	4.	4.
5. A built-in kitchen sink	5.	5.
6. An electric stove or hotplate	6.	6.
7. A working telephone	7.	7.

Do you personally do any of the following?

Items	Yes	No
1. Shop at supermarkets	1.	1.
2. Use any financial services such as a bank account, ATM card or credit card	2.	2.
3. Have an account or credit card at a retail store	3.	3.

Appendix D

Emotion-cueing story measures (Emotion-situation fit)

Mary Story:

This is the story of a girl named Mary. This is a picture of Mary's pet rabbit, named Floppy.

One day, Mary comes home from school, and takes Floppy out of the cage to play. Mary plays with floppy in the yard and watches him hop around. Suddenly, the neighbor's black spotted dog runs into the yard. The black spotted dog scares Floppy so much--Floppy runs away and never comes back. Mary feels sad.

Control question: Why is Mary sad?

Emotion match: Well, many days later, Mary plays outside in the yard picking flowers with her mom. Suddenly her neighbor's black-spotted dog runs into the yard again and knocks down Mary's flowers, and crushes them to bits! Mary starts to feel sad.

Why does Mary start to feel sad right now?

Emotion mismatch: Well, many days later, Mary plays outside in the yard picking flowers with her mom. Her neighbor's black-spotted dog comes into the yard, slowly walks over to Mary sits down in front of her, and wags his tail real friendly. Mary starts to feel sad.

Why does she start to feel sad right now?

Jesse Story:

This is a story about a boy named Jesse. This is a picture of Jesse's dog, named Nelson.

One day, Jesse goes outside to play with Nelson. Jesse throws around a red ball and Nelson runs to catch it. One time Nelson runs so fast to catch the red ball he jumps high into the air. Jesse laughs and says, "Wow, Nelson! You jumped so high for the red ball, I'm so excited, you did an amazing new trick!" Jesse feels really happy.

Control question: Why is Jesse happy?

Emotion match: Well, many days later, Jesse goes outside to pick up all his toys. He sees his red ball lying on the ground and smiles, then runs to pick it up. When he reaches down to get the red ball he finds some money lying on the ground. He starts to feel happy.

Why does Jesse start to feel happy right now?

Emotion mismatch: Well, many days later, Jesse goes outside to pick up all his toys. He sees his red ball lying on the ground and smiles, he then runs over to pick it up. When he reaches down to get the red ball he loses his balance and falls on the ground! He starts to feel happy.

Why does Jesse start to feel happy right now?

Anne Story:

This is a story of a girl named Anne. This is a picture of Anne's favorite doll called Mitsy.

One day Anne goes to the circus with her mom. Anne brings her favorite baby doll Mitsy to the circus with her too. Anne's mom says, "Let's go meet Bozo the clown!" When Anne is talking to Bozo the clown, she drops her doll Mitsy on the ground. Bozo the clown accidentally steps on Anne's doll Mitsy and breaks her into pieces. Anne feels mad.

Control question: Why is Anne mad?

Emotion match: Well, many days later, Anne is at her friend Jane's birthday party. Jane's mom says, "Surprise, its Bozo the circus clown!" Bozo the clown dances into the room juggling water balloons in his hand. One balloon lands on Anne and gets her clothes soaking wet! She starts to feel mad.

Why does Anne start to feel mad right now?

Emotion mismatch: Well, many days later, Anne is at her friend Jane's birthday party. Jane's mom says, "Surprise, its Bozo the circus clown!" Bozo dances into the room. He gives everyone, including Anne, a nice big balloon. Anne starts to feel mad.

Why does Anne start to feel mad right now?

Toni Story

This is a story of a girl named Toni. Toni loves getting presents.

One Christmas morning, Toni runs into the lounge and sees a huge Christmas tree with lots of colourful decorations. Underneath the Christmas tree there are lots of presents. Toni smiles because she knows that her mom and dad have bought lots of nice presents for her. Toni feels happy.

Why does Toni feel happy?

Emotion matched: A few days later Toni sits in the lounge with her mom. Her and her mom are eating chocolate chip cookies and drinking milk. She sees the nicely decorated Christmas tree and smiles. Toni starts to feel happy.

Why does Toni start to feel happy right now?

Emotion mismatched: A few days later Toni sits in the lounge with her mom. Her and her mom are eating chocolate chip cookies and drinking milk. She sees the nicely decorated Christmas tree and smiles. While she is drinking her milk she accidentally spills some all over her clothes. Toni feels happy.

Why does Toni start to feel happy right now?

Ben Story:

This is a story of a boy named Ben. This is a picture of Ben's new bicycle.

One day Ben is riding his new bicycle in the road. He goes inside to have some lunch, he leaves his bicycle outside. Suddenly, a man in a yellow race car comes speeding down the road and crashes into Ben's bicycle. His bicycle breaks into pieces! Ben feels sad.

Control question: Why is Ben sad?

Emotion matched: Well, many days later Ben and his friend are rollerblading in the road. Suddenly, the man in that same yellow race car speeds down the road so fast that both Ben and his friend lose their balance and fall to the ground. Ben starts to feel sad.

Why does Ben start to feel sad right now?

Emotion mismatched: Well, many days later Ben and his friend are rollerblading in the road. Suddenly, the man in that same yellow car drives down the road. He stops and waves at Ben and his friend. Ben starts to feel sad.

Why does Ben start to feel sad right now?

Appendix E

Emotion-cueing measures (Emotion-person fit)

Mark Story:

This is a story about a boy named Mark. This is a picture of Mark's favorite teddy bear.

One day Mark plays with his teddy bear at the park. He pretends to have a tea party in the sandbox. Suddenly, a red-haired girl comes over, steals his teddy bear, and never gives it back! His special teddy bear is gone forever! Mark feels mad.

Control question: Why is Mark mad?

Emotion situation matched/ emotion person matched: Well, many days later Mark and his friend Luke bring some building blocks to the park to play. They build a big block tower. Suddenly, the red-haired girl runs by and bumps into it, knocking their block tower down to the ground. Mark starts to feel mad. Luke starts to feel mad too.

Why does Mark start to feel mad right now?

Why do you think his friend feels mad right now?

Emotion situation mismatched/emotion person mismatched: Well, many days later Mark and his friend Luke bring some building blocks to the park to play. They build a big block tower. Suddenly, the same red-haired girl walks by and gives them some more building blocks to play with. Mark starts to feel mad but Luke starts to feel happy.

Why does Mark start to feel mad right now?

Why do you think his friend feels happy instead?

Sussie Story

This is a story of a girl called Sussie. Sussie loves to go to school.

One day Sussie's teacher gives her an award for being such a good girl. Sussie is so excited she comes home to tell her mom. Her mom is so proud of her she gives Sussie a big hug and hangs the award up on the wall for all to see. Sussie feels happy.

Why does Sussie feel happy right now?

Emotion situation matched/ emotion person matched: Many days later Sussie comes home from school and her friend Jane comes over to play. Sussie's mom offers to take them both to MacDonald's for lunch. Sussie walks pass the lounge as she leaves with her mom and sees her award hanging on the wall, and starts to smile. Sussie feels happy. Jane feels happy too.

Why does Sussie feel happy right now?

Why does her friend feel happy right now?

Emotion situation mismatched/ emotion person mismatched: Many days later Sussie comes home from school and her friend Jane comes over to play. Sussie's mom offers to take them both to MacDonald's for lunch, only after they have cleaned up all their toys. Sussie walks passed the lounge to her room and sees her award hanging on the wall and starts to smile. Sussie feels happy. Jane feels sad.

Why does Sussie feel happy right now?

Why does Jane feel sad instead?

Appendix F

Mixed Design ANOVA summary table

Table F1

Results of the mixed design 3x4 ANOVA for age and story type

Source	SS	df	MS	F	P	Partial η^2
Age	128.14	2	64.07	37.76	0.00001	0.64
Error	71.27	42	1.697			
Story Type	28.194	3	9.34	26.16	0.00001	0.38
Story Type *age	6.79	6	1.13	3.149	0.007	0.13
Error	45.2	126	0.36			

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Student Number: JSPLOR001

Course: PSY4000W

Honours Research Report

Declaration

1. I know that plagiarism is wrong. Plagiarism is to use another's work and pretend that it is one's own.

2. I have used the convention for citation and referencing. Each contribution to, and quotation in, this essay/report/project/..... from the work(s) of other people has been attributed, and has been cited and referenced.

3. This essay/report/project/..... is my own work.

4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

Signature _____

Date _____ **28 October 2010** _____