

Running Head: MEMORY, EMOTION INFORMATION AND TEMPERAMENT

Children's Memory for Mild Emotional Information: Positive and Negative Emotional  
Information and Associations with Temperament

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### Abstract

The 2 aims of the current study were to investigate 1) children's memory for positive and negative emotional information and 2) the influence of temperament on the type of emotional information recalled. Seventy-five children aged 61-77 months participated in a staged event, "Visiting the Pretend Zoo". Approximately 6-9 days later children participated in a memory interview. Parents/caregivers completed a temperament questionnaire. Children recalled more negative relative to positive emotional information. Children higher in Effortful Control (EC) recalled more negative emotional information relative to children lower in EC. This indicates that EC may play an important role in children's memory. No other effects of temperament were identified. Limitations of the current study are discussed followed by directions for future study.

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## Table of Contents

Abstract .....	2
Acknowledgements.....	3
Table of contents.....	4
List of tables.....	8
Introduction	
<i>Emotion</i> .....	10
<i>Emotion and Memory</i> .....	10
<i>Valence</i> .....	12
<i>Theories of Valence</i> .....	13
<i>The Density Hypothesis (Unkelbach, Fiedler, Bayer, Stegmüller, &amp; Danner, 2008).</i> ....	13
<i>The Range-Frequency Model (Parducci, 1965)</i> .....	15
<i>Negativity Bias</i> .....	17
<i>Positivity Bias</i> .....	20
<i>Parent-Child Conversation and the influence on children's memory</i> .....	23
<i>Parent-Child Discussion during an Event</i> .....	26
<i>Discussion of Emotion</i> .....	27
<i>Parent-Child Conversation of Negative Emotions</i> .....	29
<i>Parent-Child Conversation of Positive Emotions</i> .....	30
<i>Individual Differences and Memory</i> .....	32
<i>Temperament</i> .....	32
<i>Negative Affectivity</i> .....	33
<i>Surgency/Extraversion</i> .....	34
<i>Effortful Control</i> .....	35

<i>Temperament and Memory</i> .....	36
<i>The Current Study</i> .....	38
<b>Method</b>	
<i>Design</i> .....	40
<i>Participants</i> .....	40
<i>Materials</i> .....	41
<i>Props for the Zoo Event</i> .....	41
<i>Child Behavior Questionnaire Very Short Form (CBQ-VSF; Putnam &amp; Rothbart, 2006)</i> .....	41
<i>Procedure</i> .....	42
<i>Event</i> .....	42
<i>Coding</i> .....	47
<i>Memory Interview</i> .....	47
<i>Inter-rater Reliability</i> .....	49
<b>Results</b>	
<i>Statistical Strategy</i> .....	49
<i>Preliminary Analyses</i> .....	50
<i>Correct Recall</i> .....	50
<i>Recall of Negative and Positive Information</i> .....	50
<i>Associations between Temperament and Recall</i> .....	52
<i>Negative Affectivity</i> .....	53
<i>Surgency/Extraversion</i> .....	54
<i>Effortful Control</i> .....	54
<i>Negative Affectivity and Effortful Control</i> .....	56
<i>Summary of Results</i> .....	57

## Discussion

<i>Do children remember more negative than positive emotional information?..</i>	59
<i>The Range-Frequency Model (Parducci, 1965) .....</i>	60
<i>The Role of Goals and Motivations on Memory .....</i>	62
<i>Does Temperament Influence the Type of Emotional Information Recalled?..</i>	65
<i>Negative Affectivity .....</i>	65
<i>Surgency/Extraversion .....</i>	66
<i>Effortful Control .....</i>	66
<i>Negative Affectivity and Effortful Control .....</i>	68
<i>Other Findings .....</i>	70
<i>Errors .....</i>	70
<i>Applications .....</i>	70
<i>Limitations .....</i>	71
<i>Future Research .....</i>	73
<i>Conclusions .....</i>	74
References .....	76
Appendix A: Counterbalancing Order .....	83
Appendix B1: Information Letter (Principal) .....	84
Appendix B2: Information Letter (Parents/Caregivers and Consent Form) .....	86
Appendix C1: Photos of Animals Used in the Event (Crocodile and Friend) .....	89
Appendix C2: Photos of Animals Used in the Event (Hippo and Blanket) .....	90
Appendix C3: Photos of Animals Used in the Event (Cheetah and Friend) .....	91
Appendix C4: Photos of Animals Used in the Event (Elephant and Birthday Present) .....	92
Appendix C5: Photos of Animals Used in the Event (Lamb) .....	93

Appendix C6: Photos of Animals Used in the Event (Mouse) .....	94
Appendix C7: Photos of Animals Used in the Event (Mouse with Tears) .....	95
Appendix C8: Photos of Animals Used in the Event (Zookeeper's Hat and Badge) .....	96
Appendix D: Child Behavior Questionnaire (CBQ: Rothbart, Ahadi, Hershey, & Fisher, 2001): a measure of Temperament .....	97
Appendix E: Event Script .....	101
Appendix F: Memory Interview Script.....	102
Appendix G: Coding Criteria.....	104

## List of Tables

Table 1: <i>Structure of Event</i> .....	44
Table 2: <i>Means and Standard Deviations for Overall, Negative and Positive Recall (Total and Free) of Emotional Information</i> .....	51
Table 3: <i>Means and Standard Deviations for each Category of Positive and Negative Information for Total Recall</i> .....	52
Table 4: <i>Descriptive Statistics for the subscales of the CBQ</i> .....	54
Table 5: <i>Means and Standard Deviations for Total and Free Recall of Positive and Negative Information for High and Low NA, SE and EC</i> .....	55
Table 6: <i>Means and Standard Deviations of Total and Free Recall of Positive and Negative Information for NA and EF</i> .....	56



## Children's Memory for Mild Emotional Information: Positive and Negative Emotional Information and Associations with Temperament

Emotional experiences vary in their impact on an individual according to the valence of the event; some experiences are positive, while others are negative. How do we understand and remember these emotional experiences? Limited research has investigated children's memory for emotional information, however, there are gaps in the literature regarding children's memory for emotional information. Two questions in particular are the focus of the current study. First, does the valence of emotional information affect what information children remember of a staged event? Secondly, does temperament affect the type of emotional information (that is; negative or positive emotional information) remembered by children of a staged event? The primary aim of the current study is to investigate young children's (aged 5-6 years) memory of an event which includes emotional information presented verbally to children. Of particular interest, is understanding children's memory for positive and negative emotional information; that is, do children remember negative emotional information better or positive emotional information better? The second aim of the current study is to investigate whether children's temperament influences the type of emotional information that is remembered during an event. Information presented to children through discussion with adults plays an important role in children's memory (Fivush, Haden, & Reese, 2006). Therefore in the current study, emotional information will be presented verbally.

The questions of the current study are important to understand due to the implications of children's memory for emotional information on their psychological adjustment. Memory for emotional information and particular types of temperament has been associated with varying outcomes of psychological adjustment, such as

internalising and externalising difficulties (Eisenberg et al., 2005). Therefore it is important to understand how emotional information is remembered and the role this may have in contributing to the development of psychological difficulties, as well as the influence of the child's temperament. The effect of memory on psychological adjustment may occur through the influence of memory on the development of children's understanding of emotion and emotional experiences. Memory contributes to children's understanding of emotions and emotional experiences and therefore influences how they respond to similar experiences later in life (Wareham & Salmon, 2006). As a result, memory has important implications for the adjustment of children.

### *Emotion*

Emotion is a phenomenon that is experienced within each day, in many life experiences and relationships (Langlois, 2004). Although there are contradictory views regarding the precise definition of emotion (Goldsmith et al., 1987; Kleinginna & Kleinginna, 1981; Langlois, 2004; Reisenzein, 2007), there is general agreement that emotion consists of cognitive, affective, behavioural and bodily sensation aspects (Kleinginna & Kleinginna, 1981; Reisenzein, 2007). Therefore, emotion can be defined as a mental state comprised of cognitions, affect, emotive and expressive behaviour, and bodily sensations. As emotion is present in many areas of an individual's life, it can be expected that it will have important implications for their outcome, wellbeing and future responses to such experiences. Therefore, it is an important aspect of life to remember and understand.

### *Emotion and memory*

Emotion has an effect on people's memory for events (Reisberg & Heuer, 2005). Memory is a store of knowledge about the world and previous personal experiences including emotions (Nelson & Fivush, 2004). The importance of memory

and the effect of emotion are demonstrated in its role in influencing and guiding people's behaviour. For example, a child who remembers negative experiences may attempt to avoid similar negative experiences, while a child who remembers positive experiences may approach similar positive experiences (Salmon & Conroy, 2009). The effect of memory on children's behaviour has been demonstrated in research with children who were presented with verbal information regarding an unfamiliar animal. Children presented with negative verbal information later avoided the animal, while children who were presented with verbal positive information approached the animal (Field & Lawson, 2003). A number of questions remain regarding memory for emotion, such as how memory differs for emotions of different valences. Research on memory for emotion and valence will be reviewed.

Most of the research investigating the influence of emotion on memory has focused on adults, but a growing body has begun to address these questions in child populations. Therefore the following discussion of previous research includes studies of both adults' and children's memory for emotions and emotional events. Emotion experienced during an emotional event influences people's memory for the event. Reisberg and Heuer (2005) discuss evidence demonstrating the various effects emotion experienced during an event may have on memory with some evidence suggesting emotion enhances memory and other research suggesting it worsens memory. There is evidence demonstrating that there is a relationship between the intensity of the emotion experienced and the vividness of the memory. For example, Schaefer and Philippot (2005) demonstrated that the intensity of the emotion experienced during an event tends to be associated with more vivid memories. This indicates that it is the intensity of emotion experienced that is important for memory. Although emotion may contribute to the vividness of the memory, this does not

guarantee that the memory is accurate and the memories may in fact be inaccurate. For example, people tend to recall particular aspects, to which they had attended to during the event, while the other aspects to which little attention was paid are overlooked (Reisberg & Heuer, 2005). Research conducted with adults (aged 20 years) investigated the effect of emotions experienced during an event on their memory for the event (Schaefer & Philippot, 2005). Participants were required to retrieve positive, negative and neutral memories and then recall all aspects of the memory (perceptual, sensory, semantic, contextual and temporal). Findings demonstrated that emotion increases the vividness of the memory as emotional memories relative to neutral demonstrated greater clarity, remembered thoughts and remembered feelings. Emotions, however, did not increase recall for the context or temporal aspects of the memory. This indicated that emotions contribute to the vividness of the memory, while not increasing necessarily the detail of the memory. The research discussed above indicates that emotion has a clear impact on people's memory (Reisberg & Heuer, 2005; Schaefer & Philippot, 2005). Due to the impact of emotion on memory, it may be possible to speculate that emotional information impacts memory, which is an area to which more attention needs to be paid. It is important to understand how children remember emotional information, both positive and negative, due to the impact of emotion on memory, the frequent occurrence of emotion and the role of memory in guiding people's behaviour (Salmon & Conroy, 2009).

### *Valence*

Inherent to emotions and emotional information is valence. Emotional information can either be positive or negative and varies in the degree of intensity (Reisberg & Heuer, 2005). There may be varying responses and effects of particular emotions on an individual's memory of information from an event depending on its

valence (Reisberg & Heuer, 2005). Levine and Pizarro (2004) review research investigating how people respond to various emotions. This demonstrated that people's response to emotions vary by the goals and motivations that are associated with that emotion. People then focus their attention on the particular aspects of the event that are relevant to their goals and motivation, thereby affecting what information of the event is remembered (Levine & Pizarro, 2004). This contributes to the argument that people's responses to emotions impact on memory according to the emotion experienced. This suggests that in the current study memory for emotional information will differ according to the valence of the information.

### *Theories of Valence*

Two theories have been proposed to explain the differing responses which include the Density Hypothesis (Unkelbach, Fiedler, Bayer, Stegmüller, & Danner, 2008) and the Range-Frequency Hypothesis (Parducci, 1965). Although the Range-Frequency Model does not focus specifically on memory, the processes proposed in the model have implications for memory. The Density Hypothesis, on the other hand, does focus on memory. These theories propose mechanisms that may explain the response to positive and negative information. Each theory, however, proposes a different mechanism, resulting in different responses and outcomes to positive and negative information. These theories will be discussed to provide a greater understanding of the mechanisms involved with the presentation and processing of positive and negative information. This will be followed by discussion of the research on the varying responses to information of different valences.

#### *Density hypothesis (Unkelbach, Fiedler, Bayer, Stegmüller, & Danner, 2008).*

The Density Hypothesis proposes that the concept of density explains the varying responses to negative and positive information. The concept of density refers to the

idea that stimuli of a particular group are more closely related and similar, conceptually and semantically, than stimuli in another group. In particular, the Density Hypothesis (Unkelbach et al., 2008) suggests that positive information is denser (more closely related and similar) than is negative information. In an experiment with 40 university students, Unkelbach et al. (2008) demonstrated that positive information is denser than negative information. Participants were required to rate the similarity of a series of pairs of words. A computer programme was used to visually demonstrate how closely related and similar these words were. The closer the words were clustered together the greater the similarity, which has been referred to as density. Stimuli with higher density (greater relatedness); that is positive information, are processed more quickly than stimuli with lower density; that is negative information. The Density Hypothesis, therefore, claims that positive information is denser and thus more closely related than is negative information and therefore is processed more quickly than negative information. Additionally positive information occurs at a greater frequency than negative information, as reflected in the fact that the vocabulary of positive words is larger than for negative words (Unkelbach et al., 2008).

Vaish, Grossman, and Woodward (2008) also discuss evidence suggesting there are more positive than negative stimuli. For example, Vaish et al. (2008) discuss research indicating that early in development children have more positive experiences than negative experiences. In particular, positive interactions occur more often than negative interactions between the caregivers and children (Vaish et al., 2008). The greater occurrence of positive interactions may result in positive interactions and information becoming more expected for children and therefore the negative interactions and information may be unexpected. Children may then pay greater

attention to the information that is unexpected, that is the negative information.

Another theory attempting to explain people's responses to positive and negative information will now be discussed.

*Range-Frequency Model (Parducci, 1965).* The Range-Frequency Model is another theory that has offered an explanation for the varying responses to positive and negative information. There are two key principles within the Range-Frequency Model; the range principle and the frequency principle (Lim, 1995; Smith, Diener, & Wedell, 1989; Parducci, 1965). The range principle refers to an individual's subjective psychological rating of a stimulus compared to the ratings of other stimuli on the same continuum. In particular, a comparison is made between the highest and lowest stimuli present on the continuum (Lim 1995; Parducci, 1965). Therefore, when compared to the highest and lowest stimuli, a stimulus may be rated as 5 out of 1-10 on the same continuum as another stimulus (Lim, 1995). The second principle, the frequency principle, considers the frequency at which each stimulus occurs and distribution of occurrence for the stimuli (Lim, 1995; Smith et al., 1989). As the expectation of the individual is that the stimuli occur equally often, the judgement of a stimulus is affected when stimuli do not occur equally often (Parducci, 1965). For example, in a distribution in which positive stimuli occurs more often than negative stimuli, the individual has a greater expectation for positive information to occur (Vaish et al., 2008). The greater occurrence of positive information results in the negative information being unexpected and therefore, greater attention is directed to the negative information (Vaish et al., 2008). Therefore, the extent to which positive and negative information is noticed and attended to depends on whether it is relatively unexpected given the valence of the other information in the context. This is in contrast to the argument offered by the Density Hypothesis which suggests that

positive information occurs more frequently, and therefore is processed faster resulting in a positivity bias. The Range-Frequency Model, however, suggests that positive information occurs more frequently, which causes negative information to be more unexpected, resulting in greater attention being paid toward negative information producing the negativity bias (Parducci, 1965). Both of the principles discussed above, the rating and the frequency of the stimulus compared with other stimuli, are considered and used in making a final judgement on the stimulus (Lim, 1995; Parducci, 1965). The final judgement contributes to the unexpectedness of the stimulus and therefore, to the attention paid and memory for the stimulus.

In summary, the Density Hypothesis (Unkelbach et al., 2008) suggests that positive information is denser, which refers to the idea that the meaning of positive information is more similar and closely related than negative information. As a result, positive information is processed faster than negative information, displaying a bias toward positive information relative to negative information. On the other hand, the Range-Frequency Model (Parducci, 1965) proposes that people engage in two processes when evaluating information. These are known as the range principle and the frequency principle. The range principle rates the information compared with other information, while the frequency principle compares the frequency of occurrence of the information in focus with other stimuli. The Range-Frequency Model proposes that when information is rated more negative than other information and occurs less than positive information, it is more unexpected. This results in a bias toward negative information. These theories have implications for understanding the way people respond to information of different valences. For example, the Density Hypothesis proposes adults and children will remember positive information better than negative information, while the Range-Frequency Model suggests adults and



children will remember negative information better than positive information. The following discussion will first address research that has investigated the negativity bias in adults and children. Following this, research that has provided support for the positivity bias will then be discussed. Discussion of the positivity bias only includes research with adult participants.

*Negativity Bias.* The negativity bias refers to an individual's, adult and children's, tendency or preference to attend to negative or threatening information over positive and neutral information. Negative information may possess greater saliency thereby capturing the individual's attention and causing the individual to attend to the negative information over other information (Ito, Larsen, Smith, & Cacioppo, 1998; Kihara & Osaka, 2008; Reed & Derryberry, 1995; Rozin & Royzman, 2001). Research investigating the negativity bias has found evidence supporting the negativity bias in a range of areas including attention and memory, which is of particular interest to the current study (Rozin & Royzman, 2001; for a review see Vaish et al., 2008). Additionally, research has investigated how children respond to negative and positive emotional information. Of particular relevance to research with children's memory of emotional information is the parent-child conversation, which also differs according to the valence of the information being discussed (Lagattuta & Wellman, 2002).

Vaish et al. (2008) review the development of the negativity bias in children, which is present as early as infancy and continues throughout the lifespan. Evidence indicates that initially infants show an increased attention toward positive information and there is a predominance of positive stimuli presented to the infants. For example, infants receive positive attention from their caregivers and there are little negative interactions between the infant and caregivers (Vaish et al., 2008). It is thought that

this predominance of positive interactions results in negative information or interactions being evaluated as more negative and unexpected than the positive information or interactions. Thus greater attention is paid to the negative information. As infants become more mobile, however, they receive more feedback from their caregiver, which increases the negative information they receive. This is then used to guide their behaviour and greater attention is allocated to negative information. Although there is some discussion of memory, the majority of evidenced has focussed on attention. The research with attention has implications for memory, with greater attention resulting in better encoding of the information and therefore better recall of information (Craik, Govoni, Naveh-Benjamin, & Anderson, 1996). Research providing support for the existence of the negativity bias in memory has also been discussed (Vaish et al., 2008). This has indicated that parents and children discuss negative experiences and emotions more than they do positive experiences and emotions. Vaish et al. (2008) suggest that one reason for the shift towards a negativity bias the unexpectedness of negative information as proposed in the Range-Frequency Model (Parducci, 1965)

Field (2006) investigated the effect of verbally presented information about unfamiliar animals which differed by valence on the attentional bias. Children aged 7-9 years participated in a pictorial dot-probe task. In this task, children viewed two pictures. These pictures disappear revealing a probe. When the children see the probe, they press the button paired with that probe. Reaction times and errors are measured to give an indication of the animal that children were attending to. Children were presented with positive, negative and neutral information about the animals and then participated in the dot-probe task. Results demonstrated that children displayed an attentional bias toward negative information demonstrated through children's

increased attention toward the animal of which they heard negative information. The results of this study therefore, indicate that information presented verbally can have a significant impact on attentional biases, showing that children tend to display the negativity bias and attend to negative or threatening information.

There has been little research on the negativity bias in memory. Some studies have, however, investigated the negativity bias in memory with individuals experiencing depression and anxiety difficulties (Foa, Schechtman, Amir, & Freshman, 2000; Pyszczynski, Hamilton, Herring, & Greenberg, 1989). Pyszczynski et al. (1989) investigated whether college students, classified as sub clinically depressed or non-depressed, would demonstrate a negativity bias when asked to recall recent events. Results showed that participants classified as sub clinically depressed recalled a greater number of negative events specific to themselves relative to non-depressed participants. The finding of the negativity bias in memory has been further supported by Foa et al. (2000), who compared adults presenting with social anxiety and non-anxious adults. Participants were presented with pictures of faces expressing positive, negative or neutral slides and then required to recall the expression for each face. Results demonstrated participants high in anxiety recognised negative facial expressions better than positive or neutral facial expressions relative to non-anxious adults.

In summary, the negativity bias appears to be evident from infancy. Research has investigated the presence of the negativity bias providing much evidence for the presence of an attentional bias toward negative information throughout the lifespan, infancy till adulthood. The negativity bias for memory has been demonstrated with adults experiencing depression or anxiety; however, little research has investigated

the negativity bias for memory in children, whether typically developing or experiencing psychological difficulties.

*Positivity Bias.* Although there is much evidence for the negativity bias as discussed above, the Density Hypothesis (Unkelbach et al., 2008) suggests that there is a positivity bias, where people may demonstrate a preference to attend to or remember positive information over negative information. This has received some attention in the literature, which will not be discussed.

Research by Schulkind and Woldorf (2005) investigated the role of cues in eliciting positive and negative memories with one group of younger adults (age 19 years) and another group of older adults (age 70 years). Findings showed that people reported more positive memories relative to negative memories. These results, however, also demonstrated that the memories reported were affected by the valence of the cues. For example, when provided with a positive cue, more memories were reported and these memories were more arousing relative to memories recalled in response to negative cues. These memories were also quicker to retrieve with positive cues relative to memories recalled in response to negative cues (Schulkind & Woldorf, 2005), consistent with the Density Hypothesis (Unkelbach et al., 2008). The faster retrieval of memories following positive cues relative to memories following negative cues is consistent with the Density Hypothesis as it suggests that positive information is processed more quickly than negative information and adds support to the proposal for a positivity bias in memory. The implications of these findings for memory are unclear, however; positive and negative cues were used to elicit memory and therefore may not generalise to memory without cues.

Additionally, D'Argembeau, Comblain, and van der Linden (2003) investigated the patterns of recall according to valence in a study with undergraduate

students, aged 18-32 years. Participants were required to recall positive, negative and neutral autobiographical events and then rate these memories for various qualities of the memory, such as the clarity of memory for time and location, rating of the emotion experienced, complexity of event and the tastes, smells and odours of the event. The pattern of recall differed according to valence of the memory. In particular, positive memories were reported with increased detail relative to negative memories. Other differences were found between negative and positive autobiographical memories and neutral autobiographical memories, which included the processing of these memories. For example, in positive and negative memories, the individual experienced the memory as if they were experiencing the event, while in neutral memories they remembered as if they were an observer. This indicates that autobiographical memories are processed differently for memories with valence and memories without valence (neutral). Additionally, it also indicates that positive and negative autobiographical memories differ in processing of the event, impacting the type of memory that is formed.

In summary, the body of research reviewed in this section provides support for the positivity bias in memory in adults. There was no research indicating that the positivity bias appears throughout the lifespan. The literature addressing a bias toward positive information investigated the bias with adults, however, there was no research investigating a bias toward positive information with children. A bias toward recalling positive memories has only been demonstrated when cues of varying valences were used (Schulkind & Woldorf, 2005), which therefore may not generalise to memory without cues. Additionally, it has been demonstrated that autobiographical memories of different valences do vary in their qualities, such as the number of details remembered and the individual's view of the memory (D'Argembeau et al., 2003).

Therefore, it appears that little research has addressed a bias toward positive memories in children, nor has it investigated memory for emotional information. The current study will attempt to address these gaps in the literature through investigating children's memory for positive emotional information presented verbally during an event.

On the other hand, research with children and adults has provided support for a bias toward negative information. Much of the research with children has used behavioural paradigms in which the child's behaviour infers their attentional or memory bias toward negative information, such as avoidance of the animals they heard negative information about (Field, 2006). Most research has addressed the negativity bias in attention, however, research has demonstrated the existence of the negativity bias in memory with adults with depression and anxiety difficulties. Therefore, it will be important to understand whether the negativity bias is also displayed with memory for individuals without psychological difficulties. Again as in the research for positivity bias, the evidence for the negativity bias has been demonstrated for memory personal to the participants. This indicates that memory for positive or negative emotional information is presently a gap in the literature. Overall, there is mixed evidence for the presence of the negativity bias and positivity bias. Theories have been proposed to explain the presence of the negativity bias and positivity bias, as well as evidence to support the existence of both biases. Therefore, it appears that there is a need to understand the presence of these biases in children. To address the identified gaps in the literature, the current study will investigate children's memory for emotional information presented during an event with children without psychological difficulties. Children's memory will be assessed through their verbal report.

A critical element of children's memory is the parent-child conversation. The parent-child conversation is a way of providing children with information and enhancing their understanding of the events and thereby contributing to better memory (Boland, Haden, & Ornstein, 2003). Much research has investigated the effects of the parent-child conversation after an experienced event. There has also been some investigation of parent-child conversations during an event indicating that discussion during an event enhances the children's memory for the event. The following discussion is going to firstly address the nature of the parent-child conversation. Following this, the influence of the parent-child conversation for a previously experienced event will be discussed. Finally, the discussion will include the influence of the parent-child conversation during an event as this is the type of discussion that will be used in the current study.

#### *Parent-Child Conversation and the Influence on Children's Memory*

Research conducted with children has emphasised the importance of information that is presented verbally for children's attention and memory (Field & Lawson, 2003; Field, 2006). Field and Lawson (2003) investigated the effect of information (negative and positive) presented verbally on children's attention and memory. Children aged 6-9 years were presented with verbal information, positive and negative, about unfamiliar animals. Verbally presented information influenced the children's response to the animals; for example, children avoided the animal paired with negative information, which also influenced their beliefs about the animal. Additionally, the children's responses differed according to the valence of the information, such as avoiding the threatening animal, while approaching the animal of which they heard positive information. Therefore, this study indicates that information presented verbally may have a significant impact on the development of children's

beliefs and behaviour and that this is impacted greatly by the valence of the information. Although this study has not addressed memory, it gives an indication of the type of impact verbal transmission of information may have.

The parent-child discussion is a mode of presenting verbal information. It has received considerable attention in the literature to investigate how the different elements of these conversations, such as the style and content, may influence children's memory, particularly the autobiographical memory. According to social construction theories of autobiographical memory, conversations between parents and children have a significant role in children's memory development (Fivush et al., 2006; Wareham & Salmon, 2006). Autobiographical memory is an individual's store of personal information of events and emotions experienced by an individual, their understanding of the world and their role in it (Nelson & Fivush, 2004). In the parent-child conversation, children are scaffolded by adults with more knowledge and skills in order for children to learn and develop the skills of remembering and understanding their experiences beyond their current level (Fivush et al., 2006). The parent achieves this with their skills, which they use to shape the conversation, increase the child's contribution to the conversation, and their understanding of the event contributing to their skills in reminiscing and remembering. In this way, children's memory is scaffolded through their discussion with parents about important events, emotions, and experiences (Fivush et al., 2006). It is through these parent-child conversations that the child is taught how to remember information and events and develops the skills for organising and storing information in their memory (Fivush et al., 2006; Wareham & Salmon, 2006).

As the parent-child conversation has been shown to have great implications for children's memory, it is important to understand the style of conversation that



contributes to better memory in children. The style of conversation may differ in the frequency of questions, type of questions and the inclusion of children's contribution to the conversation (Nelson, 1993). A key component of the parent-child conversation that contributes to the quality of children's memory is the level of elaborativeness engaged in by the parent. In particular, it has been associated with various outcomes on the development of children's autobiographical memory (Fivush et al., 2006; Wareham & Salmon, 2006). It has been suggested that autobiographical memory has a role in an individual's socialisation as it develops skills in conversation, attaining knowledge and relaying information and stories (Nelson, 1993). Parent-child conversation is proposed to exist on a continuum of elaborativeness. Parents with a high elaborative style tend to engage the child in conversations that are longer and incorporate more details, use open-ended 'wh' questions, and use the child's contributions to extend the conversation and integrate more information, whereas parents with a low elaborative style engage in shorter conversations in which there is limited input from the child (Wareham & Salmon, 2006). Research has investigated the influence of the parent-child conversation for discussion of past events and during the event. First, the research for parent-child conversations of past events will be discussed followed by discussion of the research investigating the parent-child conversation during an event.

The level of elaborativeness engaged by parents has been associated with varying outcomes of children's memory. Children of parents who engage in a rich elaborative style demonstrate greater memory skills, understanding of themselves and others as well as additional related skills, relative to children of parents who engage in low elaborative style (Fivush et al., 2006; Wareham & Salmon, 2006). This indicates that there is a significant impact on memory for information presented verbally on

children's memory and recall. Research investigating the role of the parent-child conversation and the level of elaborativeness engaged in these conversations has demonstrated that this has a significant influence for conversations of past experiences as well as during the experience. The influence of elaborativeness in conversations of past experiences on children's memory has received much attention in the literature. An area of parent-child conversation that has received less attention is how the level of elaborativeness in conversations during an event influences children's memory of the event. Next, the influence of the parent-child conversation during an event will be discussed.

*Parent-Child Discussion during an Event*

McGuigan and Salmon (2004) investigated memory for information during an event, "Visiting the Zoo", in which they were introduced to animals and information was presented verbally to children aged 3-4 years old and 5-6 years old. There were different conditions in which the style of conversation was manipulated on the quality of elaborativeness as well as the timing of the conversations, with conversation before, during and after the event. Results indicated that the children in the conditions that engaged an elaborative style remembered more correct information than children in conditions that were not discussed elaboratively. It also indicated that discussion during the event did aid the children's memory for emotional information for the children aged 5-6 years in that they recalled more correct information than children that discussed prior to the event. This indicates that information presented during an event is an important factor to consider in children's memory.

Other research has investigated the effect of mother-child discussion during an event on children's memory for the event (Boland et al., 2003). There were two conditions in this study controlling for the type of conversation employed by mothers.

One condition was trained to engage in elaborative conversation during the event, while the second condition received no training regarding discussion during the event. Children, aged 46 months, and their mothers participated in a staged camping event. The type of discussion that occurred during this event was observed and recorded. Children were interviewed 1 day and 3 weeks later. Results indicated that children whose mothers were trained to engage in discussion of an elaborative style during the event recalled more information regarding the event than children of untrained mothers. This provides further evidence that information presented during an event has important implications for children's memory of an event.

### *Discussion of Emotion*

Research has investigated parent-child talk about emotions and shown that the way in which parents discuss emotions can affect children's understanding of emotions when they are older (Dunn, Brown, & Beardsall, 1991). For example, it was identified that children at age of 6 years were better at understanding and being aware of other's emotions if they engaged in high elaborative conversations with their mother regarding emotions when they were 36 months (Dunn et al., 1991). This highlights the important implications of the parent-child conversation, as well as the importance of understanding the particular processes of the parent-child conversation on emotions and the valence of emotion.

Although the evidence indicated that emotion experienced during an event influences the memory formed of the event, this may not be applicable to the memory of emotional information when the individual did not directly experience an emotion. Therefore, it is important to understand children's memory of emotional information when they did not experience an emotion. This links to the research discussed above, on the impact of parent-child conversation on children's memory of experiences as this

information in the parent-child conversation is presented verbally, which is a common mode of transmission for emotional information when the individual is not experiencing the emotion. van Bergen and Salmon (in press) investigated children's memory for emotion using a staged event, "Visiting the Zoo" during which they were provided with verbally presented emotional information. The study aimed to identify how discussion of emotions influenced children's recall of an event while controlling for elaborativeness of the discussion. Children participated in a reminiscing interview 2 days after the event, which differed in style of conversation; emotion-cause (that is, discussion that focussed on the causes of emotions), emotion-expression (that is, discussion that focussed on the expression of emotions), no emotion (that is, discussion focussed on physical aspects not emotions) and minimal (that is, a low elaborative discussion of the event). A memory interview was then conducted two weeks later. Children in the emotional reminiscing conditions recalled more information about the event, both emotional and non-emotional information, relative to children in the minimal reminiscing condition (that is, reminiscing interview discussed in low elaborative style). This suggests that emotional information may be more salient and therefore, greater attention is directed to emotional information relative to non-emotional information. This results in greater memory being displayed through increased recall of information for both the emotional and non-emotional information. Interestingly, children in the emotion-cause reminiscing condition, in particular, reported more information, demonstrating that discussion of the cause of emotion aids children's memory for emotional information and general information.

The research discussed has indicated that information presented verbally has an important influence on children's development of skills. This has been demonstrated through the outcomes of the parent-child conversation and other

research in which information is presented verbally the children. However, the effect of the valence of emotional information that is presented verbally has not been investigated. That is, how children remember emotional information, positive or negative, that is presented verbally. This is an important area to address as it has been found that conversation styles may differ according to the valence of the topic discussed, such as negative emotions being discussed more often and with greater discussion of the causes (Wareham & Salmon, 2006). Research of parent-child conversation for varying valence follows.

*Parent-Child Discussion of Negative Emotions.* Valence of emotional information has been associated with varying patterns in parent-child conversations. Lagattuta and Wellman (2002) conducted a study on the associations between the valence of emotional information and the style and content of the parent-child conversations about the past. The particular style and content components included temporal references, explanations of the cause of the emotion, discussion of consequences and the connections with mental states. Their findings demonstrated that negative information was discussed more than positive information in conversations of past events. Negative emotions were discussed with greater focus on the cause of the emotion experienced than were the causes of positive emotions. Additionally the connections between emotions and mental states were more likely to be discussed for negative emotions relative to positive emotions. This demonstrates that the parent-child conversation engages in distinct patterns of discussion that is specific to negative emotional information. These findings have significant implications on children's memory due to the large body of research indicating that the parent-child conversation has a crucial influence on children's memory. In particular, the parent-child has been shown to influence children's ability to form and relay

memory (Nelson, 1993) and therefore, these differences are crucial to the understanding of memory for information of varying valence.

*Parent-Child Discussion of Positive Emotions.* As discussed above, research findings suggest that there are distinct patterns of conversations that are associated with negative emotional information. This is suggestive of the idea that there are also patterns associated with the discussion of positive emotional information. Lagattuta and Wellman (2002) identified some of the associations with negative emotions and parent-child discussion. However, further to this they also discovered that the parent-child conversations identified that positive information was discussed at a greater rate in conversations that focused on the present. This supports further the idea that the valence of the emotion affects the style of discussion between a child and parent.

The varying patterns of the parent-child conversation on emotions and experiences that differed by valence as demonstrated in the research discussed above has implications for children's memory. The parent-child conversation has a role in developing children's understanding of a past event and the emotions that may have also been experienced. The parent-child conversations during an event of varying valences may also have an influence on children's memory due to the varying styles and content discussed in these conversations. This influence may present through focusing and highlighting to children's attention to particular information during the discussion causing children to attend to the information and therefore enhance their memory for it (Boland et al., 2003). The discussion of previous research above demonstrated that parent-child conversation of experiences and emotions of negative valence is discussed in greater detail, with more discussion of causes and consequences and links to mental states than is the parent-child conversation of positive experiences and emotions. This indicates that the discussion of negative

experiences and emotions will result in greater memory for the negative experiences and emotions as children's attention will be focussed toward the negative information thereby aiding their memory for this information.

In summary, there is evidence demonstrating that information presented verbally has a significant influence on children's beliefs and behaviour. This can occur through the parent-child conversation, which has also shown to differ according to the valence of the topic discussed. This is important to understand as information will be presented during the event in the current study. Overall, the research discussed thus far has demonstrated mixed evidence for the presence of a negativity bias and the positivity bias. The negativity bias has mainly been demonstrated by research investigating the bias in attention although there has been some research in memory. The negativity bias has been demonstrated with both adults and children aiding robustness to evidence supporting the existence of the negativity bias. The positivity bias on the other hand has been demonstrated only in adults while retrieving past memories of personal events. It was shown that positive cues aided recall of positive memories. It has also demonstrated that the parent-child conversation may differ in the quality of the discussion which results in differing outcomes for the children's memory; better memory for rich elaborative conversation styles and poorer memory for low elaborative conversation styles. The style of conversation may differ according to the valence of the topic being discussed and therefore, children's memory may differ according to the valence of information. Therefore, there are some gaps in the literature that need to be addressed. Firstly, little research has addressed biases in memory. Secondly, much of the research on memory has been with adults so this needs to be extended to children. Much of the research on memory has also focused on people's past experiences and memories, however, it is also important to understand

how emotional information is remembered. As the parent-child conversation has been shown to have important implications for children's memory, it is important that information is presented verbally in the current study to ensure that children recall the most amount of information they can to aid to the robustness of the findings.

There may be other factors that also influence the type of information that is remembered by children. One such factor that may influence memory for negative and positive emotional information is individual differences, such as the child's temperament. Temperament will now be discussed. This will be followed by discussion of temperament and the research investigating its influence on attention and memory.

### *Individual Differences and Memory*

Individual differences, such as temperament, may have clear implications for the type of emotional information children remember. Research has investigated individual's memory and the role of individual difference factors, such as anxiety, indicating that there is an influence of anxiety for memory recalled (for a review see Puliafico & Kendall, 2006). Little research has investigated the influence of temperament on the way individuals remember emotional information, however, it is possible that temperament traits will also have an important effect on children's memory for emotional information. Therefore, the following discussion will focus on temperament and the research that gives some indication to as to the type of memory associated with temperament dimensions.

### *Temperament*

There is little agreement in the literature regarding the definition of temperament. The approaches to temperament differ in various aspects, such as the extent to which emotion is included in the conceptualisation and the theory that adult



personality develops out of temperament (for a comprehensive review of the different approaches to temperament see Goldsmith et al., 1987). Rothbart, Ahadi, and Evans (2000) defined temperament as a stable, genetic, individual difference which appears in infancy and continues throughout the lifespan. These individual differences interact with the environment and guide the individual's behaviour and responses to the environment (Teglasi & Epstein, 1998), including emotional and behavioural reactions.

Temperament, as defined above, can be measured through a questionnaire; The CBQ (Rothbart et al., 2001). The CBQ is a measure of temperament for children aged 3-7 years (Rothbart et al., 2001). It measures 15 scales; positive anticipation, smiling/laughter, high intensity pleasure, activity level, impulsivity, shyness, discomfort, fear, anger/frustration, sadness, soothability, inhibitory control, attentional focusing, low intensity pleasure and perceptual sensitivity. These scales compose three dimensions of temperament; negative affectivity (NA), surgency/extraversion (SE), and effortful control (EC). These dimensions correspond to various traits of the Big Five Model of Personality; negative affectivity has strong relations with neuroticism, surgency/extraversion corresponds to the trait of extraversion and effortful control is linked to conscientiousness (Rothbart et al., 2001). These categories of temperament will be discussed in regard to the makeup of the category and the research investigating individual's varying response with different levels of these temperament categories.

*Negative Affectivity (NA).* The dimension of NA is comprised from 5 of the 15 items measured in the CBQ; discomfort, sadness, fear, anger/frustration, shyness and a negative association with soothability (Rothbart et al., 2001). It has been associated with negative outcomes and maladjustment. For example, Eisenberg et al.

(2005) demonstrated that NA had associations with both internalising and externalising difficulties, such as anxiety, depression, anger and irritability. NA does not appear to a sufficient factor to develop these difficulties, however, as demonstrated by the finding that alongside NA, effortful control interacts with NA and influences the development of these difficulties (Eisenberg et al., 2005; Rothbart, 2007).

Similarly, Lonigan and Vasey (2009) investigated the effect of NA on children's (4<sup>th</sup> to 12<sup>th</sup> grade) attention using a dot-probe task using threatening and neutral words. The results indicated that high levels of NA were associated with an attentional bias toward threatening information; this pattern is only observed when there are low levels of EC, however. This suggests that high levels of NA may increase a child's vulnerability to attend more to negative information. It is not sufficient, however, to explain this pattern and other factors will need to be considered. Although the above research focuses on the psychological and attentional outcomes associated with NA, it also gives an indication of the pattern that may exist for memory as attention has been shown to have an impact of on people's memory, with divided attention being associated with poorer memory relative to full attention (Craig et al., 1996).

*Surgency/Extraversion (SE).* Surgency/Extraversion consists of the following items; impulsivity, high intensity pleasure, activity level, positive anticipation, smiling/laughter, as well as a negative association with shyness (Rothbart et al. 2001). SE, in particular children high in impulsivity, has been associated with externalising problems (Eisenberg et al., 2005; Rothbart, 2007). However, as discussed with NA, this appears to be influenced by the level of EC. For example, children high in impulsivity and low in EC tended to have externalising difficulties (Eisenberg et al.,

2005). Although there has not been much research investigating the role of SE in adults or children's attention and memory, the current study will address the role of SE on children's memory for emotional information in order to address the gaps in the literature.

*Effortful Control (EC)*. Four items comprise the dimension of EC. This includes low intensity pleasure, inhibitory control, perceptual sensitivity, and attentional control (Rothbart et al., 2001). EC is system of control for attention, which regulates attention and behaviour (Rothbart, 2007). EC has a role in decision making regarding behaviour (for example, restraining inappropriate behaviour while promoting more appropriate behaviour), changing the focus of attention and engaging in planning (Rothbart, 2007; Rothbart, Ellis, Rueda & Posner, 2003; Salmon & Pereira, 2002). It has also been associated with the development of conscience (Kochanska, Murray & Harlan, 2000). The development of the skills under the umbrella of EC has significant implications for the individual's adjustment and the development of psychological and behavioural disorders (Eisenberg et al., 2005; Rothbart, 2007; Rothbart et al., 2003). EC has been associated with both internalising and externalising difficulties; however appears to have more predictive significance for externalising difficulties (Rothbart, 2007).

EC, particularly attentional control, has been shown to mediate an attentional bias toward threatening information for individuals with high levels of anxiety. Derryberry and Reed (2002) demonstrated that as a result of attentional control, individuals can shift their attention to positive information, while initially they attend more to negative information. Lonigan and Vasey (2009) has demonstrated similar results in research with children as discussed earlier. Using a dot-probe detection task, they investigated children attentional bias toward threatening information in

consideration of their levels of NA and EC. The findings from the research with adults and children on the influence of EC on attention suggest that EC has an important role in attentional biases. As attention influences the quality of memory displayed (Craik et al., 1996), EC's role in attention is likely to impact memory in a similar nature; that is, children with high levels of EC will be able to recall more negative and positive emotional information as a result of their ability to control attention toward positive and negative emotional information during the encoding stage.

### *Temperament and Memory*

As it has been shown that individual differences in anxiety may result in differing patterns of memory, temperament may be an important factor that will contribute to children's memory for emotional information. There is a dearth of research of the associations that may exist between an individual's temperamental traits and memory. It is likely that an individual's memory for an event will differ according to their temperamental traits. This is suggested by the literature that shows that an attentional bias is more prevalent with individuals higher in anxiety levels as discussed above. An attentional bias may have implications for information recalled. For example, a person may display better memory for information that they displayed an attentional bias toward. Craik et al. (1996) demonstrated the importance of attention on people's memory in an experiment in which participants' attention was divided during the encoding stage. Memory was shown to be poorer for the participants whose attention was divided than participants who paid full attention. There is, however, limited research indicating that an individual's level of anxiety is associated with a memory bias for negative information. Mitte (2008) conducted a meta-analysis of the research investigating the presence of a memory bias in adults

with high and low levels of anxiety. This demonstrated that there was a bias for greater recall of threatening information; that is, participants with high levels of anxiety recalled more threatening information relative to participant with low levels of anxiety. Additionally, participants with high levels of anxiety recalled less positive information than participants with low levels of anxiety. This memory bias was, however, only demonstrated for explicit memory and not implicit memory or recognition.

In adults, findings suggest that there is a relationship between temperamental traits, attention and memory. Reed and Derryberry (1995) investigated the temperamental traits, extraversion and neuroticism which correspond to the Child Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, & Fisher, 2001) dimensions of SE and NA respectively, and their relationship with attention and memory bias in adults. Participants completed a dot-probe detection task in which positive, negative and neutral pairs of words were presented to the participants and they were then required to identify the probe. Results demonstrated that probes were detected faster when in the same location as the negative words for participants higher in neuroticism relative to probes in other locations. This demonstrates an attentional bias toward negative information. Additionally, memory was tested through presenting a third word, which then had to be matched with one of the previous words. Response latencies to the third word were faster for participants with high levels of neuroticism when it matched a negative word from the previous presentations relative to words matching a different valence; that is, a positive word. The findings also indicated that extraversion did not impact on the participants' attention and memory.

In summary, there is evidence demonstrating the influence of temperament on factors such as psychological adjustment and attention and limited evidence for

memory with adults. The personality dimensions of extraversion and neuroticism in the Big Five Personality Model corresponds to temperament dimensions of SE and NA in the CBQ (Rothbart, 2007). Therefore, the findings of research with the personality dimensions on attention and memory may inform the potential findings of the current study with temperament dimensions of the CBQ in children. For example, the finding that adults with high levels of neuroticism attended to and remembered more negative information may also be found in children with high levels of NA. However, the results discussed above require further investigation with children's memory for emotional information to identify the particular patterns that occur.

#### *The current study*

Despite previous research on children's memory for emotional information, there are a various areas of children's memory for emotional information that remain unclear. Although past research has investigated attention and memory for information of varying valences, there are inconsistent results and therefore, it is important that the effect of valence in children's recall of emotional information is clarified.

Additionally, the association that may exist between temperament and children's memory of emotional information has not been under much investigation. There has been a limited amount of research investigating the association between adult's personality and memory, which has indicated that personality traits do have an effect on the type of information recalled. This indicates that temperament may influence the type of information recalled by children. Therefore, there are two main questions in the current study; 1) Do children remember negative emotional information better than positive emotional information, and 2) is children's temperament associated with the type of information recalled. These questions will be

investigated using a staged event, “Visiting the Pretend Zoo” in which children will be presented with positive or negative emotional information about an animal and then their memory for the information in the event will be tested two weeks later. A measure assessing temperament will be completed by parents to provide the associations with temperamental traits.

Given previous research suggesting that children are more likely to attend to and remember negative relative to positive information, it is expected that children will display better memory for negative emotional information relative to positive emotional information demonstrated through increased correct recall of negative emotional information relative to correct recall of positive emotional information. The second hypothesis of this study is that children’s temperamental traits will be associated with differing patterns of recall, including the type of information recalled. It is expected, therefore, that children higher on NA will recall negative emotional information better than positive emotional information; higher levels of SE will be associated with recall of positive emotional information and lower levels of EC will be associated with better overall recall of all information, positive and negative. Additionally, it is hypothesised that higher levels of NA and lower levels of EC will be associated with increased memory for negative information relative to higher levels of NA and higher levels of EC, lower levels of NA and higher levels of EC or lower levels of NA and lower levels of EC. The hypothesised influences of temperament on children’s recall of positive and negative information are expected to be additional to the general pattern of recall.

## Method

### *Design*

The design of this study was a mixed design repeated measures ANOVA with temperament (median split of each temperament type; Negative Affectivity, Surgency/Extraversion and Effortful Control) as the between-participants factors and information type (positive and negative) as the within-participants factor. To control for order effects, the type of information presented to the participants was counterbalanced, resulting in six ‘orders’ (see Appendix A).

### *Participants*

Initially 84 participants were recruited; however, 9 participants were excluded as they either withdrew or did not complete the assessment. One participant was excluded due to technical difficulties. The remaining participants were 75 children (33 males, 42 females) aged 61-77 months old ( $M = 68$  months,  $SD = 3$ ; mean and standard deviation of age for boys and girls did not differ significantly;  $p = .53$ ).

Ethical approval for the completion of the study was obtained from the Victoria University Human Ethics Committee. Participants were recruited from four schools in Wellington, New Zealand. Principals and parents/caregivers were sent information letters about the study and parent/caregivers also received a consent form to fill in if they agreed for their child to participate (see Appendix B). Three schools had a decile 10 rating, indicating that the children lived in areas of the highest socio-economic advantage (Education Review Office Te Tari Arotake Mātauranga, 2008, 2009a; 2009b). One school had a decile rating of 2, indicating that the children live in an area of low socio-economic advantage (Education Review Office Te Tari Arotake Mātauranga, 2007). The majority of the students at decile 10 schools were Pakeha students (70% and higher), while the decile 2 school had a greater range ethnic backgrounds (Education Review Office Te Tari Arotake Mātauranga, 2007, 2008, 2009a; 2009b).



## *Materials*

*Props for the Zoo Event.* Two green camouflage hats and two name tags saying “zookeeper” were used to dress up like a zookeeper. Six stations were set up in which an animal was situated. The current study is part of a larger study investigating children’s memory for emotional and non-emotional information. The current study, however, is addressing how children’s memory differs according to the valence of emotional information. Therefore, the non-emotional information will be omitted from the discussion of the method and results of this study. The animals included a Cheetah, Hippo, Lamb, Elephant, Mouse and Crocodile. The animals were soft toys (sized 50cm x 30cm x 20cm) bought from a children’s toyshop. Facial expressions were made with coloured paper and glued to the animals’ faces to represent the emotional state the animal was experiencing (for example, a smile for happy emotion, raised eyebrows for scared emotion; see Appendix C to view the animal props and the facial expressions). Other props for the event included props for the activities that the participants engaged in, such as a blanket, two additional smaller soft toys, a birthday present, pencils and paper.

*Child Behavior Questionnaire Very Short Form (CBQ-VSF; Putnam & Rothbart, 2006).* The Child Behavior Questionnaire Very Short Form is a variant of the Child Behavior Questionnaire, which is a measure of temperament (Rothbart et al., 2001; Putnam & Rothbart, 2006). In the *CBQ* and *CBQ-VSF*, temperament is conceptualised into three broad dimensions; negative affectivity, surgency/extraversion and effortful control (Rothbart et al., 2001). The *CBQ-VSF* consists of 36 items that are rated on a 7-point Likert scale (ranging from 1 being extremely untrue of the child to 7 being extremely true of the child). These items measure the three dimensions consisting of twelve items per dimension. It can be

completed in approximately fifteen minutes (Putnam & Rothbart, 2006; see Appendix D to view the questionnaire). The *CBQ-VSF* can be completed by parents for children aged 3-7 years of age (Putnam & Rothbart, 2006). Psychometric evaluations of the *CBQ-VSF* demonstrate that it measures the same dimensions as the CBQ and displays acceptable internal consistency for each dimension. Putnam and Rothbart (2006) report internal consistency being .72, .75 and .74 for negative affectivity, surgency/extraversion and effortful control respectively.

### *Procedure*

Children participated in a staged event, ‘Visiting the Pretend Zoo’ with a female experimenter. During the event children were taken to six stations in which they were introduced to an animal, presented with information about the animal (positive and negative emotional information) and participated in a two tasks with each animal.

*Event.* The event was adapted from previous research using the ‘Visiting the Pretend Zoo’ paradigm (McGuigan & Salmon, 2004; van Bergen & Salmon, in press). First, each child was met in the classroom and escorted to a separate room by a female researcher. The female researcher engaged in informal talk with the child (e.g., about their day) and explained to the child where they were going and that they were going to do some activities with some animals. Then the child was introduced to a second female researcher and to the task of becoming a zookeeper and helping with the animals. Thereafter, the second female researcher guided him or her through the event.

Each animal was introduced and their emotion identified (positive emotion, negative emotion e.g., *happy*, or *scared*). The researcher explained how to identify the emotion (e.g., *has a big smile*) and the cause of the emotion. The researcher then guided the child through two activities for each animal, which was related to the emotion the animal was experiencing. The child then said goodbye to the animal. For

example, when introduced to the cheetah, the researcher said: “The Cheetah (name) is happy (emotion) because she has been playing with friends (cause). You can see that she is happy because she has a big smile (emotion expression)! She has been playing hide and seek, and her friend is still hiding! See if you can find her (first activity). Well done, you found her friend! Now you should give Cheetah a nice pat (second activity). Thank you. Now let’s say goodbye to the Cheetah. Goodbye (non-core activity).” After the child had met each animal, they were taken back to their classroom by the first female researcher (see Appendix E for full event script).

The script for each animal followed the same structure (see Table 1 for the structure of the event). To ensure that the intensity and salience of the emotional information for each animal were similar, the following steps were taken.

First, emotions were included according to their ratings by Strauss and Allen (2008). In Strauss and Allen (2008), undergraduate students rated the intensity of emotional and non-emotional words. Scared and happy were rated relatively equal; 6.56 (0.78) and 6.11 (1.83) for scared and happy respectively. Therefore, the emotions scared and happy were used to maintain equal intensity between the negative and positive emotions. Second, causal statements (“The Cheetah is happy *because* she has been playing with friends.”) were included in all scenarios. The rationale was that it is important to maintain the equality of causality for each statement as causal statements have been shown to yield greater memory (van Bergen & Salmon, in press). Third, the number of times the animals’ names were used was consistent across animals.

Table 1.

*Structure of Event*

Animal	Emotion	Cause	Expression	Activities
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Hippo	Scared	'Is scared because there was a loud noise.'	'You can see that he is scared because his hair is standing up.'	Give Hippo a hug. Put blanket over him.
Cheetah	Happy	'Is happy because she has been playing with friends'	'You can see she is happy because she has a big smile.'	Find her friend. Give Cheetah a pat.
Lamb	Warm	'Because she usually lives outside'	'You can see she is warm because she has such thick fur'	Stroke the Lamb's thick fur. Take the hat off.
Mouse	Scared	'because her mother is not at home'	'You can see she is scared because she is crying.'	Draw a picture. Give the picture to the Mouse.
Crocodile	Can see well at night	'because he is awake at night'	'You can see that he sees well at night because he has big eyes.'	Do the special sleep dance. Give him teddy.
Elephant	Happy	'Because it's his birthday today.'	'You can see he is happy because he is jumping around dancing.'	Give present to Elephant. Sing Happy Birthday.

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Fourth, children engaged in two activities with each animal. The activities were matched on salience. To ensure the activities were matched on salience, children participated in one activity that involved touching the animal and one performance activity. An example of an activity involving touching the animal is 'Now you should

give Cheetah a nice *pat*'. An example of a performance activity is 'She has been playing hide and seek, and her friend is still hiding! See if you can *find* her'. Fifth, each activity was related to the emotion being experienced by the animal, such as 'Can you give hippo a hug so he feels better'. The activities were related to the emotion being experienced by the animal as the degree of relatedness has been shown to enhance recall (Bird & Reese, 2006). Finally, the word length for the narrative of each animal was controlled with each narrative having 70-80 words. The duration of the event was approximately 5 minutes.

One week after the event (6-9 days), the children that had participated in the event were interviewed by a different female experimenter to assess their memory of the event (see Appendix F to view the memory interview script). This time interval between the event and interview was selected to be consistent with other research investigating the influence of adult-child talk on children's memory. In that work, there was approximately one week between the last exposure to the event (via a post-event reminiscing conversation) and the interview (McGuigan & Salmon, 2004; van Bergen & Salmon, in press).

The interview followed the evidence-based format of the National Institute of Child Health and Human Development interview protocol (NICHD; Orbach et al., 2000). Children were introduced to the experimenter, given an explanation of the purpose of the interview, and given a practice question to demonstrate that they may not know the answers to some questions in which case they can say 'I don't know'. To build rapport, the children were asked to tell the experimenter of an exciting event from the recent past. In order to prepare the children for the conversational style employed in the substantive phase of the memory interview, non-directive prompts, such as 'Uh huh', 'Wow', and 'Tell me more' were used in the presubstantive phase during

which the children described an exciting event that occurred recently (Orbach et al., 2000). It has been demonstrated that this protocol, which emphasises the importance of using open-ended questions, results in a greater amount of detail being recalled by children (Orbach & Lamb, 2000; Orbach et al., 2000). Additionally, it has been shown that this style of questioning results in greater accuracy of information recalled (Orbach & Lamb, 2000).

The children's recall of the event was then assessed. The responses during the memory interview were recorded on a MP3 recorder. The substantive phase of the memory interview began with *free recall*, which, in turn, began with an open-ended prompt; "Now, I'd like to talk to you about the day you visited some animals here at school. I wasn't in the room and I'd really like you to tell me what happened. Tell me everything you can remember, from beginning to end." Following this, non-directive prompts, such as "Tell me more", *Uh hui*, and "Wow" were used in response to the children's answers. When it appeared that the children had provided all the information they could, the interviewer used *prompted recall* in which a series of standardised prompts were provided. Specifically, the children were provided with the names of each animal (hippo, elephant, cheetah, crocodile, lamb, and mouse) to provide a prompt, such as, "I heard you visited a Cheetah at the Zoo. Tell me all about that". As in free recall non-directive prompts were used to elicit more information with greater detail and accuracy (Orbach et al., 2000). When it appeared the children could provide no more information, the children were thanked for their effort and assured that they did well in remembering the information. They were then given two stickers as a token of our appreciation for their help.

The parents of children who returned consent forms and participated in the event were sent a copy of the *CBQ-VSF* form via either post with a posted return

envelope or email, depending on their preference. The parents completed the questionnaire and returned it directly to the researchers. Of the 83 CBQ-VSF forms sent out, 74 were returned completed by children's caregivers.

### *Coding*

*Memory Interview.* All information the children reported in the memory interviews were transcribed verbatim. The coding system was based on that used by van Bergen and Salmon (in press). Information reported was coded as free or prompted recall. Information was only coded the first time it was reported.

The information reported in the memory interviews was coded as positive or negative emotional information. Information was further coded into the following categories: correct naming of the animal, emotion, expression of emotion and the cause of the emotion, as well as the actions engaged in with each animal. For example, a child who correctly labelled an animal ('there was a *hippo*') was given a point (name). Similarly, a point was given for correct recall of a specific emotion ('the hippo was *scared*'). Correct recall of the facial expression of an emotion was given one point when it was reported ('she has a *big smile*').

Children were given credit for every piece of information reported, even if they did not make correct links between the animal and the other categories of information. To gain the point for reporting the cause of an emotion, the children were not required to recall the link between the cause and the emotion. In the following example, 'there was a *loud noise*', a child would be given one point for reporting the cause of the emotion. An emotion-cause link was coded if there was one emotion and one cause, at least one of which was correct. For example, 'the mouse was sad because her mother was not at home' would be coded as an emotion-cause link despite the labelled emotion being incorrect (coded as an error; see below).

Additional non-emotional information presented during the emotional scenes (negative and positive emotional scenes) was also coded. This included information such as descriptions of the animal (for example, “the Hippo was *pink*”), reporting the location of the animal in the room (for example, “the Hippo was *in the corner*”) and any other activities carried out (that is, saying goodbye to the animals). Each additional piece of information within the category that was reported was given one point.

Incorrect recall was also coded. Distortions were incorrect information reported that was related to the information from the event. For example, the statement “the cheetah was *playing tag*” was coded as a distortion as the correct information was “the cheetah was *playing hide and seek*”. Incorrect emotions reported for animals in the event were coded according to whether the emotion reported was of the same valence as the emotion in the script, whether it was present or absent in the event and if it was a positive or negative emotion. Intrusions were coded when a child reported information, such as animals, emotions or activities, that were not in the event but the child clearly believed it to be in the event. For example, “there was a *monkey*” would be coded as an intrusion. Additional intrusion categories included positive and negative emotional intrusions. Other errors include incorrect connections and elaborations of the cause of an emotion (see Appendix G for details.). Each error was assigned one point.

### *Inter-rater Reliability*

Three independent researchers coded approximately one quarter (21 of 75) of the memory interview transcripts. The transcripts were selected randomly and the researchers were blind to the children’s temperament styles. Reliability was calculated using Cohen’s Kappa, yielding reliability of 81%.



## Results

### *Statistical Strategy*

In this section, the key variables analysed are defined. The first variable was overall correct recall (that is, total correct information (free and prompted recall) from the negative emotional scenes and total correct (free and prompted recall) from the positive emotional scenes from the emotional scenes, summed). Recall was also categorised into negative correct recall (that is, total information from the negative emotional scenes summed). Total information from the negative emotional scene consists of the animals' names, emotion label, emotion expression, emotion cause, emotion-cause link, activity, descriptions, location and non-core activities summed. Another variable is positive correct recall (that is, total information presented in the positive emotional scenes summed). Total information from the positive emotional scene consists of the animals' names, emotion label, emotion expression, emotion cause, emotion-cause link, activity, descriptions, location and non-core activities summed.

Overall correct recall, negative correct recall and positive correct recall were split into total recall (that is free and prompted recall summed) and free recall (that is, information recalled without the use of prompts). Therefore, the resulting variables were total overall correct recall, free overall correct recall, total negative correct recall, free negative correct recall, total positive correct recall and free positive correct recall.

### *Preliminary Analyses*

The normality of the key variables was analysed with the Kolmogorov-Smirnov test (K-S test). The following variables were normally distributed: total overall correct recall, free overall correct recall, total negative correct recall, free negative correct recall, total positive correct recall and each dimension of

temperament (SE, NA and EC). Free positive correct recall was not normally distributed,  $p > .05$ . As free positive correct recall was not normally distributed, the Q-Q plots, skewness and kurtosis were investigated which indicated that there were no violations of major statistical assumptions (Field, 2005). Further analysis also identified that there were no significant outliers. As the mean number of errors was less than 1, no further analyses were conducted.

### *Correct Recall*

Table 2 presents descriptive statistics for children's total overall correct recall, free overall correct recall, total negative correct recall, free negative correct recall, total positive correct recall and free positive correct recall as described above.

*Recall of Negative and Positive Information.* To test the hypothesis that children would recall greater amounts of negative information than positive information (that is, information about the negative scenes in the event than information about the positive scenes in the event), paired-samples  $t$ -tests were conducted. Findings showed that, as expected, children reported more negative information than positive information with respect to total recall,  $t(74) = 2.46, p = .02$ , and free recall,  $t(74) = 2.45, p = .02$ .

To establish whether differences in children's recall of positive and negative information were evident for all categories of information or only that were related directly to emotion (that is, activities, description, location and non-core activities), a Table 2:

### *Means and Standard Deviations for Overall, Negative and Positive Correct Recall of Information from the Emotional Scenes (Total and Free)*

		Mean	SD
Overall Correct	Total	12.88	5.47

Recall	Free	10.95	5.48
Negative Correct	Total	6.99	3.52
Recall	Free	5.97	3.53
Positive Correct	Total	5.31	3.00
Recall	Free	4.39	2.70

---

series of paired-samples t-tests was conducted between the amount of positive and negative information recalled in each category in total and free recall. Findings showed there were significant differences between positive and negative items recalled for the categories Animal's Name and Emotion Expression. Greater amounts of negative emotional information were reported relative to positive information. Table 3 presents the means, standard deviations and  $p$ -values for the paired samples t-tests of each category for total and free recall respectively. The same pattern was replicated for free recall with more negative emotional information being recalled relative to positive emotional information,  $t(74) = 2.19, p = .03$  and  $t(74) = 8.10, p = .00$  for Animal's Name and Emotion Expression respectively.

Due to the low number of errors in children's recall of positive and negative information, errors were not analysed further;  $M < 1$  for all errors.

Table 3:

*Means and Standard Deviations for each Category of Positive and Negative Information for Total Recall*

	Negative Recall	Positive Recall		
Variable	$M(SD)$	$M(SD)$	$t(74)$	$p$

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Animal's Name	1.12 (0.68)	0.91 (0.57)	2.19	.03
Emotion Label	0.21 (0.47)	0.19 (0.46)	0.32	.75
Emotion Expression	0.72 (0.65)	0.05 (0.28)	8.69	.00
Emotion Cause	0.92 (1.02)	0.72 (0.73)	1.57	.12
Emotion-Cause	0.15 (0.39)	0.12 (0.37)	0.41	.69
Link				
Total Emotional	3.12 (2.12)	1.99 (1.37)	4.35	.00
Categories				
Activities	3.23 (1.96)	2.92 (1.81)	1.19	.24
Description	0.28 (0.58)	0.25 (0.68)	0.31	.75
Location	0.31 (0.52)	0.28 (0.58)	0.45	.66
Non-core activity	0.05 (0.28)	0.09 (0.41)	-1.14	.26
Total Non-emotional	3.87 (2.11)	3.55 (2.15)	1.10	.28
Categories				

#### *Associations between Temperament and Recall*

Following scoring guidelines by Putnam and Rothbart (2006), the means of the twelve items comprising each dimension of the CBQ-VSF (NA, SE, and EF) were calculated to give a score for these dimensions. A median split established high and low groups with respect to each CBQ-VSF dimension. The possible range of scores was 1 (lowest score on the dimension) to 7 (highest score on the dimension). Table 4 shows the descriptive statistics for the high and low groups of each dimension in the CBQ.

To ensure there were no significant differences in age between the high and low groups for SE, NA and EF, a series of t-tests was conducted. There were no significant difference in age between children who had higher scores in SE ( $M = 68$ ,  $SD = 3.10$ ), NA ( $M = 68.26$ ,  $SD = 2.98$ ), and EF ( $M = 68.71$ ,  $SD = 3.31$ ) relative to children with lower scores in SE ( $M = 68.71$ ,  $SD = 3.67$ ), NA ( $M = 68.47$ ,  $SD = 3.82$ ) and EF ( $M = 68.03$ ,  $SD = 3.49$ );  $t_s < 0.87$ ,  $p_s > .05$ .

To test the hypotheses that children with high levels of NA will recall more negative information than positive information; that children with high in levels of SE will recall more positive information than negative information; and that children with high levels of EC will recall more overall information (positive and negative), a repeated measures ANOVA was conducted with dimension of temperament as the within participants factor. Six participants were excluded in these analyses due to incomplete data on the temperament measure. To investigate the associations between temperament and recall of emotional information, a number of repeated measures ANOVAs were conducted with the dimensions of temperament to investigate the associations between temperament and memory for emotional information; positive and negative emotional information.

*Negative Affectivity.* For NA, there was a significant main effect of information type (positive, negative),  $F(1, 67) = 5.35$ ,  $p < 0.05$  and  $F(1, 67) = 6.04$ ,  $p < .05$  for total and free recall respectively; more negative information than positive

Table 4:

*Descriptive Statistics for the subscales of the CBQ.*

	Negative Affectivity		Surgency/Extraversion		Effortful Control	
	High ( $\geq 4$ )	Low ( $< 4$ )	High ( $> 4.58$ )	Low ( $\leq 4.58$ )	High ( $> 5.58$ )	Low ( $\leq 5.58$ )
N	35	34	34	35	34	35
Mean	4.66	3.36	5.15	3.93	6.07	4.99
SD	.53	.51	.41	.61	.32	.48

information was reported as established earlier (see Table 5). Neither the main effect of NA nor the interaction of NA and information type were significant, for either total or free recall (all  $F$ s  $< 1$ , all  $p$ s  $> .05$ ). That is, children higher in NA did not recall more negative information than children lower in NA.

*Surgency/Extraversion.* For SE, there was again significant main effect for information type (positive, negative) for total recall,  $F(1, 67) = 5.33, p < .05$  and free recall,  $F(1, 67) = 6.07, p < .05$ ; more negative information than positive information was reported as was previously established (see Table 5). Main effect of SE was not significant, nor was the interaction between SE and information type recalled, for either total or free recall (all  $F$ s  $< 1$ , all  $p$ s  $> .05$ ). That is, children higher in SE did not recall more positive information than children lower in SE; in fact, for these children, negative information was recalled more than positive information.

*Effortful Control.* As established previously, there was a significant main effect for information type (positive, negative),  $F(1, 67) = 6.37, p < .05$  and  $F(1, 67) = 6.91, p < .05$  for total and free recall respectively; more negative information than

Table 5:

*Means and Standard Deviations for Total and Free Recall of Positive and Negative Information for High and Low NA, SE and EC.*

Overall	Negative	Surgency/	Effortful Control
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		Affectivity			Extraversion			
			High	Low	High	Low	High	Low
Total	Positive	5.31	5.89	5.79	5.91	5.77	5.85	5.83
Recall		(3.00)	(3.45)	(2.88)	(3.25)	(3.11)	(3.24)	(3.12)
	Negative	6.99	6.94	6.97	6.94	6.97	8.38	5.57
		(3.52)	(3.38)	(3.80)	(3.20)	(3.94)	(3.58)	(3.00)
Free	Positive	4.39	4.63	5.15	4.91	4.86	5.14	4.63
Recall		(2.70)	(3.00)	(2.97)	(2.98)	(3.01)	(3.02)	(2.95)
	Negative	5.97	5.91	6.00	6.09	5.83	7.35	4.60
		(3.53)	(3.57)	(3.63)	(3.48)	(3.71)	(3.30)	(3.34)

positive information was reported (see Table 5). Findings demonstrated a main effect of EC; children higher in EC recalled more negative information relative to positive information. The interaction between EC and information type (positive, negative) was significant,  $F(1, 67) = 10.02, p < .05$  and  $F(1, 67) = 7.28, p < .05$  for total and free recall respectively. That is, children higher in EC recalled more negative information than positive information, while children lower in EC recalled similar amounts of both negative and positive information (see Table 5). Additionally, children higher relative to lower in EC recalled more information overall,  $F(1, 67) = 4.71, p < .05$  and  $F(1, 67) = 6.59, p < .05$  for total and free recall respectively.

Table 6:

*Means and Standard Deviations of Total and Free Recall of Positive and Negative Information for NA and EF.*

		Total Recall	Free Recall
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NA and EF	Negative	Positive	Negative	Positive
(low NA/low EF)	5.44 (3.36)	5.89 (2.68)	4.72 (3.43)	4.94 (2.88)
(low NA/high EF)	8.69 (3.61)	5.69 (3.18)	7.44 (3.41)	5.38 (3.14)
(high NA/low EF)	5.71 (2.66)	5.76 (3.61)	4.47 (3.34)	4.29 (3.08)
(high NA/high EF)	8.11 (3.63)	6.00 (3.38)	7.28 (3.30)	4.94 (2.98)

*Negative Affectivity and Effortful Control.* To investigate the hypothesis that children higher on NA and lower on EC would recall more negative emotional information relative to higher levels of NA and higher levels of EC, lower levels of NA and higher levels of EC or lower levels of NA and lower levels of EC, a repeated measures ANOVA was conducted. Children's CBQ scores were further subdivided to identify four groups: high EC/low NA, high EC/high NA, low EC/high NA and low EC/low NA. As expected, there was a significant main effect for information type (positive, negative), for total recall  $F(1, 65) = 6.39, p < .05$  and free recall  $F(1, 65) = 6.69, p < .05$  respectively; more negative than positive information recalled (see Table 6). For total recall, there was a significant interaction between temperament type (NA/EF) and information type (positive, negative),  $F(1, 65) = 3.45, p < .05$  for total recall. This interaction was not significant for free recall,  $F(1, 65) = 2.42, p = .07$ . There were no significant interactions between each group's recall of positive information; all  $p > .05$  for all groups. Univariate tests also showed that children with low levels of NA and high levels of EC reported more negative information than group 1 ( $M = 5.44, SD = 3.36$ );  $p < .05$ . No other significant differences were identified between each group for recall of negative information;  $p > .05$ .

### *Summary of Results*



Children recalled more negative emotional information than positive emotional information. Errors were too few to analyse. When analyses compared children's recall of emotional and non-emotional information from the negative emotional scenes and the positive emotional scenes, it was demonstrated that children recalled more negative emotional information than positive emotional information. There was no difference between the recall of negative and positive non-emotional information recalled of the emotional scenes. Children higher on EC, relative to those lower in EC, recalled more negative emotion information, whereas there were no significant differences in the amount of positive emotion information recalled by children higher and lower in EC. Moreover, children with low levels of NA/high levels of EC and high levels of NA/high levels of EC resulting in more recall of negative emotional information than positive emotional information. These results indicate that high EF results in greater recall of negative information irrespective of the level of NA. There were no significant differences in children's recall dependent on the level of NA and SE.

### Discussion

Emotional event are experienced commonly by everyone (Langlois, 2004). These experiences have a significant influence on our lives as our memory for previous experiences guides our future behaviour in similar situations. How people respond to these events may vary depending on many factors. The valence of an experience has been shown to be an important factor that influences how people respond and attend to information in these experiences, with people paying greater attention toward negative than positive information (Vaish et al., 2008). Research on the influence of valence on memory is, however, relatively new and there are still questions remaining regarding its influence on memory. In addition to the valence,

differences between individuals may contribute to varying responses or memory for such experiences or information. An important individual difference may be temperament. The temperamental traits have each shown to be associated with varying psychological outcomes for people, such as externalising difficulties being associated with SE and internalising behaviours being associated with NA (Eisenberg et al., 2005). Further research is required to clarify the factors influencing children's memory for emotional information.

The primary aim of the current study was to investigate children's memory for emotional information and identify whether children better remembered positively- or negatively-valenced emotional information that was presented verbally. To do this, we staged an event, 'Visiting the Pretend Zoo', which was accompanied by emotional information presented verbally. Children were verbally introduced to animals with varying emotions (that is, the negative emotion scared and the positive emotion happy), given explanations of the cause and expression of the emotions and engaged in activities that were related to the animal's emotion. One week later the children's memory for the experience was assessed. Children's memory was demonstrated through children's recall of emotional information; positive and negative. The second aim of this study was to understand how children's temperament (specifically, NA, SE and EC) influenced the type of emotional information (positive or negative) recalled by children.

There have been some limitations of the limited previous research on this issue, which we attempted to address in the current study. For example, we attempted to match the intensity of the emotions used, and to this end, used two emotions, scared and happy. The intensity of these emotions was rated by undergraduate university

students, which indicated that scared and happy were similar in the level of saliency (Strauss & Allen, 2007).

Moreover, it has been demonstrated in previous research that the degree of causality explained (that is whether aspects of an event are connected by causal relationships) can aid children's memory for emotional information (van Bergen & Salmon, in press). Previous research investigating children's memory for emotional information has confounded causality and emotion content (van Bergen & Salmon, in press). Therefore, in the current study each emotional scene followed the same sequence during which the cause of each emotion was explained (full details described in the method). The findings from the current study and the implications of these findings will be discussed.

*Do children remember more negative than positive emotional information?*

Due to the predominance of evidence for the negativity bias in the relevant theory and research (Field, 2006; Ito et al., 1998; Kihara & Osaka, 2008; Parducci, 1965; Reed & Derryberry, 1995; Rozin & Royzman, 2001; Vaish et al., 2008) it was hypothesised that children would recall significantly more negative emotional information than positive emotional information from the event. This prediction was supported, as there was a significant difference between the amount of recall for negative emotional information and amount of recall for positive emotional information. This indicates that when the intensity of emotions and the degree of causal connection discussed are controlled for, children may remember negative information better than positive information.

Although there has been some evidence for better memory for positive relative negative events or information (D'Argembeau et al., 2003; Schulkind & Woldorf, 2005), the results of the current study do not support that evidence. Negative

emotional information was remembered better relative to positive emotional information in all analyses. That is, children recalled more negative emotional information about the event than positive emotional information. These results occurred even with the intensity of the emotions used in the event and the causality for each emotion being controlled for. For example, the emotions used in this study were chosen as they were rated as equal in intensity by Strauss and Allen (2008) so that recall did not differ due to the intensity of the emotions. The causes of the emotions were also provided in order to aid children's memory and ensure that all information was equal in the saliency as the causal structure has been shown to aid memory (van Bergen & Salmon, in press). There are several possible explanations for the results of the current study. The first explanation for the results involves discussion of The Range-Frequency Model (Parducci, 1965) and the second explanation considers the role of children's goal on their memory for emotional information (Levine & Edelstein, 2009).

*The Range-Frequency Model (Parducci, 1965).* The finding that a greater amount of negative emotional information was recalled relative to positive emotional information is consistent with the expectations formed from the principles of The Range-Frequency Model (Parducci, 1965). The Range-Frequency Model proposes that when an individual is evaluating information, there are two principles that guide how this evaluation is formed. These principles are the range principle and the frequency principle. It is proposed by the Range-Frequency Model that negative information is more unexpected, which results in greater attention to and therefore memory for the negative information. The Range-Frequency Model would therefore suggest that in the current study, the negative emotional information may have been

unexpected for the children and therefore, greater attention may have been focussed toward the negative information aiding children's memory for it.

The Range-Frequency Model argues that the negativity bias occurs due to the combination of the intensity of the information and the frequency of occurrence for the type of information compared with other types of information. For example, information of greater intensity that occurs less frequently will be remembered better as there is a greater degree of unexpectedness than for information with less intensity and occurs more frequently as this would be more expected. Research is discussed in Vaish et al. (2008) which demonstrates that early in development children typically engage in more positive interactions with caregivers, which causes negative interactions to become more unexpected. The greater occurrence of positive interactions skews the children's evaluation of the frequency of positive and negative information toward the positive direction, thereby causing negative interaction to be unexpected and therefore may be attended to and remembered better.

There are, however, limitations of The Range-Frequency Model in explaining the results of the current study. For example, the current study controlled for the intensity of the emotions and each emotion was of equal intensity as demonstrated by Strauss and Allen (2008). Therefore, the emotions should not have been evaluated by the children as different in intensity. The frequency of positive and negative emotions was also controlled for. There were two negative and two positive emotions which means that in the current study, neither positive or negative emotions should have been more unexpected than the other. Additionally, research indicating that the negative information or experiences are more unexpected has been conducted with children in early infancy (Vaish et al. 2008). Therefore, it is likely that children's expectations may differ as they get older. Finally, the research indicating that negative

events are more unexpected has been conducted with typically developing children and therefore may not generalise to other populations to which negative experiences are not unexpected. Due to the limitations of The Range-Frequency Model in explaining the results of the current study, another possible explanation will now be discussed.

*The Role of Goals and Motivations on Memory.* It has been suggested that the response to emotional events or information is partly determined by the goals of the individual which in turn influences the memory for the event or information (Levine & Edelstein, 2009). The goals influence memory through the narrowing or broadening attention to the information or stimuli that are particularly relevant to the state of goal attainment. For example, if a child is attempting to achieve a particular goal, it is suggested that their attention is focussed on the information relevant to that goal, while once achieved their focus broadens again (Levine & Edelstein, 2009). This may offer another explanation for the results of the current study. The emotions and emotion cause of the negative emotional scenes may have been more relevant to the child's goals than the emotions and emotion cause of the positive emotional scenes. For example, in the negative emotional scenes the animals were scared. The animals were scared due to 1) 'mother is out' and 2) 'there was loud noise', while the animals in the positive emotional scenes were happy because 1) 'playing with friends' and 2) 'it's his birthday today'. Levine and Edelstein (2009) discuss evidence demonstrating that people higher in fear remember more information about risks. Therefore, it may be that in the current study, the causes for the emotion of scared were more relevant to the goals of the children thereby aiding their memory for the information thus explaining the greater recall of negative information.

In summary, the results of the current study demonstrated that children remembered a greater amount of negative emotional information relative to positive emotional information that was presented verbally. These results suggest that the children have a tendency to recall negative relative to positive information, even when the intensity of the words, the degree of causal connection have been controlled for. The findings fit conceptually with the Range-Frequency Model and previous research investigating the way negative emotions are discussed. Therefore, it may be possible that there is a greater unexpectedness associated with negative emotional information, which contributes to the children's better memory for negative information. Alternatively, the emotions discussed during the event may be relevant to the children's goals. As discussed in Levine and Edelstein, (2009), the goals of an individual focus their attention to information and stimuli that are particularly relevant to that goal. Therefore, it may be possible that the negative emotional experiences in emotional scenes of the current study were particularly relevant to the children who participated and as a result was remembered better than the positive emotional information.

Another interesting finding from the current study demonstrated that the emotional information from the negative and positive emotional scenes was recalled differently, while there was no difference in recall of the non-emotional information from the negative and positive emotional scenes. We defined emotional information as the animal's name, emotion label, emotion expression, emotion cause and emotion-cause link, and non-emotional information as the activities, description, location and non-core activities. Emotional information from the negative emotional scene was remembered better than was emotional information from the positive emotional scene. There was, however, no significant difference between the negative and positive

emotional scenes for non-emotional information. This suggests that emotional information may be better remembered than non-emotional information, although this may be so only for the negative emotional information. The finding that emotional information may be better remembered than non-emotional information has also been demonstrated in van Bergen and Salmon (in press). Children participated in a reminiscing interview during which information from the event was discussed. There were emotional and non-emotional reminiscing interview. Children who participated in the emotional reminiscing interviews remembered more emotional and non-emotional information than children in the non-emotional reminiscing interviews. Therefore, findings from the current study and van Bergen and Salmon (in press) suggest that discussion of emotional information may aid children's memory for the event.

The current study focused on children's recall of emotional information presented verbally during the event as it has been shown in previous research that discussion during an event aids children's memory for the event (Haden, Ornstein, Eckerman, & Didow, 2001; McGuigan & Salmon, 2004). Discussion during the event has been shown to result in children recalling more information than children who discussed prior to the event (McGuigan & Salmon, 2004). Other research has investigated the influence of discussion during an event on children's development of fear (Field & Lawson, 2003; Field, 2006). This has indicated that discussion during an event has a significant impact on children's development of fear. For example, Field and colleagues demonstrated that verbally presenting negative information about an unfamiliar animal contributes to a child's fear of the animal (Field, 2006). This was demonstrated through the children's displaying an attentional bias toward the animal of which they heard the negative information. The influence of information presented



verbally has also been displayed in behavioural paradigms in which children avoid the animal of which they heard the negative information (Field & Lawson, 2003). Field and colleagues did not compare the relative memorability of negative and positive emotional information, however. The findings from the current study suggest that negative emotional information may be particularly well recalled by children, strengthening the theoretical position that fear can be transmitted verbally.

*Does Temperament Influence the Type of Emotional Information Recalled?*

Much research has demonstrated that children's temperament traits have a broad influence, including on their attentional response to particular kinds of stimuli and the long-term psychological adjustment associated with temperament trait (Eisenberg et al., 2005; Lonigan & Vasey, 2009). There has been little research, however, addressing the influence of temperament traits on memory. As it has been shown that temperament traits can have an important influence on attention, it is possible that temperament will also influence memory for emotional information due to the role attention plays in memory (Craik et al., 1996). Therefore, the hypothesis in this study was that children's temperament would influence the type of emotional information, positive or negative, recalled by children. A discussion of the hypothesis for each temperament trait and the expected influence on children's memory, the findings and implications of these findings will be discussed now.

*Negative Affectivity.* It was hypothesised that children with higher levels of NA would recall more negative emotional information than they would positive emotional information. This hypothesis was not supported, however, as there was no significant interaction between the level of NA and the type of information recalled by children. This finding indicates that the level of NA does not appear to influence the pattern of recall for emotional information in children.

These results may indicate that the presence of high levels of NA may not be necessary to result in greater memory for negative emotional information. Previous research has investigated NA and its impact on psychological adjustment (Eisenberg et al., 2005) and attention (Lonigan & Vasey, 2009). These studies have indicated that NA does have an impact on psychological adjustment and attention, with higher levels of NA associated with more psychological difficulties and attention toward negative or threatening information. The impact of NA was, however, in combination with other temperamental traits. The research demonstrating the effect of the combination of temperament traits will be discussed in the section on the results for NA and EC combined.

*Surgency/Extraversion.* It was hypothesised that the level of SE would influence the type of information recalled by children, and, in particular, that children with high levels of SE would recall more positive emotional information relative to negative emotional information. This expectation; however, was not supported by the results, as there was no significant interaction between the level of SE and the type of information recalled by children. There has been little research focusing on the role of SE in regard to attention and memory. Therefore, the results of the current study indicate that SE may not have a role in children's memory for emotional information. This result, however, needs further attention in future research before this conclusion can be made.

*Effortful Control.* It was expected that EC would influence the type of information recalled by children. In particular, it was expected that children with higher relative to lower levels of EC would recall more overall information (positive and negative information) as previous research has demonstrated that EC plays a significant role in mediating attention between positive and negative information

(Derryberry & Reed, 2002; Lonigan & Vasey, 2009). The findings were consistent with this expectation. Specifically, children higher relative to lower on EC recalled more information overall, and, in particular, more negative emotional information. This demonstrated that the level of EC does influence children's recall of emotional information as there was a significant interaction between level of EC and information type recalled.

The finding indicating that children with high levels of EC recalled more negative emotional information relative to children who were lower in EC was somewhat surprising and not the result that was expected. EC is composed of low intensity pleasure, inhibitory control, perceptual sensitivity, and attentional control (Rothbart et al., 2001). Decision making, changing the focus of attention and engaging in planning are skills associated with EC (Rothbart, 2007; Rothbart, Ellis, Rueda & Posner, 2003; Salmon & Pereira, 2002). Children with high levels of EC may be able to focus on and disengage from information (Derryberry & Rothbart, 1997). In the current study, that indicates that children with high levels of EC could focus on and recall negative emotional information then disengage from it to focus on and recall positive emotional information. The influence of EC on children's coping during a distressing medical experience highlights the benefits of the ability to flexibly shift and refocus attention (Salmon & Pereira, 2002). In this study children with high levels of EC had greater ability to engage in more effective coping strategies, such as distraction indicating that children high in EC have the ability to engage and disengage from negative information. Additionally, in the current study the finding that the levels of EC influenced overall recall of emotional information indicates the role EC may have in children's recall of information. Therefore, in consideration of the qualities of EC, the results of the current study may have

occurred due to the ability of children with high levels of EC to allocate their attention to both positive and negative information both during encoding and retrieval, which resulted in greater recall of all information. This may also explain the greater recall of negative information as the children with high levels of EC may be able to choose to recall the negative emotional information for a time and then disengage from this information and attend to different information.

One crucial implication of the role of goals on memory is the influence of emotion regulation as a goal and its deterioration on memory for the stressful event (Levine & Edelstein, 2009). It is proposed that the goal is to regulate the emotions and therefore greater attention is focussed on the goal rather than the events occurring. EC has a role in regulating one's response to stressful events as demonstrated in Salmon and Pereira (2002). This indicated that children with high levels of EC had greater skill in regulating their distress and engaging in effective coping strategies during a medical procedure than children with low levels of EC. Therefore, it may be that individuals with high levels of EC have greater skills in regulating their emotions and therefore can focus their attention on the events that are occurring more efficiently relative to individuals with low levels of EC. Finally, this may contribute to the greater memory for negative emotional information displayed by children with high levels of EC relative to children with low levels of EC.

*Negative Affectivity and Effortful Control.* The final hypothesis for this study was that children with high levels of NA and low levels of EC would recall more negative emotional information relative to positive emotional information. This was hypothesised as previous research demonstrated that EC had a significant influence on the outcome of psychological adjustment (Eisenberg et al., 2005) and attention (Lonigan & Vasey, 2009), however, this influence was in combination with NA.

Lonigan and Vasey (2009) demonstrated that a combination of high NA and low EC resulted in greater attention to negative information. The level of EC appears to mediate the influence of NA with higher levels of EC serving as a protective factor, while low levels of EC contribute to these difficulties. Therefore, considered together, the findings from Eisenberg et al. (2005) and Lonigan and Vasey (2009) raise the possibility that the combination of the level of NA and EC is crucial to the effect of temperament on psychological outcomes and attention. Findings of the current study did not support this hypothesis, however, there was significant interaction between the levels of NA and EC on children's recall of information, indicating that the level of NA and EC does influence the type of information recalled by children. It was demonstrated that children with low levels of NA and high levels of EC and children with high levels of NA and high levels of EC also reported a greater amount of negative emotional information, while children with low levels of EC and high and low levels of NA recalled equal amounts of positive and negative emotional information. This indicates that high levels of EC has an influence on the type of information recalled irrespective of the level of NA; greater recall for negative emotional information relative to positive emotional information.

In summary, the current study indicated that all children recalled more negative emotional information than positive emotional information. The temperament traits of NA and SE did not appear to have an influence on the type of information recalled, which differed to the hypotheses of this study. The results did, however, indicate that EC has a significant influence on the type of emotional information recalled by children with high EC leading to greater recall of negative emotional information. This result has been explained due to the skills that are associated with EC, which will aid children's ability to engage and disengage from

information and therefore, recall both more overall emotional information and also recall more negative emotional information relative to positive emotional information.

### *Other Findings*

*Errors.* Children reported very few errors in this study; less than one per child. As a result, the type of errors for positive and negative emotional information and the difference between these errors were not analysed. The low occurrence of errors demonstrated in the current study is consistent with previous research using the ‘Visiting the Pretend Zoo’ (McGuigan & Salmon, 2004; van Bergen & Salmon, in press). The low occurrence of errors may also possibly be due to the utilisation of interviewing practice based on the principles of the National Institute of Child Health and Development protocol (NICHD; Orbach, Hershkowitz, Lamb, Sternberg, Esplin, & Horowitz, 2000). This emphasises the importance of using open-ended questions, and non-suggestive questioning to reduce the occurrence of errors in recall with children as well as recalling more detail.

### *Applications*

Overall, the results of this study indicate that children remember negative emotional information that is verbally presented better than they remember positive emotional information that is verbally presented. These results contribute to developing an understanding of how children remember emotional information and events of positive and negative valence. This indicates that emotional experiences may be important for children in learning about emotions, themselves and the world. The experiences are stored in their memory and then used to guide their future behaviour (Nelson & Fivush, 2004). In consideration of previous research, the parent-child conversation is an important avenue through which learning about emotions and emotional experiences occur (Fivush et al., 2006; Wareham & Salmon, 2006). In

particular, when these conversations adopt an elaborative conversational style, the child will develop an understanding of their experiences and also remember these experiences better (Wareham & Salmon, 2006).

Past research has investigated the coping skills that children aged 2-7 years old display during a medical procedure according to the level of EC (Salmon & Pereira, 2002). Findings indicated that the level of EC influenced the coping strategies children used as well as the frequency of using such strategies with children with higher levels of EC engaging in more effective strategies. Higher levels of EC have also been associated with better psychological outcomes (Eisenberg et al., 2005), better coping skills (Salmon & Pereria, 2002) and now greater memory for negative emotional information, and overall information. Although there is no evidence to suggest it is possible, one implication may be that children with low levels of EC may benefit from a training programme to develop their level of EC. This would result in greater ability to shift their attention to other information, engage in behaviour that may not be as beneficial in the short-term but would be in the long-term, as well as better skills to manage experiences that are unpleasant (Rothbart, 2007).

### *Limitations*

Several limitations should be discussed. Firstly, the nature of the emotional information used in the current study may be a drawback in this study. As discussed earlier, the intensity and the causality of the emotions were controlled for in the current study to ensure all information was equal. The emotional information provided during the event was, however, mild in intensity. As the emotions were mild, it may be that the information did not attain the attention of the children during the event. This would affect the children's memory for the information as the amount of attention paid to information affects the memory for the information ( Craik et al.,

1996). Therefore, if the information did not attain the children's attention, less information would be remembered by the children in the memory interview one week later. This is a gap in the literature that could be addressed in future. It may be that different emotions, such as angry and excitement and stronger emotions affect the type of recall (Reisberg and Heuer, 2005). Therefore, it may be beneficial for future research to address children's memory for other emotions and stronger emotions. The results would indicate the validity of generalising the results of the current study to all positive and negative emotions or give an indication of the results being unique to the emotions used in the current study.

Additionally, the props used in this study may have posed as a limitation. The animals were toys purchased from a well-known children's toy store. This may be a limitation as a small number of children recognised some of the toys used in the event or even owned one of the toys themselves. For these children, the toy animals may have served as an additional cue for the children to remember the information presented and the activities they participated in during the event. It is unclear whether this occurred differently for the animals in the negative emotional scenes and animals in the positive emotional scenes. The data for these children did not display a particular bias for recall and therefore their data remained in the study. Future studies could, however, address this issue through purchasing toys at a store less commonly used or alternatively, toys could be made to use in the study in particular. This would ensure that the children have not seen the toy before nor own the toy and therefore, removes the possibility that they have cues reminding them of the event.

### *Future Research*

There are still many gaps in the literature regarding children's memory for positive and negative emotional information presented verbally and the influence of



temperament on children's memory. This study aimed to address these gaps through investigating children's memory of a staged event in which they were verbally presented with negative and positive emotional information, and measuring the children's temperament through parent report. This clearly demonstrated a negativity bias in memory for emotional information with children, as well as identifying that EC has a significant influence on children's memory. Future research needs to replicate this study in order to ensure the validity and reliability of the results of this study.

Another area that should be addressed in future research is how these results may differ with children of a different age and developmental stage. This is an important area to address as children's skills change as they move through the developmental stages and they may display their memory in different ways. Ornstein, Haden, and San Souci (2008) completed a review of the evidence of the development of memory skills in children, which indicated that the capacity to form memories begins early in the developmental span, as young as infancy, and continues to develop throughout the child's development. This review discusses paradigms, such as the conjugate reinforcement paradigm (infants learn to kick their feet to move a mobile and learning and memory is indicated by an increase in kicking) and the imitation based paradigm (requires infants to imitate an observed action) for research with infants (Ornstein et al., 2008). For older children, the research tended to utilise children's ability to recall information about familiar activities in order to assess their memory, which suggests that children develop scripts for familiar events in which the information of the event is stored and organised (Ornstein et al., 2008). It was also demonstrated that memory differed by age with older children displaying better memory than younger children, such as learning the information faster, retaining it for

longer periods of time and including more details. Therefore, it has been demonstrated that children's memory skills change over the developmental stages and develop alongside other skills, such as language. Replication of this study with other age groups and developmental stages will therefore, give an indication to the generalisability of the results to other age groups.

### *Conclusions*

Children recalled negative emotional information better than they recalled positive emotional information. This may be due to the unexpectedness of the negative emotional information as suggested by the Range-Frequency Model (Parducci, 1965). Another possible explanation for the results of the current study relates to the goals of the children. The emotional information in the negative emotional scenes may have been more relevant to the children's goals and concerns. As it has been shown that the goals of an individual influences the information that is remembered, it is possible that the negative emotional information was remembered better than the positive emotional information due to the relevance to their goals.

In addition, the components of temperament differed in their influence on children's recall for type of emotional information. One temperament trait that was demonstrated to influence children's recall was EC. EC control influenced both the type of information recalled and the overall amount of information recalled. This was also demonstrated when considering the impact of NA and EC on recall. The level of EC influenced the type of information recalled independent to the level of NA. This raises the possibility that the level of EC has an important role in children's memory. There were no significant interactions for NA or SE. This indicates that NA does not influence the type of information recalled by children as was expected. It was also demonstrated that SE did not impact on the type of information recalled by children,

however, little research had addressed the role of SE and therefore, the results of this study indicate that SE may not have a major role on children's memory for emotional information.

The current study contributes to the body of literature on children's memory and extends the current literature through investigating the role of temperament on children's memory for positive and negative emotional information. Although there were some limitations to the current study, which should be controlled for in future research. Children's memory for emotional information and the influence of temperament needs to be further investigated to contribute to the understanding of these issues.

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Appendix A  
Counterbalancing Order

1	2	3	4	5	6
Cheetah (H)	Hippo (S)	Lamb (N)	Elephant (H)	Mouse (S)	Croc (N)
Hippo (S)	Croc (N)	Elephant (H)	Lamb (N)	Cheetah (H)	Mouse (S)
Lamb (N)	Elephant (H)	Mouse (S)	Croc (N)	Hippo (S)	Cheetah (H)
Elephant (H)	Cheetah (H)	Croc (N)	Mouse (S)	Lamb (N)	Hippo (S)
Mouse (S)	Lamb (N)	Cheetah (H)	Hippo (S)	Croc (N)	Elephant (H)
Croc (N)	Mouse (S)	Hippo (S)	Cheetah (H)	Elephant (H)	Lamb (N)

Appendix B1  
Information Letter (Principal)



**Children's Memory for Mild Emotional and Non-Emotional Information: How it is associated with children's temperament and understanding of emotion**

Dear Principal

We are conducting a study that is looking at children's memory for emotional and non-emotional information. We would like to invite your children in your school, if born between January 1<sup>st</sup> 2003 and June 1<sup>st</sup> 2004 (aged 5 - 6.5 years), to participate in this study. This has been approved by the Victoria University Human Ethics Committee.

**What is the purpose of this research?**

- There are two components to this study. Firstly, we are interested in investigating whether children better remember information that is mildly emotional (both positive and negative) or information that is neutral. Secondly, we are interested in whether children's temperament (for example, whether they are shy or outgoing) and their knowledge of basic emotions influences the type of information that they remember about an event. Studies such as this can provide important information about individual differences that shape children's developing understanding of the world.

**Who is conducting the research?**

- This research is being conducted by researchers from the School of Psychology at Victoria University, Wellington. Katherine Mackay and Janelle McIvor are undertaking this study under the supervision of Dr Karen Salmon. The research will be used to complete two Masters Theses.

**What is involved if you and your child participate in this study?**

- Your students will be seen individually at school.
- Your students will first participate in a staged event involving "Visiting the pretend Zoo". We will give each child information about animals (e.g. the panda); an example of the statements given is "The panda is happy because there are lots of animals to play with". The event will take approximately 5 minutes.
- One week later, we will interview your students about their memory for the event. Children will also undertake a short questionnaire about their understanding of emotions. The interview and questionnaire will take approximately 20 minutes in total.
- Your students can withdraw by saying that they do not wish to proceed at any stage of the study.

- The parents/caregivers will be asked to complete a questionnaire asking how their child would respond in specific situations. This will be emailed or posted depending on their preference.
- Dr Karen Salmon has used events like these in many previous studies. We know the children are keen to participate and find the experience enjoyable.

### **Privacy and Confidentiality**

- Interviews will be audio recorded then transcribed for data analysis. The data will be coded by numbers and therefore, data of your students will never be identified.
- Consent forms and data from the study will be kept for five years after publication.
- Coded data may be shared with other competent professionals upon request.
- The data of your students may be used in other studies.
- The coded data of your child will be securely stored in the laboratory of Dr Karen Salmon.

### **What happens to the information that you provide?**

- We may publish the results of the study in a scientific journal or present them in a conference. For both publication and theses, no child will be identified in the results and will remain confidential.
- The overall findings will form part of two Master's Theses, which will be submitted for assessment.

The results of the study will be available approximately January 2010. A summary of the results will be sent out to you upon completion.

If you have any further questions regarding this study, you are most welcome to contact the supervisor of this study, Dr Karen Salmon, ph 463 9528 or [Karen.Salmon@vuw.ac.nz](mailto:Karen.Salmon@vuw.ac.nz).

Thank you for your time in considering participating in this study.

Yours sincerely,

Janelle McIvor (Masters student)

Katherine Mackay (Masters student)

Karen Salmon, PhD., Dip.Clin.Psych  
Senior Lecturer in Psychology

Appendix B2  
Information Letter (Parents/Caregivers and Consent Form)



**Children's Memory for Mild Emotional and Non-Emotional Information: How it is associated with children's temperament and understanding of emotion**

Dear Parent/ Caregiver,

We are conducting a study that is looking at children's memory for emotional and non-emotional information. We would like to invite your child, if born between January 1<sup>st</sup> 2003 and June 1<sup>st</sup> 2004 (aged 5 - 6.5 years), to participate in this study. This has been approved by the Victoria University Human Ethics Committee.

**What is the purpose of this research?**

- There are two components to this study. Firstly, we are interested in investigating whether children better remember information that is mildly emotional (both positive and negative) or information that is neutral. Secondly, we are interested in whether children's temperament (for example, whether they are shy or outgoing) and their knowledge of basic emotions influences the type of information that they remember about an event. Studies such as this can provide important information about individual differences that shape children's developing understanding of the world.

**Who is conducting the research?**

- This research is being conducted by researchers from the School of Psychology at Victoria University, Wellington. Katherine Mackay and Janelle McIvor are undertaking this study under the supervision of Dr Karen Salmon. The research will be used to complete two Masters Theses.

**What is involved if you and your child participate in this study?**

- Your child will be seen individually at school.
- Your child will first participate in a staged event involving "Visiting the pretend Zoo". We will give each child information about animals (e.g. the panda); an example of the statements given is "The panda is happy because there are lots of animals to play with". The event will take approximately 5 minutes.
- One week later, we will interview your child about their memory for the event. Children will also undertake a short questionnaire about their understanding of emotions. The interview and questionnaire will take approximately 20 minutes in total.
- Your child can withdraw by saying that they do not wish to proceed at any stage of the study.

- You will be asked to complete a questionnaire asking how your child would respond in specific situations. This will be emailed or posted to you depending on your preference.
- Dr Karen Salmon has used events like these in many previous studies. We know the children are keen to participate and find the experience enjoyable.

### **Privacy and Confidentiality**

- Interviews will be audio recorded then transcribed for data analysis. The data will be coded by numbers and therefore, data of your child will never be identified.
- Consent forms and data from the study will be kept for five years after publication.
- Coded data may be shared with other competent professionals upon request.
- The data of your child may be used in other studies.
- The coded data of your child will be securely stored in the laboratory of Dr Karen Salmon.

### **What happens to the information that you provide?**

- We may publish the results of the study in a scientific journal or present them in a conference. For both publication and theses, no child will be identified in the results and will remain confidential.
- The overall findings will form part of two Master's Theses, which will be submitted for assessment.

The results of the study will be available approximately January 2010. A summary of the results will be sent out to you upon completion.

If you have any further questions regarding this study, you are most welcome to contact the supervisor of this study, Dr Karen Salmon, ph 463 9528 or

[Karen.Salmon@vuw.ac.nz](mailto:Karen.Salmon@vuw.ac.nz).

If you agree for you and your child to participate in this study, please return this consent form to your child's teacher.

Thank you for your time in considering participating in this study.

Yours sincerely,

Janelle McIvor (Masters student)

Katherine Mackay (Masters student)

Karen Salmon, PhD., Dip.Clin.Psych  
Senior Lecturer in Psychology

## Statement of Consent

I have read all the information above and have asked any questions relating to this study, which have been answered satisfactorily.

I consent to the participation of my child in this research. I understand that my child can withdraw from this study at any point prior to the end of the study.

I would like the questionnaire sent to me by:

- ☐ post with a self-addressed stamped envelope, or
- ☐ email

Parents Name: .....

Child's Name: .....

Child's Date of Birth: .....

Address: .....

Email Address: .....

Phone Number: .....

Signature: .....

Date: .....



Appendix C1  
Photos of Animals Used in the Event (Crocodile and Friend)



Appendix C2  
Photos of Animals Used in the Event (Hippo and Blanket)



Appendix C3  
Photos of Animals Used in the Event (Cheetah and Friend)



Appendix C4  
Photos of Animals Used in the Event (Elephant and Birthday Present)



Appendix C5  
Photos of Animals Used in the Event (Lamb)





Appendix C6  
Photos of Animals Used in the Event (Mouse)



Appendix C7  
Photos of Animals Used in the Event (Mouse with Tears)



Appendix C8  
Photos of Animals Used in the Event (Zookeeper's Hat and Badge)





Appendix D  
 Child Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, & Fisher, 2001): a  
 measure of Temperament (reprinted with permission of Putnam, 2009)

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 University of Oregon  
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**Children's Behavior Questionnaire**  
 Version 1

Participant Name \_\_\_\_\_

Date of Child's Birth:

Today's Date \_\_\_\_\_

\_\_\_\_\_  
 Month    Day    Year

Sex of Child \_\_\_\_\_

Age of Child \_\_\_\_\_

\_\_\_\_\_

Years

months

Instructions: Please read carefully before starting:

On the next pages you will see a set of statements that describe children's reactions to a number of situations. We would like you to tell us what your child's reaction is likely to be in those situations. There are of course no "correct" ways of reacting; children differ widely in their reactions, and it is these differences we are trying to learn about. Please read each statement and decide whether it is a "true" or "untrue" description of your child's reaction within the past six months. Use the following scale to indicate how well a statement describes your child:

- | Circle # | If the statement is:                 |
|----------|--------------------------------------|
| 1        | extremely untrue of your child       |
| 2        | quite untrue of your child           |
| 3        | slightly untrue of your child        |
| 4        | neither true nor false of your child |
| 5        | slightly true of your child          |
| 6        | quite true of your child             |
| 7        | extremely true of your child         |

If you cannot answer one of the items because you have never seen the child in that situation, for example, if the statement is about the child's reaction to your singing and you have never sung to your child, then circle NA (not applicable).

**Please be sure to circle a number or NA for every item.**

1. Seems always in a big hurry to get from one place to another.  
1      2      3      4      5      6      7      NA
2. Gets quite frustrated when prevented from doing something s/he wants to do.  
1      2      3      4      5      6      7      NA
3. When drawing or coloring in a book, shows strong concentration.  
1      2      3      4      5      6      7      NA
4. Likes going down high slides or other adventurous activities.  
1      2      3      4      5      6      7      NA
5. Is quite upset by a little cut or bruise.  
1      2      3      4      5      6      7      NA
6. Prepares for trips and outings by planning things s/he will need.  
1      2      3      4      5      6      7      NA
7. Often rushes into new situations.  
1      2      3      4      5      6      7      NA
8. Tends to become sad if the family's plans don't work out.  
1      2      3      4      5      6      7      NA
9. Likes being sung to.  
1      2      3      4      5      6      7      NA
10. Seems to be at ease with almost any person.  
1      2      3      4      5      6      7      NA
11. Is afraid of burglars or the "boogie man."  
1      2      3      4      5      6      7      NA
12. Notices it when parents are wearing new clothing.  
1      2      3      4      5      6      7      NA
13. Prefers quiet activities to active games.  
1      2      3      4      5      6      7      NA
14. When angry about something, s/he tends to stay upset for ten minutes or longer.  
1      2      3      4      5      6      7      NA
15. When building or putting something together, becomes very involved in what s/he is doing, and works for long periods.  
1      2      3      4      5      6      7      NA
16. Likes to go high and fast when pushed on a swing.  
1      2      3      4      5      6      7      NA

17. Seems to feel depressed when unable to accomplish some task.  
1      2      3      4      5      6      7      NA
18. Is good at following instructions.  
1      2      3      4      5      6      7      NA
19. Takes a long time in approaching new situations.  
1      2      3      4      5      6      7      NA
20. Hardly ever complains when ill with a cold.  
1      2      3      4      5      6      7      NA
21. Likes the sound of words, such as nursery rhymes.  
1      2      3      4      5      6      7      NA
22. Is sometimes shy even around people s/he has known a long time.  
1      2      3      4      5      6      7      NA
23. Is very difficult to soothe when s/he has become upset.  
1      2      3      4      5      6      7      NA
24. Is quickly aware of some new item in the living room.  
1      2      3      4      5      6      7      NA
25. Is full of energy, even in the evening.  
1      2      3      4      5      6      7      NA
26. Is not afraid of the dark.  
1      2      3      4      5      6      7      NA
27. Sometimes becomes absorbed in a picture book and looks at it for a long time.  
1      2      3      4      5      6      7      NA
28. Likes rough and rowdy games.  
1      2      3      4      5      6      7      NA
29. Is not very upset at minor cuts or bruises.  
1      2      3      4      5      6      7      NA
30. Approaches places s/he has been told are dangerous slowly and cautiously.  
1      2      3      4      5      6      7      NA
31. Is slow and unhurried in deciding what to do next.  
1      2      3      4      5      6      7      NA
32. Gets angry when s/he can't find something s/he wants to play with.  
1      2      3      4      5      6      7      NA
33. Enjoys gentle rhythmic activities such as rocking or swaying.

- |     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | NA |
|-----|---|---|---|---|---|---|---|----|
| 34. | Sometimes turns away shyly from new acquaintances.  |   |   |   |   |   |   |    |
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | NA |
| 35. | Becomes upset when loved relatives or friends are getting ready to leave following a visit. |   |   |   |   |   |   |    |
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | NA |
| 36. | Comments when a parent has changed his/her appearance.                                      |   |   |   |   |   |   |    |
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | NA |

Please check back to make sure you have completed all items by marking a number or "NA".

Thank you very much for your help!

## Appendix E

### Event Script

Hello [name of child] come on in. Today we're going to visit the zoo! The zookeeper has been very busy so wants some help with some of the animals. First let's dress you up like the zookeeper. To look like a zookeeper, you need to put on a green hat. The zookeeper needs a tag so that everyone knows who he/she is. I'll put this tag on, that says zookeeper. Awesome, now you really look like a zookeeper! Let's go meet all the animals.

The first animal we will meet is the Cheetah. The Cheetah is happy because she has been playing with friends. You can see that she is happy because she has a big smile! She has been playing hide and seek, and her friend is still hiding! See if you can find her. Well done, you found her friend! Now you should give Cheetah a nice pat. Thank you. Now let's say goodbye to the Cheetah. Goodbye.

Now, we are going to meet the Hippo! The Hippo is scared because there was a loud noise. You can see he is scared because his hair is standing up. You should give him a hug so he feels better. Hippo is not so scared when he has his blanket with him, can you put it over him. Good work, that's better. Thank you. Now let's say goodbye to the Hippo. Goodbye.

The next animal is the Lamb. The Lamb has a warm coat because she usually lives outside. You can see she is warm because she has such thick fur. Can you stroke the Lamb's thick fur? Good work. Because she usually lives in the cold she is too warm being inside. She normally wears this hat; can you take it off so she'll cool down? Nice. Now say goodbye to the Lamb. Goodbye.

The next animal we will meet is the Elephant. The Elephant is happy because it's his birthday today! You can see he is happy because he is jumping around dancing. We have a birthday present for the Elephant, can you give this present to him? Excellent, now we can sing him happy birthday. (Happy Birthday to you, Happy Birthday to you, Happy Birthday dear Elephant, Happy Birthday to you). Good, very nice singing! Now let's say goodbye to the Elephant. Goodbye.

Now we are going to meet the Mouse. The Mouse is scared because her mother is not at home. You can see she is scared because she is crying. Here are some pencils; can you draw a picture of something nice for the Mouse? Wow that's a great picture, now give it to her and she'll be less scared. Well done! Thank you for giving her that nice picture. Now let's say goodbye to the Mouse. Goodbye.

The last animal is the Crocodile. The crocodile can see well in the dark because he is awake at night. You can see that he sees well at night because he has big eyes. The crocodile rests during the day, and needs us to do the special sleep dance so he can sleep! Can you dance with me? Like this. Good work! Now give him Teddy to cuddle while he's falling asleep. Thanks. Let's say goodbye to the Crocodile. Goodbye.

Thank you for all your help with the new animals you met! You did such a great job. Now my friend will take you back to your classroom.

Appendix F  
Memory Interview Script

**Interview Script**

Hello (name of child)

**Interview Protocol**

NOTE: Each question should be followed by a 10 second pause for child to respond.

**Stage I. (Introduction)**

**“Hello, my name is \_\_\_\_\_, and I am here today to talk to you about last week when you helped out at the zoo.”**

**“You can see that I have a tape recorder here. It will help me remember everything you tell me today.”**

**“If I ask a question that you don’t know the answer to, you can just say ‘I don’t know’. So, if I ask you the name of my cat, what would you say?”**

[wait for response]

**“That’s right, because you don’t know my cat’s name. But if I ask you the name of your teacher, you would say?”**

[wait for response]

**“That’s right...because you do know your teacher’s name.”**

**“If I ask a question, and you don’t know what I mean, just tell me and I’ll say it again so you do know what I mean.””.**

**Stage II. (Rapport Building)**

**“First I’d really like you to tell me about something fun you did in the last few days. Just think about something that was really fun (pause). Now tell me everything you did, from the beginning to the very end.”**

**(if child mentions zoo event, say): “Something apart from visiting the zoo”**

**If the child gives a short answer, or gets stuck, ask:**

**“I really want to hear about X, what else can you tell me about that fun time?”**

[wait for a response].

If the child does not answer, say:

**“What was something you enjoyed doing/made you feel happy?”**

[wait for a response]

If child still does not respond, say:

**“like when you went on a school trip/to a birthday party”**

[wait for a response]

When the child has stopped, use cued invitations:

**“you said you did X. Tell me more about that:...”uh huh”, “wow”**

Again, when the child has stopped, further cued invitations:

**“You said you did Y. Tell me more about that” “OK, and then what happened?”**

*(Introduce around 5 cued invitations if possible so the child learns, during this phase, that they are to provide the information)*

**“You’ve done really well telling me lots and lots of things”**

Stage III (Interview about event)

**“Now, I’d like to talk to you about the day you visited some animals here at school. I wasn’t in the room and I’d really like you to tell me what happened. Tell me everything you can remember that, from beginning to end.”**

[wait for a response]

If child responds:

Non directive prompts: **“uh huh”, “hmmm”, repetition of child’s own words**

**“Tell me more about that”**

**“What else can you remember about that?”**

**“And then what happened?”**

Praise attempts to answer rather than correct answers (**“you’re doing really well; trying really hard”**)

Follow up child’s comments with cued invitations after probing generally for information.

**“You told me you...(e.g. saw a Cheetah), respond “Tell me more about that” “uhuh” etc.**

When memory is apparently exhausted:

Stage IV (Prompted Questions)

**“I heard you visited a Cheetah at the Zoo. Tell me all about that”**

**“I also heard you visited a Hippo! Tell me about that”**

**“And I heard you visited a Crocodile! Tell me about that”**

**”I also heard you visited a Mouse. Tell me about that”.**

**“I also heard you visited an Elephant. Tell me all about that”.**

**“And I heard you visited a Lamb. Tell me all about that”.**

Encourage and follow up responses as above.

Appendix G  
Coding Criteria

**Free Recall**

1. Opening Sequence

<b>Dress Information (DI) 1</b>	<b>Dress descriptions (DD) - 2</b>	<b>Rational information (RI) -3</b>
<ul style="list-style-type: none"> <li>• (zookeeper) hat,</li> <li>• (zookeeper) Badge/tag</li> </ul>	<ul style="list-style-type: none"> <li>• Green/camouflage hat</li> <li>• badge says zookeeper/had zookeeper written on it,</li> <li>• dress</li> <li>• as/like zookeeper</li> </ul>	<ul style="list-style-type: none"> <li>• Zookeeper very busy, needs help (with animals),</li> <li>• Have to look like a zookeeper</li> <li>• Be a zookeeper</li> </ul>
<ul style="list-style-type: none"> <li>• 2 points</li> </ul>	<ul style="list-style-type: none"> <li>• 4 points</li> </ul>	<ul style="list-style-type: none"> <li>• 3 points</li> </ul>



## 2. Hippo

Animal (NA) 4	Emotion (NE) 5	Emotion Expression (NEE) 6	Cause (NC) 7	Emotion-Cause Link (NL) 8	Activities (NCA) 9	Descriptions (ND) 10	Place (NP) 11	Non-core activity (NN) 12
• Hippo	• Scared/afraid, got a fright	• Fur/hair standing up, • eyebrows /eyes pointed down/ wobbly mouth	• There was a loud noise/heard a big bang/there were noises	• Because, as e.g. “scared cos there was loud noise” <i>(Must have 1 emotion &amp; 1 cause, 1 of which is correct)</i>	• Put over/on/around, gave • blanket • give • a hug/cuddle, hugged • <u>Rational</u> : not so scared/won’t be scared, feel better, cheer him up	• Fluffy, • pink, • soft,	• Describes placement (e.g. On a chair /between table and heater /pointing to place)	• Saying goodbye • Waved
• 1 pt	• 1 pt	• 2 points	• 1 point	• 1 point	• 5 points	• 3 points	• 1 point	• 2 point
• D 13	• MM sad, angry, upset, nervous, lonely 14	• D spiky fur, funny mouth 15	• D got a fright, someone surprised him 16		• D throw, hurl • squeezed him • Make him happy/felt happier • Warm him up 18	• D wrong colour, texture, size. Descriptions can’t be credited to another animal. 19	• D different place to actual place 20	• D 21
•	• MIS present happy, warm, see well in the dark 22 • MIS absent excited, glad, 242	•	○ E (refer to end page for criteria) 23	•	•	•	•	•

## 3. Cheetah

Animal (PA) 24	Emotion (PE) 25	Emotion Expression (PEE) 26	Cause (PC) 27	Emotion-Cause Link (PL) 28	Activities (PCA) 29	Descriptions (PD) 30	Place (PP) 31	Non-core activity (PN) 32
• Cheetah,	• happy	• Smiling/big smile,	• Playing, playing hide & seek, playing a game, • with friends,	• Because/as e.g. “happy cos been playing with friends” <i>(Must have 1 emotion &amp; 1 cause, 1 of which is correct)</i>	• Find/search/looked for/got • her friend/duck, • pat/stroke • give (pat). • <u>Rational</u> : friend still hiding, can’t find friend	• Had spots, • Blue/brown (spots) • orange/yellow (body)	• Describes placement (e.g., On the table, /in that corner /pointing to right place)	• Saying goodbye • Waved
• 1 point	• 1 point	• 1 point	• 2 points	• 1 point	• 5 points	• 3 points	• 1 point	• 2 point
• D leopard, jaguar, tiger <b>33</b>	• MM excited, glad, cheerful <b>34</b>	• D laughing <b>35</b>	• D chasing, tag, <b>36</b>		• D lost (her friends) • hiding from friends • duck finding cheetah • looking for the cheetah <b>37</b>	• D wrong colour, texture, size. Descriptions can’t be credited to another animal. <b>38</b>	• D anywhere in the wrong place <b>39</b>	• D <b>40</b>
•	MIS present scared, warm, see well in the dark <b>41</b> • MIS absent sad, angry, upset, nervous, anxious <b>243</b>	•	• E <b>42</b> (refer to end page)	•	•	•	•	•

## 4. Lamb

Animal (AA) 43	Emotion (AE) 44	Emotion Expression (AEE) 45	Cause (AC) 46	Emotion-Cause Link (AL) 47	Activities (ACA) 48	Descriptions (AD) 49	Place (AP) 50	Non-core activity (AN) 51
<ul style="list-style-type: none"> <li>Lamb</li> </ul>	<ul style="list-style-type: none"> <li>Has warm coat, has coat /is warm</li> </ul>	<ul style="list-style-type: none"> <li>Thick/woolly</li> <li>fur</li> </ul>	<ul style="list-style-type: none"> <li>Usually lives/stays outside,</li> <li>Lives/stays in the cold,</li> </ul>	<ul style="list-style-type: none"> <li>Because, as e.g. “warm coat cos she usually lives outside” (<i>Must have 1 emotion &amp; 1 cause, 1 of which is correct</i>)</li> </ul>	<ul style="list-style-type: none"> <li>Stroke/pat/touched (fur/it)</li> <li>take off</li> <li>hat/wool/hood,</li> <li><u>Rational</u> cool down, too hot/warm being inside</li> </ul>	<ul style="list-style-type: none"> <li>Orange/brown/white</li> <li>jumper/hoody /jacket</li> <li>fluffy/furry</li> </ul>	Describes placement (e.g., On chair, /by the heater /points right direction)	<ul style="list-style-type: none"> <li>Saying goodbye</li> <li>Waved</li> </ul>
<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>2 point</li> </ul>	<ul style="list-style-type: none"> <li>2 points</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>4 point</li> </ul>	<ul style="list-style-type: none"> <li>3 point</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>2 point</li> </ul>
<ul style="list-style-type: none"> <li>D 52</li> </ul>	<ul style="list-style-type: none"> <li>MM see well in dark, cold 53</li> </ul>	<ul style="list-style-type: none"> <li>D e.g., 54</li> </ul>	<ul style="list-style-type: none"> <li>D in snow, mountains, farm, paddock 55</li> </ul>		<ul style="list-style-type: none"> <li>D 56 better, happy again</li> <li>Ripped, yanked</li> <li>Tickled</li> <li>Hit</li> </ul>	<ul style="list-style-type: none"> <li>D wrong colour, texture, size. Descriptions can’t be credited to another animal. 57</li> </ul>	<ul style="list-style-type: none"> <li>D anywhere in the wrong place 58</li> </ul>	<ul style="list-style-type: none"> <li>D</li> </ul>
<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>MIS pos present happy 60</li> <li>MIS neg present scared 238</li> </ul>	<ul style="list-style-type: none"> <li>MIS pos absent excited, glad, cheerful, 244</li> <li>MIS neg absent upset, nervous, anxious, sad, angry 245</li> </ul>	<ul style="list-style-type: none"> <li>E 61 (refer to end page)</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>

Elephant

Animal (AP) 62	Emotion (PE) 63	Emotion Expression (PEE) 64	Cause (PC) 65	Emotion-Cause Link (PL) 66	Activities (PCA) 67	Descriptions (PD) 68	Place (PP) 69	Non-core activity (PN) 70
<ul style="list-style-type: none"> <li>Elephant, heffalump, lumpy</li> </ul>	<ul style="list-style-type: none"> <li>Happy</li> </ul>	<ul style="list-style-type: none"> <li>Jumping</li> <li>dancing,</li> </ul>	<ul style="list-style-type: none"> <li>Birthday today</li> </ul>	<ul style="list-style-type: none"> <li>Because, as e.g. “happy cos its his birthday” <i>(Must have 1 emotion &amp; 1 cause, 1 of which is correct)</i></li> </ul>	<ul style="list-style-type: none"> <li>There was/give</li> <li>a present/gift</li> <li>sing/sang</li> <li>song/happy birthday</li> <li><u>Rational:</u> we have a present for him</li> </ul>	<ul style="list-style-type: none"> <li>Purple,</li> <li>trunk,</li> <li>hair sticking up</li> </ul>	<ul style="list-style-type: none"> <li>Describes placement (e.g., On chair, /Point to right direction)</li> </ul>	<ul style="list-style-type: none"> <li>Saying goodbye</li> <li>Waved</li> </ul>
<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>2 points</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>5 points</li> </ul>	<ul style="list-style-type: none"> <li>3 points</li> </ul>	<ul style="list-style-type: none"> <li>1 points</li> </ul>	<ul style="list-style-type: none"> <li>2 point</li> </ul>
<ul style="list-style-type: none"> <li>D 71</li> </ul>	<ul style="list-style-type: none"> <li>MM excited, cheerful, glad 72</li> </ul>	<ul style="list-style-type: none"> <li>D 73</li> </ul>	<ul style="list-style-type: none"> <li>D she was getting presents, 74</li> </ul>		<ul style="list-style-type: none"> <li>D said happy birthday</li> <li>Bought</li> <li>Toy, teddy 75</li> </ul>	<ul style="list-style-type: none"> <li>D wrong colour, texture, size. Descriptions not credited another animal. 76</li> </ul>	<ul style="list-style-type: none"> <li>D anywhere in the wrong place 77</li> </ul>	<ul style="list-style-type: none"> <li>D 78</li> </ul>
<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>MIS present scared, warm, see well in dark 79</li> <li>MIS absent sad, angry, upset, nervous anxious 246</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>E 80 (refer to end page for criteria)</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>

Mouse

Animal (NA) 81	Emotion (NE) 82	Emotion Expression (NEE) 83	Cause (NC) 84	Emotion-Cause Link (NL) 85	Activities (NCA) 86	Descriptions (ND) 87	Place (NP) 88	Non-core activity (NN) 89
<ul style="list-style-type: none"> <li>• Mouse, rat</li> </ul>	<ul style="list-style-type: none"> <li>• Scared, afraid,</li> </ul>	<ul style="list-style-type: none"> <li>• Crying, tears,</li> </ul>	<ul style="list-style-type: none"> <li>• Mother/parents</li> <li>• gone/out/away,</li> </ul>	<ul style="list-style-type: none"> <li>• Because, as e.g. “scared cos mother is out” (<i>Must have 1 emotion &amp; 1 cause, 1 of which is correct</i>)</li> </ul>	<ul style="list-style-type: none"> <li>• Drew/made</li> <li>• give</li> <li>• picture/drawing/card</li> <li>• <u>Rational</u>: not so scared, feel better</li> <li>• what they drew</li> </ul>	<ul style="list-style-type: none"> <li>• Grey,</li> <li>• wearing a t shirt,</li> <li>• crayons</li> </ul>	Describes placement (e.g., On table /in corner /point in right direction)	<ul style="list-style-type: none"> <li>• Saying goodbye</li> <li>• Waved</li> </ul>
<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 2 points</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 5 points</li> </ul>	<ul style="list-style-type: none"> <li>• 3 points</li> </ul>	<ul style="list-style-type: none"> <li>• 1 points</li> </ul>	<ul style="list-style-type: none"> <li>• 2 point</li> </ul>
<ul style="list-style-type: none"> <li>• D <b>90</b></li> </ul>	<ul style="list-style-type: none"> <li>• MM e.g., sad, angry, nervous, anxious, upset <b>91</b></li> </ul>	<ul style="list-style-type: none"> <li>• D <b>92</b></li> </ul>	<ul style="list-style-type: none"> <li>• D e.g., got left by himself, <b>93</b></li> </ul>		<ul style="list-style-type: none"> <li>• D <b>94</b> distortion of rationale e.g., happy</li> </ul>	<ul style="list-style-type: none"> <li>• D wrong colour, texture, size. Descriptions can’t be credited to another animal. <b>95</b></li> </ul>	<ul style="list-style-type: none"> <li>• D anywhere in the wrong place <b>96</b></li> </ul>	<ul style="list-style-type: none"> <li>• D <b>97</b></li> </ul>
<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• MIS present e.g., happy, see well in dark, warm <b>98</b></li> </ul>	<ul style="list-style-type: none"> <li>• MIS absent e.g., excited, glad, cheerful <b>247</b></li> </ul>	E <b>99</b> (refer to end page for criteria).	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

## Crocodile

Animal (AA) 100	Emotion (AE) 101	Emotion Expression (AEE) 102	Cause (AC) 103	Emotion-Cause Link (AL) 104	Activities (ACA) 105	Descriptions (AD) 106	Place (AP) 107	Non-core activity (AN) 108
<ul style="list-style-type: none"> <li>• Crocodile</li> </ul>	<ul style="list-style-type: none"> <li>• See well /good in the dark/night,</li> </ul>	<ul style="list-style-type: none"> <li>• Big eyes</li> </ul>	<ul style="list-style-type: none"> <li>• Awake at night,</li> </ul>	<ul style="list-style-type: none"> <li>• Because, as e.g. “can see well in the dark because he is awake at night” <i>(Must have 1 emotion &amp; 1 cause, 1 of which is correct)</i></li> </ul>	<ul style="list-style-type: none"> <li>• Do (sleep) dance,</li> <li>• Go to sleep</li> <li>• give</li> <li>• teddy/mouse</li> <li>• <u>Rational</u> sleep dance so he can sleep,</li> <li>• to cuddle (teddy) while falling asleep, going to bed</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow eyes,</li> <li>• (sharp/big/white) teeth,</li> <li>• colour</li> </ul>	<ul style="list-style-type: none"> <li>• Describes placement (e.g., On shelf, /by the door /points right direction)</li> </ul>	<ul style="list-style-type: none"> <li>• Saying goodbye</li> <li>• Waved</li> </ul>
<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 1points</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 1point</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 6 points</li> </ul>	<ul style="list-style-type: none"> <li>• 3 points</li> </ul>	<ul style="list-style-type: none"> <li>• 1 points</li> </ul>	<ul style="list-style-type: none"> <li>• 2 point</li> </ul>
<ul style="list-style-type: none"> <li>• D 109</li> </ul>	<ul style="list-style-type: none"> <li>• MM e.g., warm 110</li> </ul>	<ul style="list-style-type: none"> <li>• D huge, massive, gigantic 111</li> </ul>	<ul style="list-style-type: none"> <li>• D active, midnight , night animals 112</li> </ul>		<ul style="list-style-type: none"> <li>• D 113</li> </ul>	<ul style="list-style-type: none"> <li>• D wrong colour, texture, size. Descriptions can't be credited to another animal. 114</li> </ul>	<ul style="list-style-type: none"> <li>• D anywhere in the wrong place 115</li> </ul>	<ul style="list-style-type: none"> <li>• D 116</li> </ul>
<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• MIS pos present happy; 117</li> <li>• MIS neg present scared 239</li> </ul>	<ul style="list-style-type: none"> <li>• MIS pos absent: e.g., excited, cheerful, glad 248</li> <li>• MIS neg absent e.g., nervous, anxious, sad, angry, upset 249</li> </ul>	<ul style="list-style-type: none"> <li>• E 118 (refer to end page for criteria)</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

### Prompted Recall

#### 2. Hippo

Animal (NA) 119	Emotion (NE) 120	Emotion Expression (NEE) 121	Cause (NC) 122	Emotion-Cause Link (NL) 123	Activities (NCA) 124	Descriptions (ND) 125	Place (NP) 126	Non-core activity (NN) 127
• Hippo	• Scared/afraid, got a fright	• Fur/hair standing up, • eyebrows/eyes pointed down /wobbly mouth	• There was a loud noise/heard a big bang/there were noises	• Because, as e.g. “scared cos there was loud noise” <i>(Must have 1 emotion &amp; 1 cause, 1 of which is correct)</i>	• Put over/on/around, gave • blanket • give • hug/cuddle, hugged • <u>Rational</u> : not so scared/won’t be scared, feel better, cheer him up	• Fluffy, • pink, • soft,	• Describes placement (e.g., On a chair, /between table and heater /pointing to place)	• Saying goodbye • Waved
• 1 pt	• 1 pt	• 2 points	• 1 point	• 1 point	• 5 points	• 3 points	• 1 point	• 2 point
• D 128	• MM sad, angry, upset, nervous, lonely 129	• D spiky fur, funny mouth 130	• D got a fright, someone surprised him 131		• D throw, hurl • squeezed him • Make him happy/felt happier • Warm him up 132	• D wrong colour, texture, size. Descriptions can’t be credited to another animal. 133	• D different place to actual place 134	• D 135
•	• MIS present happy, warm, see well in the dark 136 • MIS absent excited, glad 250	•	• E 137 (refer to end page for criteria)	•	•	•	•	•

## 3. Cheetah – Prompted recall

Animal (PA) 138	Emotion (PE) 139	Emotion Expression (PEE) 140	Cause (PC) 141	Emotion-Cause Link (PL) 142	Activities (PCA) 143	Descriptions (PD) 145	Place (PP) 146	Non-core activity (PN) 147
<ul style="list-style-type: none"> <li>Cheetah, leopard, jaguar</li> </ul>	<ul style="list-style-type: none"> <li>happy</li> </ul>	<ul style="list-style-type: none"> <li>Smiling/big smile,</li> </ul>	<ul style="list-style-type: none"> <li>Playing, playing hide &amp; seek, playing a game,</li> <li>with friends,</li> </ul>	<ul style="list-style-type: none"> <li>Because/as e.g. “happy cos been playing with friends” <i>(Must have 1 emotion &amp; 1 cause, 1 of which is correct)</i></li> </ul>	<ul style="list-style-type: none"> <li>Find/search/looked for/got</li> <li>her friend/duck,</li> <li>Pat/stroke</li> <li>Give (pat)</li> <li><u>Rational</u>: friend still hiding, can’t find friend</li> </ul>	<ul style="list-style-type: none"> <li>Had spots,</li> <li>Blue/brown (spots)</li> <li>orange/yellow (body)</li> </ul>	<ul style="list-style-type: none"> <li>Describes placement (e.g., On the table, /in that corner /pointing to right place)</li> </ul>	<ul style="list-style-type: none"> <li>Saying goodbye</li> <li>Waved</li> </ul>
<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>2 points</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>5 points</li> </ul>	<ul style="list-style-type: none"> <li>3 points</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>2 point</li> </ul>
<ul style="list-style-type: none"> <li>D leopard, jaguar, tiger <b>148</b></li> </ul>	<ul style="list-style-type: none"> <li>MM excited, glad, cheerful <b>149</b></li> </ul>	<ul style="list-style-type: none"> <li>D laughing <b>150</b></li> </ul>	<ul style="list-style-type: none"> <li>D chasing, tag, <b>151</b></li> </ul>		<ul style="list-style-type: none"> <li>D lost (her friends)</li> <li>hiding from friends</li> <li>duck finding cheetah</li> <li>looking for the cheetah</li> <li>hugged, <b>152</b></li> </ul>	<ul style="list-style-type: none"> <li>D wrong colour, texture, size. Descriptions can’t be credited to another animal. <b>153</b></li> </ul>	<ul style="list-style-type: none"> <li>D anywhere in the wrong place <b>154</b></li> </ul>	<ul style="list-style-type: none"> <li>D <b>155</b></li> </ul>
<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>MIS present scared, warm, see well in the dark <b>156</b></li> </ul>	<ul style="list-style-type: none"> <li>MIS absent sad, angry, upset, nervous, anxious <b>251</b></li> </ul>	<ul style="list-style-type: none"> <li>E (refer to end page)<b>157</b></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>



## 4. Lamb – Prompted recall

Animal (AA) 158	Emotion (AE) 159	Emotion Expression (AEE) 160	Cause (AC) 161	Emotion-Cause Link (AL) 162	Activities (ACA) 163	Descriptions (AD) 164	Place (AP) 165	Non-core activity (AN) 166
<ul style="list-style-type: none"> <li>Lamb</li> </ul>	<ul style="list-style-type: none"> <li>Has warm coat, has coat/is warm</li> </ul>	<ul style="list-style-type: none"> <li>Thick/woolly</li> <li>fur</li> </ul>	<ul style="list-style-type: none"> <li>Usually lives/stays outside,</li> <li>Lives/stays in the cold,</li> </ul>	<ul style="list-style-type: none"> <li>Because, as e.g. “warm coat cos she usually lives outside” (<i>Must have 1 emotion &amp; 1 cause, 1 of which is correct</i>)</li> </ul>	<ul style="list-style-type: none"> <li>Stroke/pat/touched (fur/it)</li> <li>Take off</li> <li>hat/wool/hood</li> <li><u>Rational</u> cool down, too hot/warm being inside</li> </ul>	<ul style="list-style-type: none"> <li>Orange/brown/white</li> <li>jumper/hoody/jacket</li> <li>fluffy/furry</li> </ul>	<ul style="list-style-type: none"> <li>Describes placement (e.g., On chair, /by the heater /points right direction)</li> </ul>	<ul style="list-style-type: none"> <li>Saying goodbye</li> <li>Waved</li> </ul>
<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>2 point</li> </ul>	<ul style="list-style-type: none"> <li>2 points</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>4 point</li> </ul>	<ul style="list-style-type: none"> <li>3 point</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>2 point</li> </ul>
<ul style="list-style-type: none"> <li>D 167</li> </ul>	<ul style="list-style-type: none"> <li>MM see well in the dark, cold 168</li> </ul>	<ul style="list-style-type: none"> <li>D 169</li> </ul>	<ul style="list-style-type: none"> <li>D in snow, mountains, farm, paddock 170</li> </ul>		<ul style="list-style-type: none"> <li>D 171 better, happy again</li> <li>Ripped, yanked</li> <li>Tickled</li> <li>Hit</li> </ul>	<ul style="list-style-type: none"> <li>D wrong colour, texture, size. Descriptions can't be credited to another animal. 172</li> </ul>	<ul style="list-style-type: none"> <li>D anywhere in the wrong place 173</li> </ul>	<ul style="list-style-type: none"> <li>D 174</li> </ul>
<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>MIS pos present happy 175</li> <li>MIS neg present scared 240</li> </ul>	<ul style="list-style-type: none"> <li>MIS pos absent excited, glad, cheerful 252</li> <li>MIS neg absent upset, nervous, anxious, sad, angry 253</li> </ul>	<ul style="list-style-type: none"> <li>E e.g., in a paddock, farm 176</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>

## Elephant – Prompted recall

Animal (AP) 177	Emotion (PE) 178	Emotion Expression (PEE) 179	Cause (PC) 180	Emotion-Cause Link (PL) 181	Activities (PCA) 182	Descriptions (PD) 183	Place (PP) 184	Non-core activity (PN) 185
<ul style="list-style-type: none"> <li>Elephant, heffalump, lumpy</li> </ul>	<ul style="list-style-type: none"> <li>Happy</li> </ul>	<ul style="list-style-type: none"> <li>Jumping,</li> <li>dancing,</li> </ul>	<ul style="list-style-type: none"> <li>Birthday today</li> </ul>	<ul style="list-style-type: none"> <li>Because, as e.g. “happy cos its his birthday”(Must have 1 emotion &amp; 1 cause, 1 of which is correct)</li> </ul>	<ul style="list-style-type: none"> <li>There was/give</li> <li>a present,</li> <li>sing/sang</li> <li>song/happy birthday</li> <li><u>Rational:</u> we have a present for him</li> </ul>	<ul style="list-style-type: none"> <li>Purple,</li> <li>trunk,</li> <li>hair sticking up</li> </ul>	<ul style="list-style-type: none"> <li>Describes placement (e.g., On chair, /Point to right direction)</li> </ul>	<ul style="list-style-type: none"> <li>Saying goodbye</li> <li>Waved</li> </ul>
<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>2 points</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>1 point</li> </ul>	<ul style="list-style-type: none"> <li>5 points</li> </ul>	<ul style="list-style-type: none"> <li>3 points</li> </ul>	<ul style="list-style-type: none"> <li>1 points</li> </ul>	<ul style="list-style-type: none"> <li>2 point</li> </ul>
<ul style="list-style-type: none"> <li>D 186</li> </ul>	MM excited, cheerful, glad 187	<ul style="list-style-type: none"> <li>D 188</li> </ul>	<ul style="list-style-type: none"> <li>D she was getting presents 189</li> </ul>		<ul style="list-style-type: none"> <li>D said happy birthday</li> <li>Bought</li> <li>Toy, teddy 190</li> </ul>	<ul style="list-style-type: none"> <li>D wrong colour, texture, size. Descriptions can't be credited to another animal. 191</li> </ul>	<ul style="list-style-type: none"> <li>D anywhere in the wrong place 192</li> </ul>	<ul style="list-style-type: none"> <li>D 193</li> </ul>
<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>MIS present scared, warm, see well in dark 194</li> </ul>	<ul style="list-style-type: none"> <li>MIS absent sad, angry, upset, nervous, anxious 254</li> </ul>	<ul style="list-style-type: none"> <li>E 195 (refer to end page for criteria)</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>

Mouse – Prompted recall

Animal (NA) 196	Emotion (NE) 197	Emotion Expression (NEE) 198	Cause (NC) 199	Emotion-Cause Link (NL) 200	Activities (NCA) 201	Descriptions (ND) 202	Place (NP) 203	Non-core activity (NN) 204
<ul style="list-style-type: none"> <li>• Mouse, rat</li> </ul>	<ul style="list-style-type: none"> <li>• Scared, afraid,</li> </ul>	<ul style="list-style-type: none"> <li>• Crying, tears,</li> </ul>	<ul style="list-style-type: none"> <li>• Mother/parents</li> <li>• gone/out/away,</li> </ul>	<ul style="list-style-type: none"> <li>• Because, as e.g. “scared cos mother is out”(Must have 1 emotion &amp; 1 cause, 1 of which is correct)</li> </ul>	<ul style="list-style-type: none"> <li>• Drew/made</li> <li>• give</li> <li>• picture/drawing/card</li> <li>• <u>Rational</u>: not so scared,</li> <li>• what they drew</li> </ul>	<ul style="list-style-type: none"> <li>• Grey,</li> <li>• wearing a t shirt,</li> <li>• crayons</li> </ul>	<ul style="list-style-type: none"> <li>• Describes placement (e.g., On table /in corner /point in right direction)</li> </ul>	<ul style="list-style-type: none"> <li>• Saying goodbye</li> <li>• waved</li> </ul>
<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 2 points</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 5 points</li> </ul>	<ul style="list-style-type: none"> <li>• 3 points</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 2 point</li> </ul>
<ul style="list-style-type: none"> <li>• D 205</li> </ul>	<ul style="list-style-type: none"> <li>• MM sad, angry, nervous, anxious, upset206</li> </ul>	<ul style="list-style-type: none"> <li>• D 207</li> </ul>	<ul style="list-style-type: none"> <li>• D got left by himself 208</li> </ul>		<ul style="list-style-type: none"> <li>• D 209 distortion of rationale e.g., happy</li> </ul>	<ul style="list-style-type: none"> <li>• D wrong colour, texture, size. Descriptions can’t be credited to another animal. 210</li> </ul>	<ul style="list-style-type: none"> <li>• D anywhere in the wrong place 211</li> </ul>	<ul style="list-style-type: none"> <li>• D 212</li> </ul>
<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• MIS present happy, see well in dark, warm 213</li> </ul>	<ul style="list-style-type: none"> <li>• MIS absent excited, glad, cheerful 255</li> </ul>	<ul style="list-style-type: none"> <li>• E 214 (refer to end page for criteria).</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

## Crocodile – Prompted recall

Animal (AA) 215	Emotion (AE) 216	Emotion Expression (AEE) 217	Cause (AC) 218	Emotion-Cause Link (AL) 219	Activities (ACA) 220	Descriptions (AD) 221	Place (AP) 222	Non-core activity (AN) 223
<ul style="list-style-type: none"> <li>• Crocodile</li> </ul>	<ul style="list-style-type: none"> <li>• See well /good in the dark/ night</li> </ul>	<ul style="list-style-type: none"> <li>• Big eyes</li> </ul>	<ul style="list-style-type: none"> <li>• Awake at night,</li> </ul>	<ul style="list-style-type: none"> <li>• Because, as e.g. “can see well in the dark because he is awake at night” (<i>Must have 1 emotion &amp; 1 cause, 1 of which is correct</i>)</li> </ul>	<ul style="list-style-type: none"> <li>• Do (sleep) dance,</li> <li>• Go to sleep</li> <li>• give</li> <li>• teddy/mouse</li> <li>• <u>Rational</u> sleep dance so he can sleep,</li> <li>• to cuddle (teddy) while falling asleep, going to bed</li> </ul>	<ul style="list-style-type: none"> <li>• Yellow eyes,</li> <li>• (sharp/big/white ) teeth,</li> <li>• colour</li> </ul>	<ul style="list-style-type: none"> <li>• Describes placement (e.g., On shelf, /by the door /points right direction)</li> </ul>	<ul style="list-style-type: none"> <li>• Saying goodbye</li> <li>• Waved</li> </ul>
<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 1points</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 6 points</li> </ul>	<ul style="list-style-type: none"> <li>• 3 points</li> </ul>	<ul style="list-style-type: none"> <li>• 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 2 point</li> </ul>
<ul style="list-style-type: none"> <li>• D 224</li> </ul>	<ul style="list-style-type: none"> <li>• MM warm 225</li> </ul>	<ul style="list-style-type: none"> <li>• D huge, massive, gigantic 226</li> </ul>	<ul style="list-style-type: none"> <li>• D active, midnight , night animals 227</li> </ul>		<ul style="list-style-type: none"> <li>• D 228</li> </ul>	<ul style="list-style-type: none"> <li>• D wrong colour, texture, size. Descriptions can’t be credited to another animal. 229</li> </ul>	<ul style="list-style-type: none"> <li>• D anywhere in the wrong place 230</li> </ul>	<ul style="list-style-type: none"> <li>• D 231</li> </ul>
<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• MIS pos present happy 232</li> <li>• MIS neg present scared 241</li> </ul>	<ul style="list-style-type: none"> <li>• MIS pos absent excited, cheerful, glad 256</li> <li>• MIS neg absent nervous, anxious, sad, angry, upset 257</li> </ul>	<ul style="list-style-type: none"> <li>• E 233 (refer to end page for criteria)</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

### Coding Notes

- Repeated information is not to be coded. If information is repeated but now allocated to an incorrect animal, ignore repetition but code as 237
- When a child correctly reports something then later distorts it or vice versa, code *both* the distortion and the correct information.
- Do not code correct but irrelevant information such as “the lamb had four legs”.
- Intrusions are in the reporting of animals, emotions, activities etc that were not in the event when the children **clearly** believed that it was in the event. Code each noun and each verb as separate intrusions. Intrusions are not coded in relation to any animal, code as 234. Stop coding after 15 intrusions in a row. Start coding again when the interview orientates the child back to the event.
- Positive emotional intrusion = **235**.
- Negative emotional intrusion = **236**.
- Emotion distortions are coded as matched (attributing an incorrect negative emotion to an originally negative animal e.g. saying the mouse is sad instead of scared; and attributing similar non-emotional states for the non-emotional animal). Emotion distortions can also be coded as mismatched (attributing an emotion of the wrong valence to an emotional e.g. saying the mouse was happy instead of scared). Mismatched emotion distortions are also coded for emotion attributed to non-emotional animals e.g., “the crocodile was happy”. Mismatch emotion distortions are coded separately for positive and negative emotion.
- Incorrect connections. Two correct aspects incorrectly related to each other even if previously reported for correct animal e.g., I gave a present to the hippo. Code all correct information and then give code for the incorrect connection. Code for each incorrect connection, for example “I have the lamb a hug, then I gave it a blanket” would be correct information and 2 incorrect connections. Code as **237**.
- Emotions reported with an incorrect or intruded animal can only be linked to the correct animal if there are two pieces of correct information indicating that the child is remembering information of that animal e.g., the hippo was happy because it played with his friends. Code emotions that cannot be related to any animal as **258**.
- “Gave” credits, if reported with a different animal, are allocated with reference to *what* they gave. E.g., “I gave the hippo a drawing”, the gave credit would be allocated to the mouse

### Include 259 code

#### Criteria for an elaboration:

1. plausible experience (likely to have happened to the child)
2. related to the animal
3. sufficient detail (2 specific pieces of information e.g., where the mother is and some other detail)
4. believe that it refers to child’s own experience

