Emotion Perception in Early Childhood: Relations with Attachment Security and Internal Working Models

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Declaration

The material offered in this thesis has not before been submitted for a degree in this or any other university.

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Abstract

An individual's ability to recognise emotional expression from other's affective displays, is thought to be linked to early atypical environmental experience (Pollack, Klorman, Thatcher & Chiccetti, 2001; Pollack & Sinha, 2002), and to adult close relationships (e.g. Feeney, Noller & Callan, 1994; Neidenthal, Brauer, Robin & Innes-Ker, 2002). However, despite these findings, no work has previously addressed emotion recognition skill within the framework of young children's attachment status and internal working models (IWMs), nor using both dynamic facial expressions and expressive body movement to do so.

The present study recruited five and six-year-old children (mean age 5.62), n = 38, from two separate SES backgrounds (low-middle class and middle class), from the northeast of England, to investigate links between individual differences in young children's mental representations (IWMs) of the attachment relationship and emotion recognition skill, in an attempt to provide a clearer view, of the potential impact, of variation in early caregiving on an individual's emotion recognition skill.

Children's attachment orientation was assessed using the Manchester Child Attachment Story Task (MCAST) (Green, Stanley & Goldwyn, 2001), and emotion recognition skill was tested using The Animated Full Facial Expression

Test (AFFECT) (Gagliardi, Figerio, Burt, Cazzaniga, Perrett & Borgatti, 2003), and the Full-light Dynamic Body Expression Task (Atkinson, Tunstall & Dittrich, 2007).

Group comparisons demonstrated no evidence for a link between the key variables of emotion recognition, attachment and IWMs. The findings are discussed in relation to the small sample size of the insecure group, as well as age related differences generally, in children's emotion recognition skill in the preschool period. In addition, recommendations for future research are addressed.

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Chapter 1

An Introduction to Emotion Recognition in Pre-school Children and its Relationship to Attachment Security and Internal Working Models

There is currently a growing body of research that demonstrates associations between individual differences in emotion recognition ability in early childhood and exposure to specific types of interpersonal environments. To date, these studies have largely focused on atypical social experience, such as emotional interactions with a clinically depressed caregiver (Dawson, Ashman, Pagiotides, Hessl, Self, Yamada & Embry, 2003) exposure to maltreatment (Pollack, Klorman, Thatcher, & Chicceti, 2001) or social and economic disadvantaged backgrounds (e.g Smith & Walden, 1998). Conversely, research within the context of typical environmental experience is largely neglected. In particular, no studies have before, directly investigated individual differences in young children's' emotion recognition accuracy within the framework of their early attachment experiences. Nonetheless, a large body of work focusing on adult close relationships and perceptual processing of emotion information clearly implies the existence of such a relationship (e.g. Feeney, Noller and Callan, 1994; Kafetsios, 1993; Neidenthal, Brauer, Robin & Innes-Ker, 2002). For example, in one study, secure compared to insecure individuals were reported to be more

accurate in their recognition of negative facial expressions (Magai, Distel, & Liker, 1995). In another study (Fraley, Davis & Shaver, 1999), quality of attachment was demonstrated to impinge upon an individual's capacity to process emotionally relevant, incoming information, particularly when its content is attachment related.

The adult literature undoubtedly provides some crucial evidence for links between emotion recognition and attachment experiences, and implies quality of attachment to be a moderator of individual differences in emotion recognition ability in adults. On the other hand, comparatively little is known about the extent to which such differences in emotion recognition become manifested in early childhood and proceed from children's internalisation and mental representations of their early attachment experiences. Nor have studies directly assessed the extent to which children's attachment experiences in this developmental period may place constraints upon their recognition of some emotions. In addition, the onset of the pre-school period brings with it a rapid expansion of social interactions outside of the caregiving environment. At this point in time, the caregiver will no longer be the sole influence on an individual's social and emotional development. Thus, what also remains unexplored is the extent to which individual differences in children's recognition of others' emotional displays may be attributed to their early attachment experiences with caregivers and how much may be attributable to other interpersonal experience outside of the

confines of this domain.

This thesis sets out to examine, in typically developing children, individual differences in the ability to recognise emotions from facial expression and expressive body movement, in relation to early interpersonal experiences within the framework of the attachment relationship. In addition, it will investigate the extent to which possible links between these variables may also relate to mental representations of the attachment relationship, in the form of Internal Working Models (IWMs).

This first chapter will provide an introduction to the development of emotion expression recognition in early childhood, and its importance for the progression of healthy social interactions in this period will be reviewed. The chapter will then go on to discuss individual differences in early attachment relationships and mental representations of these relationships, and explore the extent to which they relate to individual differences in children's ability to recognise others' emotional displays. The chapter will conclude with a summary of the aims of the study and will detail the hypotheses. The second chapter details the experimental methodology and results of the project. Chapter 3 provides a discussion of the project and concludes the thesis.

1.1 Development of Emotion Expression Recognition: Infancy to the Pre-School Period

Development within the context of emotion perception ability emerges in the first year of infancy, where two-day-old infants have been noted to be able to discriminate and emulate basic facial expressions of happiness and sadness (Field, Woodson, Greenberg & Cohen, 1982). During the first few months of development, children have demonstrated the ability to accurately decode others' emotional signals from a variety of channels simultaneously, including facial expressions, body stance, and prosody as well as from the semantic content of spoken language (e.g. deGelder, Böcker, Tuomainen, Hensen, & Vroomen, 1999; Lewkowicz, 1996). What is more, they seem to develop an appreciation of the relevance of others' basic emotions (Izard, Fantauzzo, Castle, Haynes, Rayias, & Putnam, 1995). Additionally, there is evidence that infants as young as seven months of age are adept at distinguishing between different categories of basic emotions (e.g. anger, fear, happiness and sadness). For example, there is some research to show that infants clearly have the ability to distinguish different emotions from still photographic displays (e.g Nelson, 1987; Schwartz, Izard, & Ansul, 1985) and from dynamic facial displays (Kreutzer & Charlesworth, 1973; Soken & Pick, 1992; 1999) of unfamiliar people, as well as to discriminate

between negative (e.g. angry and sad) and positive (e.g happy) emotion expressions.

Although infancy sees the rapid emergence of the development of emotion recognition, development of this skill is suggested to proceed slowly through childhood (Chung & Thomas, 1995), and is noted not to be specific to any particular developmental stage, possibly because as development proceeds, so does experience of social interactions, and thus exposure to a wide variety of faces and facial expressions. In addition, children's capability to recognise some emotional expressions has been noted to decrease with age, particularly in the case of negative emotional expressions, and most notably fear, whilst recognition for other expressions, such as disgust, shows improvement with increasing age (e.g. Moreno, Borod, Welkowitz & Alpert, 1993; Sprengelmeyer, Scott, Nimmo-Smith & Young, 2003).

By the onset of the preschool years, most typically developing children are noted to be proficient in their ability to recognise at least the basic emotions of happiness, fear, sadness and anger (e.g Gross & Bailiff, 1991). It is at this developmental stage that children reach an important milestone in terms of social interaction, whereupon their interpersonal environments will begin to undergo a phase of rapid change and expansion. Most notably, this period is one where children's social worlds will characteristically begin to extend away from the

narrow, conventional confines of the caregiving environment, to a somewhat ambiguous and much less predictable one. At this stage, a major separation from the child's primary caregiver is likely to be forthcoming, and this relationship will thus no longer be the sole, direct influence on the child's behaviour. For children to profit from this important developmental stage, and to adapt to unforeseeable social diversity that may emerge in this period, it is important for them to be able to register emotional information correctly, within self and other. For example, when individuals are equipped with the skills needed to appraise others' mental states and expressive emotional displays, this is thought to aid their anticipation of others' diverse, and somewhat ambiguous behaviour, and thus assist in increasing survival opportunities (e.g. Schore, 1994).

Essentially, being skilled at decoding others' negative internal states, from structural cues embedded within nonverbal expressive displays of face and body movement, may offer a protective mechanism that will guide children's feelings and behaviour in current and future situations of uncertainty. Conversely, when impairments occur in children's emotion recognition skill, this may constrict their capacity to distinguish others' emotional states and thus constrain healthy social interactions. For example, functional deficits in emotion perception ability have been noted to contribute considerably to poor social and emotional functioning, whereby, incorrect decoding of another's emotional signals has been linked to

poor understanding of and poor adaptation to the social environment (e.g. Damasio, 1998). Consequently, it is vital to determine the extent to which functional deficits in emotion decoding may be present in early childhood development.

1.1.1 Neurodevelopmental Considerations

The experience-dependant nature of the brain (e.g. see Balbernie, 2001) highlights the importance of establishing the extent to which children's internalised experiences of social and emotional interaction, thus far in development, may be a contributory factor in the development of emotion recognition. Given the consistent findings from neurodevelopmental research over the past decade regarding the developing brain's response towards environmental input, it is vital to examine individual variation in children's emotion recognition ability within the framework of early environmental experience. For example, evidence from the neurodevelopment literature (e.g. Schore, 2000, 2004; Siegel, 1999) is fast accumulating to suggest that a child's earliest experiences, i.e. between birth and two to three years, alter brain structure and neural pathways to construct an adaptive model that facilitates the child's responses to daily events (e.g. Damasio, 1998).

Scientific advances in imaging techniques have enabled researchers to demonstrate that the earliest experiences encountered by the child become embedded in the brain's structure and neural pathways from the prenatal period and most intensely in the first month of life (see e.g. Balbernie, 2001 for a summary). Historically, the first two years of the postnatal period is the time when the brain is noted to be most malleable, and when the child's main caregiver is instrumental, specifically during emotional communication (Siegal, 1999), as a psychobiological regulator of the 'experience dependant' development of the child's nervous system (Schore, 2001b). Thus, the transactions that occur between an individual and his/her early interpersonal environment are recognised to have a long and lasting effect on the evolving structures of the brain that underlie social and emotional functioning throughout lifespan development (Schore, 1994).

1.1.2 Familial and Environmental Influences

A child's first exposures to emotional expressions, regardless of modality, begin in the caregiving environment. Within familiar, family surroundings, children start to interpret and respond to the multimodal channels of emotionally expressive signals of their caregivers (e.g Montague & Walker-Andrews, 2002). Evidence for links between emotion decoding ability and the caregiving environment have been demonstrated in studies examining similarities between siblings in nonverbal decoding skill (Blanck, Zuckerman, DePaulo & Rosenthal,

1980). These authors have concluded that the most likely reason for observed similarities is their mutual exposure to specific family environments. Nonetheless, as outlined before, investigations into the role of experience in facilitating the recognition of specific emotional expressions (e.g. angry, happy, and sad) in the early years have most frequently been carried out within the context of atypical caregiving experience.

A growing body of evidence has demonstrated that increased experience of maltreatment notably directs children's attention more readily towards angry emotional expressions (e.g. Pollack, Klorman, Thatcher & Chiccetti, 2001; Pollack & Sinha, 2002). In addition, children exposed to violent interpersonal environments have been noted to have impaired ability in their identification of positive expressions of emotion (e.g Hodgins & Belch, 2000).

Conversely, studies examining emotion recognition ability in children who have experienced impoverished emotional interactions with a clinically depressed caregiver, and who have thus had frequent exposure to specific emotional expressions such as sad or neutral, have established that children spend less time looking at sad faces compared to children from typical caregiving environments (e.g. Dawson, Ashman, Pagiotides, Hessl, Self, Yamada & Embry, 2003).

Furthermore, in a study by de Haan, Belsky, Reid, Volein & Johnson (2004), the

link between the emotional environment (provided by mothers) and recognition of emotional expression by seven-month old infants was examined, using indexes of infant's visual attention and event-related potentials (ERP's). These authors demonstrated that infants whose mothers have high positive dispositions stared longer at fearful than happy expressions. In addition, some of those infants whose scores indicated a high positive disposition showed a larger negative central (Nc) component in the ERP to fearful expressions, than to happy expressions. Other work, examining variation in emotion recognition skill in children from socially and economically disadvantaged backgrounds (e.g. Smith et al., 1998), have shown them to be more accurate in their identification of fearful compared to other emotional expressions.

These studies clearly imply that environmental variables may indeed, to an extent, be linked to children's recognition of some emotional expressions. Findings essentially provide an indication of the importance of nonverbal communication for adapting to and surviving one's environment. For example, in the case of the group of studies relating to maltreatment, a possible explanation for these findings is that fast and accurate judgement of anger may generate a protective mechanism to aid the detection of an impending aggressive outburst on the part of the caregiver. Similarly, the over exposure to sad or neutral expressions, often a feature of the inexpressive environments of clinically depressed caregivers, may constrain recognition of positive emotional expressions. Alternatively, children

from less expressive caregiving environments have been shown to have superior understanding of facial expressions than those from expressive family environments, and this is thought to emerge because of the adaptive advantage to learning to recognise subtleties in less expressive families (Halberstadt, 1986). These assertions are supported to some extent by the notion that children from atypical environments fail to learn to recognize some emotional expressions because they are uncommon in the child's environment, and therefore less useful to understand. This would imply that adaptation to specific environments requires the development of skills that serve the individual best from a survival perspective (Hodgins et al., 2000).

Although studies examining atypical environmental experience clearly demonstrate the extent to which the recognition for some emotions may be constricted, it is reasonable to contend that such evidence is somewhat indirect. Essentially, this conclusion is drawn from investigations conducted within extremes of caregiving, which may be viewed as the exception rather than the rule, and particularly in the case of maltreatment, infringe upon social norms (Pollack et al., 2002). Thus, it remains to be seen to what extent individual variation in emotion recognition ability in childhood can be attributed to (1) early typical caregiving experience, and specifically within the context of attachment relationships, and (2) the child's subsequent internalisation and mental representations of such experience, in the form of internal working models of

attachment (IWMs). The remainder of this first chapter focuses on the role of attachment and IWMs as plausible underlying constructs in the early development of emotion recognition.

1.2 Attachment, IWMs and Emotion Recognition

1.2.1 The Attachment Relationship

Attachment theory is claimed to be one of the most compelling and long-standing theories proposed over the past forty years of developmental psychology research. The construct of attachment addresses the degree to which early experiences, particularly within the realm of the child-parent relationship, affect social, emotional and cognitive development. Essentially, the attachment relationship between an infant and his/her caregiver is posited to be the most vital relationship to emerge during the first two to three years of development (Bowlby, 1988). It is conceptualized to be emotionally salient, and associated with healthy development within particular areas of a children's mental functioning, including social relatedness, access to autobiographical memory, and the development of language and narrative (Siegel, 1999). In addition, it has proved to be a vital tool in identifying social and emotional dysfunction and psychopathology at different stages of development.

The human attachment system comprises a series of cognitive processes, e.g. for evaluating the progress made towards achieving a set goal of security. To achieve this set goal, this will require an individual to be both attentive and sensitive towards verbal and nonverbal signals, emitted by an attachment figure in response to the individual's proximity seeking attempts (e.g. Bowlby, 1982). There is some suggestion that caregivers facilitate the development of the ability to decode nonverbal cues (see Schachner, Shaver, & Mikulincer, 2005), thus implicating nonverbal encoding and decoding processes as important influential components of attachment relationships. For example, the availability of a sensitive and appropriately responsive caregiver, whose emotional displays assist in assuagement of distress, may assist a child's learning, and attention and sensitivity towards that caregiver's nonverbal signals, and may facilitate their coping capacity in the face of threat and/or danger. However, there is also some suggestion that when children receive sensitive and expressive caregiving, this might actually restrict emotion decoding ability (Halberstadt, 1986), due to a limited need to anxiously observe and monitor signals of disapproval and rejection that would be uncommon in such caregiving practice.

1.2.2 An Overview of Early Attachment Patterns

In childhood, securely attached individuals have caregivers who are emotionally

available, perceptive and respond appropriately to their signals and mental states. In the Strange Situation (SS) paradigm (see Ainsworth, Blehar, Waters & Wall, 1978), securely attached children are observed to seek proximity with the attachment figure following periods of separation and to return readily to play when this has been achieved. Conversely, insecure children have caregivers who are typically one of two types. In one type, the caregiver is emotionally unavailable, responds in a rejecting and unresponsive manner, and fails to perceive their child's signals and mental states correctly (avoidant attachment). In the other type, the caregiver's availability, perception of signals, and level of responsiveness toward the child is, for the most part, inconsistent, and the caregiver has a tendency to unleash his or her own mind states on to their child in unpredictable ways (ambivalent attachment).

These early attachment patterns have been argued to influence strongly how individuals process and interpret incoming information (Bowlby, 1980; Walker, 1982), and how they regulate negative emotion during interpersonal exchanges. For example, face-to-face exchanges are specifically noted to be very important in the making of attachment relationships (Schore, 1994), in that the caregiver's emotionally expressive face is recognised to be one of the most important channels of emotional learning during childhood (Stern, 1990, Tompkins, 1991). However, findings from work on adult attachment have implied that perceptual processing of emotion expressions may to an extent be affected by emotional

states (Neidenthal, Brauer, Halberstadt & Innes-Kerr, 2001). Moreover, early social interaction within the context of attachment experiences provides the basis for regulatory communication in the form of "internal working models" (IWMs) of attachment (Bowlby, 1980).

1.2.3 The Construct of IWMs

IWMs are a fundamental concept of Bowlby's work on attachment. Bowlby surmised that autonomy within interpersonal interactions proceeds from the relationship a child forms with his/her primary caregiver. He suggested that IWMs emerge from children's experiences within their interpersonal environments that facilitate the formation of mental schemas, or models of themselves and of relationships with others. Essentially, IWMs comprise both affective and cognitive information that connect current experience with past experience. Thus, the specific emotions that incoming information elicit will determine both the unique response and intensity of an individual's reaction to that information.

IWMs are thought to have progressed out of interaction between representational advances and experiences within the social environment (Bretherton, 1999), including sensitive caregiving, attachment behaviour-exploration equilibrium and language discourse (e.g. Meins, 1997; van IJzendorn, 1995). In addition, there is

wide belief that the preschool period may be particularly crucial in the development of IWMs. For example, children's representational and cognitive capacities are thought to increase, as language rapidly develops and becomes more sophisticated (Thompson, Laible, &Ontai, 2003). The onset of more sophisticated language, in turn, enables young children to reflect upon and to extract memories of experiences. Essentially, IWMs are recognised to consist of both conscious and unconscious schematic components that guide perceptions and generate specific rules for either processing or not processing specific types of attachment related information (Cooper, Shaver, & Collins, 1998), such as nonverbal emotional signals emitted by a caregiver. Thus, individual differences in attachment orientation may, to a degree, restrain perception of emotional information (e.g. see Neidenthal, et al., 2002). Furthermore, IWMs of relationships are thought to provide rules that allow or limit accessibility to some kinds of knowledge (Main, Kaplan, & Cassidy, 1985). To encourage flexibility in responses to external information, individuals are required to adapt their emotions by means of a cognitive understanding of what is occurring within a particular situation, and this capacity to integrate affect and cognition to guide reactions of any given situation is recognised to be a hallmark of secure attachment patterns (e.g Crittenden, 1995; 1998).

Whilst there is some research that has examined the extent of children's understanding of emotional experience in relation to attachment (e.g. Ontai &

Thompson, 2002), no studies before have directly examined whether such relations exist between children's perception of others' emotional states and their mental representations of attachment relationships in this earlier period. Nevertheless, as outlined earlier, there is accumulating evidence from research focusing on adult close relationships to suggest that such differences do exist, and are thought to be attributed, at least in part, to early attachment orientation.

1.2.4 Extending Findings from Adult Studies to Child Studies

In a review by Gauthier and Nelson (2001), it is suggested that experiential factors play a significant role in adults' acquisition of perceptual expertise. However, from a developmental stance, there is little comparative research that extends findings from studies of adults to child populations. It is contended that emotional expressions encourage social interaction, and thus, may activate attachment anxiety (see, Neidenthal et. al, 2002). In addition, studies on adult attachment have highlighted emotion recognition biases within the different attachment categories of secure and insecure individuals (e.g. Magai et. al 1995). For example, studies employing both laboratory and naturalistic methods to examine emotion-decoding ability in adult populations have established positive relations between secure attachment and emotion decoding accuracy of partners' emotional facial expressions (e.g. Kafetios, 2000). Likewise, when an attachment partner is

perceived as being available and supportive, this is suggested to facilitate more accurate decoding of his or her nonverbal cues, particularly when availability and support has previously been forthcoming (DePaulo, Brittingham, & Kaiser, 1983). Conversely, these authors found that, when availability and support was not forthcoming, nonverbal decoding was much less sensitive, thus suggesting that an individual's internalised experiences of an attachment figures' availability facilitates emotion recognition skill. Moreover, insecure adults categorised as preoccupied have been shown to have heightened sensitivity toward negative emotional signals from attachment figures, and rely on these emotional cues to stabilize and gauge the quality of intimate relationships (Bowlby, 1980), thus suggesting that emotional information that is attachment-related may be more easily recognised by these individuals.

1.3 Summary and Aims

Investigating individual differences in emotion recognition skill in preschool children has been done, but to date, only in the context of atypical caregiving experience. Although such work is undoubtedly effective in demonstrating the role of extreme caregiving as an underlying component of deficient emotion recognition skill in young children, there is the need to balance this work with investigations within the framework of more typical caregiving experiences (see above discussion). The aim of this thesis is to move away from research focusing

on atypical environmental experience and its influence on children's recognition of some emotions, to more typical experience. In addition, the adult literature provides some plausible evidence for the involvement of individual differences in mental representations (IWMs) of the attachment relationship, in either facilitating functional deficits or in improving accuracy in emotion recognition. But, these studies do not take account of the possibility of altered caregiving patterns over time, and as such, do not control for possible discontinuities in attachment experiences between early childhood and adulthood (see e.g. Hamilton, 2000; Sagi-Schwartz & Aviezer, 2005). In these circumstances, children who were once classified as having a secure attachment orientation have been shown to be classified as insecure on adult attachment measures (e.g George, Kaplan & Main, 1986, 1996). Thus, adult research does not adequately explain whether individual differences in emotion recognition skill emerged as a result of early internalised attachment experiences established in childhood, when this skill is still developing, or whether differences are a function of attachment experiences relating to close relationships formed in adulthood, by which stage, in typically developing populations, emotion recognition skill should remain constant. This thesis aims to address these methodological shortcomings to an extent, by endeavouring to expand on findings from research on the relationship between attachment and IWMs within the context of adult close relationships, to caregiving relationships in child populations. This in turn may provide a clearer view of the potential impact of variation in early caregiving on an individual's

affective-cognitive processes later on in development.

In addition to examining the impact of the above main predictor variables of attachment and IWM on emotion recognition outcome, it is fruitful to include some additional variables into the present research that may relate to both early caregiving experiences and the subsequent development of emotion recognition; specifically, variables related to children's emotion vocabulary and to their emotion labelling ability.

Children's ability to perceive emotions accurately from all channels may be affected by variation in exposure to language, and specifically, emotion words, and in their ability to assign labels to emotional expressions. In particular, knowledge of emotion language is thought to moderate nonverbal emotion decoding ability (Lindquist, Barret, Bliss-Moreau & Russel, 2006; Barrett, Lindquist & Gendron, 2007). For example, there is some evidence that the experience of language strongly influences an individual's capacity for category acquisition in general. Moreover, in a similar way that prior experience of language guides a child in the categorization of objects, such experience is suggested also to guide categorisation of emotion and to direct a child's acquisition of emotion categories, as well as being central to processing other's expressive emotional displays (Barret, 2006). In addition, exposure to emotion

words during discourse has been found to facilitate an understanding of mental states such as emotion states (Harris, 1999; Meins, 1999), and thus children's attribution of emotion to others, based upon given situational cues (Harris, de Rosnay, & Pons 2004).

To my knowledge, no previous study has investigated the influence of attachment and/or IWMs upon emotion recognition in either typical or clinical populations of young children, nor included the influence of language and emotion perspective-taking, in relation to the capability to perceive emotions, directly within the framework of early attachment relationships. By examining such links directly within the framework of early attachment relationships, a final aim of this study is to examine some additional cognitive variables (language and narrative) that have not yet been explored, within the above framework. Furthermore, by exploring these variables in typically developing populations, such explorations may guide future work with clinical populations.

To this end two groups of children (secure and insecurely attached) were recruited and administered three main tasks to assess links between attachment orientation, IWMs and emotion recognition skill. Chapter 2 explains the methodology used and reports the findings of the study.

1.4 Hypotheses

Predictions were made based on the literature discussed in this chapter.

1.4.1 Main Predictor and Outcome Variables

(1) It is expected that the insecure attachment group will score higher than the secure group in their identification of negative emotions, from both facial expressions of emotion and expressive body movement. This prediction is based on findings from the adult literature, that heightened sensitivity toward negative emotional signals may be more prevalent in insecure individuals (Bowlby, 1980). However, it is expected that both attachment groups will identify positive emotions with similar accuracy, on the premise that this category is unlikely to hold the same adaptive and survival value as negative emotional expressions. **(2)** Children's identification of negative emotions, from both facial expressions and expressive body movement, are expected to relate positively to their attachment orientation and IWM. This prediction is based on the suggestion in the literature that the level of availability of sensitive and responsive caregiving may influence children's learning, specifically, that attention and sensitivity towards their caregiver's nonverbal signals will either assist (secure attachment) or not assist (insecure attachment) them in times of threat or danger (e.g. Halberstadt, 1986).

(3) It is expected that insecure children will be more accurate in their judgement of more subtle (i.e. less intense) facial expressions. This prediction is based on the supposition of an adaptive advantage for these children in recognising more subtle expressions of emotion (e.g. Halberstadt, 1986). **(4)** It is expected that judgment of facial and bodily expression will be positively correlated. This prediction is based on recent research findings suggesting that the ability of young adults to recognize expressions of emotion in the face is highly correlated with their ability to detect emotion from expressive body movement (see Rozin, Taylor, Ross, Bennett & Hejmadi, 2005). **(5)** It is expected that secure compared to insecure children will score higher overall on their narratives about all story topics addressed within the attachment vignette task, but that differences will be found in secure compared to insecure children's narratives about emotional topics. This prediction is based on suggestions that the preschool period may play a crucial part in the development of representational and cognitive capacities, particularly in terms of the development of more sophisticated lexis (Thompson et al., 2003), which in turn, is thought to aid young children's' reflections and extractions of memories of past experiences.

1.4.2 Additional Variables

Exploratory investigations on the two additional variables of vocabulary of emotion words and emotion perspective taking, which have not yet been explored

in previous research within the above framework of emotion recognition and children's attachment experiences, were also conducted for the reasons discussed earlier.

Based on the above discussion, it is expected that secure children's performance will exceed that of insecure children on both the emotion language and emotion perspective taking tasks.

Chapter 2

Methodology and Results

2.1 Methods

2.1.1 Participants

Thirty-Eight children (17 male and 21 female) with a mean age of 5.62 years (SD = 0.45 years) were recruited from two primary schools, each located within different SES geographical areas (low-middle class and middle class), in the northeast of England. For the purpose of this study, SES was established based on the number of children in receipt of free school meals. All children were of White/British or White/European ethnic origin, and had English as their first language, with the exception of one child who was of Middle Eastern ethnic origin, with Arabic as her first language, but was fluent in spoken English. All children had either full or corrected vision.

2.1.2 Ethical Considerations

Prior to the start of the study, the researcher obtained Ethical approval from

Durham University's Ethics Committee to conduct the study. In addition, and in accordance with the university's Ethical Code of Practice and British Psychological Society (BPS) guidelines on conducting research with children, the researcher sought and obtained Enhanced Criminal Record Bureau Clearance.

2.1.3 Consent

Prior to commencing the study, the principal investigator sought consent from Head Teachers of both participating schools to conduct the study. This correspondence included an information sheet, which provided an overview of the study, and a participation consent form. Parents were also provided with information about the study, along with the opportunity to opt out of allowing their child's participation. All parents were happy for their child to take part in the study.

2.2 Administration of Tasks Session 1

The study's tasks were presented to children over two separate sessions, with approximately a one-week gap between each session.

2.2.1 Emotion Judgment and Emotion Perspective Taking Tasks

Three tasks were presented at session 1. These consisted of two emotion judgement tasks: (1) The Animated Full Facial Expression Test (AFFECT) (Gagliardi, Figerio, Burt, Cazzaniga, Perrett & Borgatti, 2003) and (2) The Full-light Dynamic Body Expression Task (Atkinson, Tunstall, & Dittrich, 2007), as well as one Emotion Perspective Taking Task - The Denham Task (Denham, 1986). Each of the emotion judgement tasks was piloted with four typically developing pre-school children (mean age 48 months). The Denham Task has been used successfully in several developmental studies both with typical and atypical pre-school children. All three tasks were therefore considered to be appropriate to the age and ability of the children who took part in this study.

Immediately prior to the first testing session children were told that they would be taking part in some tasks about feelings. All children were assessed for their ability to describe and express a feeling, to ensure that they were all competent in their understanding of feeling states. Children were asked to provide, verbally, an example of a 'feeling state' and to display the facial expression connected to that state. All children were able to describe at least two feelings, for example, feeling sad, feeling happy, and to display the facial expressions connected to these feelings.Both emotion judgement tasks were run on an Apple Mac iBook G4 with a 14-inch (diagonal) screen. The tasks were run from Psyscope X, a computer

programme that designs and runs psychological experiments. Psyscope X is an updated version of the original Psyscope programme developed by Cohen, Macwhinney, Flatt, & Provost (1993). Both tasks were four-alternative forced-choice emotion labelling tasks, with four emotion labels (anger, fear, happiness and sadness). Directly prior to testing, an A4 sheet of paper with the four emotion labels printed in large emboldened text was shown to the children. The experimenter read each of the words to the children and referred to them during testing. Throughout testing of both emotion-judgement tasks children were seated approximately 70 cm from the computer screen. They were asked to sit upright and look straight ahead at the screen.

Children were tested in a quite area in the school. Prior to participating in each task children were familiarised with the task materials and told that the session would be video taped.

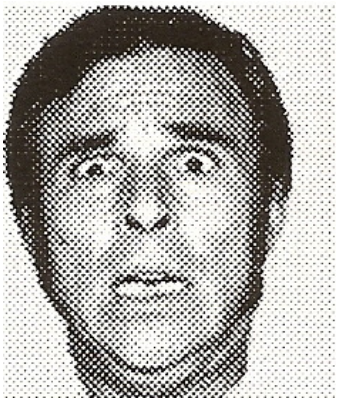
2.2.2 AFFECT Task

Materials:

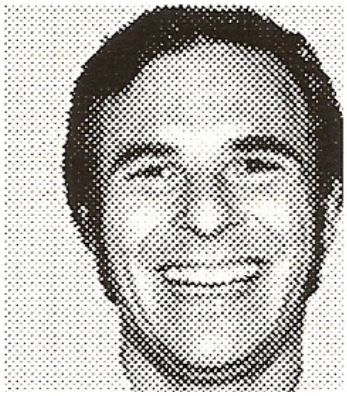
This task consists of stimuli adapted from Ekman and Friesen's standard set of expressive faces (Ekman & Friesen, 1976) and involves a set of digital video clips, each showing a dynamic facial expression, created by morphing a static face for one individual from the neutral photograph to the emotion expression. Four

facial identities were used (2 male and 2 female), each displaying one of four emotions (anger, fear, happiness and sadness) at each of two intensities, 75% or 100% (4 x 4 x 2 = 32 stimuli in total). Figure 2.1 provides an example of a male facial identity expressing fear and another expressing happiness. Both of these examples are displayed at 100% intensity. Each face movie evolved from the neutral expression to either the 75% or 100% intensities over the course of 1.92s or 2.52s, respectively. Using different intensities, in addition to the reasons outlined earlier, allowed for the control of ceiling effects. The stimuli were presented in a different random order for each participant.

Figure 2.1 Facial expression task apparatus



E.g 1.a male facial identity expressing fear



E.g. 2 a male facial identity expressing happiness

Procedure and Scoring:

The experimenter told children that they would be shown a set of moving faces and that they were to tell the experimenter whether the face was an angry, happy, frightened or sad face. Prior to the start of the main block of trials, children took part in a practice block. This a neutral face image consisted of children seeing 1 version of each emotion (i.e. 4 stimuli in total) displayed by one facial identity. The stimuli used in the practice trials did not appear again in the main block of trials. Each main experimental trial began with appearing on the screen, which was then animated to either 75% or 100%, i.e. its end state. Children were given as long as they wanted to respond, and were given some gentle encouragement if this was prolonged. The expression (final movie frame) remained on the screen until the child responded and the experimenter keyed in the response (e.g. "a" for angry, "h" for happy) and recorded the response on a scoring grid. (The inclusion of this additional scoring procedure was to enable the experimenter to check that the correct key was pressed and to record anything else the children might say – e.g. giving more than one response to a single stimulus.) If children indicated that they 'didn't know' what the stimulus was this was keyed in and recorded as "0". To eliminate the possibility of them simply not wishing to give a response to an individual stimulus, children were not told that they had this 'don't know' option. No detailed feedback was given to the children as to whether or not they were correct. Additionally, the experimenter ensured that her mannerisms did not

indicate a right or wrong answer. If children seemed unsure during testing, the experimenter provided some gentle encouragement. The AFFECT task took between 10 and 15 minutes to complete.

2.2.3 The Full-Light Dynamic Body Expression Task

Materials:

This task involved a set of digital video clips, each showing an actor dressed head-to-toe in dark grey clothing with their faces covered, expressing an emotion with body movement. Figure 2.2 provides an example of an actor displaying anger in expressive body movement. Eight versions of each of 4 emotions (anger, fear, happiness, sadness) were used (a total of 32), with each having a playing time of 3 seconds. These stimuli were selected from the set used by Atkinson et al. (2007), which were slightly modified versions of the larger set developed and validated by Atkinson, Dittrich, Gemmel and Young (2004). Intensity was not controlled for in this task.

Procedure and Scoring:

The stimuli were presented in a different random order for each child. Children

were told they were going to see some video clips of people dressed up, with their faces covered, and that they would be moving about. Children were asked to state verbally, whether the person was angry, happy, frightened or sad.

Figure 2.2 Body expression task apparatus

E.g an angry expression displayed in expressive body movement

In the same way as the AFFECT procedure, children were given as long as they wanted to respond, and given some gentle encouragement if this was prolonged. As with the AFFECT, the person remained on the screen at the last video frame (i.e. at the apex of the emotional expression) until the child responded and his or her response was keyed into the computer and additionally recorded on to a scoring grid. As with the AFFECT, children participated in a short practise block

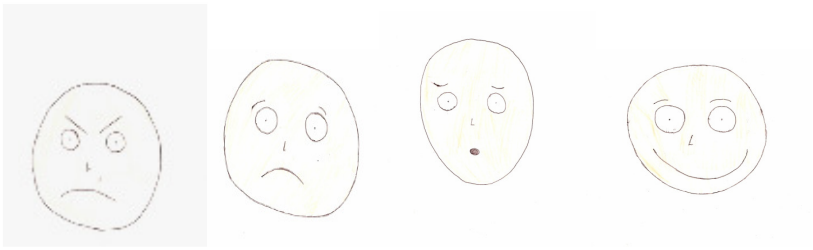
immediately prior to the start of the main trials. This practice block consisted of 3 trials displaying 3 different emotions by one actor. The task took between 10 and 15 minutes to complete.

2.2.4 The Denham Task – Emotion Labelling and Emotion Perspective Taking

Materials:

The task involved four cloth dolls, chosen to match each child for skin colour and gender, and four faces portraying angry, frightened, happy and sad expressions, drawn on to thin A4 card. The faces had been shown to 15 adults prior to being used in the testing, and all expressions were identified by them with 100% accuracy.

Figure 2.3 Emotion Perspective Task Apparatus – Face Drawings



Angry Face Sad Face Frightened Face Happy Face

Procedure and Scoring:

The experimenter presented the face drawings in random order to the children by holding each face drawing up to her own face and asking
the children "*what face do I have on now, how do I feel?*" (expressive identification of emotion). To test for receptive identification of emotion, the four cards displaying the faces were placed randomly in a row and the experimenter asked children to "*Show me the sad face", "show me the happy face", etc.* To control for the possibility of children identifying faces by the process of elimination, no feedback was provided. The four cloth dolls were then introduced to the children. One of the dolls represented the main story character and the other three represented the main doll's mother, sibling and friend. The dolls were used to enact a series of 20 vignettes, whereby the child doll felt happy, sad, frightened or angry.

The first eight vignettes portrayed unambiguous situations, i.e. specific situations in which any child would be expected to feel a particular emotion (e.g. happy to receive an ice cream; sad because mummy is going away; frightened from a dream about a scary monster or angry because a sibling has broken a favourite toy). The experimenter asked the children at the end of each story how the doll felt. Children were asked to respond verbally, or to point at the face corresponding to the doll's feelings (i.e. angry, frightened, happy and sad).

Scoring followed Denham's (1986) coding system. Children received 2 points if they chose the correct emotion portrayed, 1 point if they identified the correct valence but the wrong emotion (e.g. angry instead of sad) and 0 if the incorrect valence was identified.

The next 12 stories were selected from a series of 14 vignettes (2 stories were excluded because they did not represent situations in which children might be familiar, i.e. going for a ride on the tube, visiting a busy shopping centre) and represented stories that were likely to induce individual differences in children's emotions (e.g. going to the swimming pool). Immediately prior to presenting the vignettes, children were asked how they would feel in each of the 12 situations. If the children said that they would feel happy about going to the swimming pool, the experimenter enacted a story in which the main doll was scared about going to the swimming pool. The experimenter used vocal and facial cues to enact the doll's feelings. When each story was complete, the children were asked how the doll felt. Children's responses could be verbal or they could select the appropriate facial expression. As with the first set of vignettes, children were given a possible maximum score of 2 points for each story.

2.3 Administration of Tasks Session 2

2.3.1 Assessment of Attachment, IWMs and Emotion Language

Two tasks were presented in session 2. The Manchester Child Story Attachment Task (MCAST) (Green, Stanley & Goldwyn, 2001) was used to assess attachment orientation and IWMs. A Wordless Picture Book Task, *Frog on his own* (Mayer, 1973) was used to assess children's emotion vocabulary. The techniques used in the MCAST measure are appropriate for children aged 4 to 8 years, and more specifically use elements of behavioural observation appropriate for infancy. The Wordless picture book is suitable for children from the age of 4 years, and so both tasks were deemed both age and ability appropriate.

One child's attachment and story narration data are missing due to technical difficulties with the video recording equipment, and a further three children did not complete these tasks as their school withdrew from the study towards the end of testing, due to structural problems with the school building and children's subsequent relocation to another school. However, the remaining data collected from session 1 for those four children were available and were not excluded from the final analysis. A further child was excluded from the study based on global developmental delay, making it difficult for him to follow instructions. Thus there

were data for 33 out of the original 38 children.

As with session 1, children were tested in a quite area in the school. Prior to participating in each task children were familiarised with the room and the task materials and were told that the session would be video taped.

2.3.2 The Manchester Child Attachment Story Task (MCAST)

Materials:

The MCAST is a semi-structured play assessment that aims to induce, within a controlled and repeatable setting, behavioural patterns and reactions that have originated from children's internalised mental representations in the form of internal working models (IWMs) of the attachment relationships that they have developed thus far. The task involves a doll's house, furniture, and toys and doll figures.

Procedure and Scoring:

Children were shown a set of dolls (representative of both male and female gender and appropriate to the children's racial group) laid out in a row. Children were

asked to describe their family to the experimenter by answering the questions "how many people are in your family?" and "how many sisters and brothers do you have?" This was done to enable the experimenter to gauge children's knowledge about families, and was based on Green et al.'s (2001) procedure. All children described their immediate family, i.e. members they lived with. Children were then shown a set of dolls that had been pre-selected to match the children's race. Children were asked to choose a child doll, and were told that the doll had the same name as theirs. They were then asked to select a "mother doll" (all children had informed the experimenter that they lived with their mother, and thus she was presumed to be the main attachment figure) by choosing the name for the mother doll, e.g. mummy. In line with Green et al.'s procedure, the dolls were referred to as e.g. "Anna doll" or "mummy doll" thereafter, to enforce the child's identification with the symbolic material. However, to encourage symbolic expression, it was reinforced with the children that the doll was independent of them and that the stories were about e.g. "Anna doll" and "mummy doll". When the children had made their choice, the remaining dolls were put away, and children had no access to extra dolls during the interview. The dolls were used to enact a set of vignettes, 1 control vignette, 3 test vignettes relating to attachment themes, and 1 test vignette not related to attachment themes (5 vignettes in total). Children were introduced to the doll's house and props. The experimenter then said to the children "I am going to tell you the beginning of some stories and when I stop, I want you to tell me what happens next in the story". "I want you to

do this using the dolls and the doll's house". The presentation of the vignettes began with a breakfast story (control vignette) to familiarise the children with the procedure, and to provide incidental information about the child's home structure, parenting style and characteristic reaction patterns. The four test vignettes consisted of three emotion stories (nightmare, hurt knee, illness) and one positive topic (achievement, i.e. drawing a picture to give to mummy). Following presentation of the control vignette, children were then presented with the nightmare story. The experimenter used affective vocal and facial expressions appropriate to the theme of the vignette. When children were observed to be aroused by the story, the experimenter passed the story to the child for completion. This stage represented the starting point of testing. The experimenter did not become involved in completing the story, but prompted the child if they appeared to be 'stuck' (e.g "then what happened?"....). Where children appeared distracted or seemed to lose the thread of the story, the experimenter prompted them (e.g. "remember you were telling a story about……"). The story reached its conclusion when distress on the part of the child doll was signalled, proximity between the mother and child doll taken place, distress assuaged and the child doll returning to exploratory play. Where there seemed to be a pause or the story had clearly ended, the experimenter asked the child "Now, how is mummy doll feeling?", "What is she thinking about?" and/or "How is [e.g.] Anna doll feeling?". These prompts concluded the story. The remaining three test stories followed the same procedure. At the end of presentation and completion of the

test vignettes, children were presented with a closure vignette, where they were asked to play out a family holiday; this was to bring the children back into a descriptive mode about their own life and to rebuild their own interpersonal experiences. The procedure was recorded on video for later coding. Children received a score of 1-9 for predominant strategy of assuagement (calming, soothing. in their narrative, state of mind, and narrative coherence and attachment disorganisation. Twenty percent of the video tapes were coded by a second experimenter and received 100% reliability.

2.3.3 The Wordless Picture Book Narration

Materials:

The Wordless Picture Book is a storybook that tells a story about a pet frog who escapes from his owner, a little boy, whilst walking in the park. The frog embarks on many adventures while the little boy searches for him.

Procedure and Scoring:

The main storyline and characters were introduced to the children. Children were given some time to familiarise themselves with the book. The experimenter asked the child to tell her what was happening in the story, page by page, in as much

detail as possible. Most of the children were able to carry out the task with little prompting, but when prompting was needed, the experimenter would point to the page in the book and say "What's happening here?" Children's narratives were recorded on video and transcribed verbatim. The scoring procedure was the same as that for Meins et al. (2004). Children's narratives were broken down into individual, discrete comments (phrases or sentences) and categorized into one of the following: (1) *mind related comments:* these consisted of comments relating to the characters' beliefs, knowledge states, desires, mental activities, emotions, intentions (if the goal state did not actually happen in the story), and in cases where the child spoke on behalf of the character (e.g. "the mum is going to feed the baby some milk, but the frog gets it", "The lady is feeding the baby, the milk, but the frog gets it"); (2) *Perception comments:* Where children refer to a character's direction of gaze, or visual attention, hearing or sense of touch (e.g. look, see, stare, "The little boy was watching the boat"); (3) *attempt comments:* where the children make reference to the character's intent and when there was explicit coverage of this in the story (e.g., "and tried to get it"); (4) *self-referential comments*: references to the child's own internal states as opposed to those of the characters; (5) *distancing comments:* utterance qualified with a term that indicated the child was unclear about what was occurring (e.g., might be, looks like); (6) *general description* (e.g., "he is sitting next to the water", "the lady is reading her book"). Children received an overall score for the number of

comments made for each of the above categories. A randomly selected twenty percent of the transcripts were coded by a second coder, who was blind to the purpose of the study, and achieved 80% reliability.

2.4 Statistical Analysis

The research in this thesis compared secure versus insecure attachment group performance on three main tasks, emotion judgement of facial expressions of emotion (at both 75% and 100% of the original intensity) and expressive body movement (at 100% intensity), and coherence of narrative. Attachment group performance on two additional tasks was also compared: storybook narration and emotion perspective taking. Statistical analysis of these variables was conducted using SPSS version 11 for Windows. Table 2.1 provides descriptive information for the two attachment groups compared in this chapter. For the reasons outlined earlier, only 33 of the original 38 children recruited were assessed for attachment orientation. Classifications of insecure-avoidant (n = 3), insecure-ambivalent (n = 2) and insecure disorganised (n = 1) were combined into one insecure category for the purpose of the analyses.

All analyses were conducted a priori. Preliminary investigations were carried out

on the data to test the assumptions for using parametric testing. As all assumptions were met, the study employed ANOVA for all main analyses. Preliminary investigations were also conducted to test whether it would be feasible to conduct ANCOVA on the data, and thus control for type 1 errors. Covariates of SES, age and gender were measured against each of the main dependant variables. The assumption of homogeneity of slopes was not met in each case, and therefore ANCOVA was not applied to the data. An alpha level of 0.05 was employed for each of the analyses. Eta-Squared (η^2) was employed to estimate the magnitude of the observed significant main effects of the key variables.

The relatively small sample size of the insecure group (n=6) compared to the secure group (n=27) in this study, called for extreme caution when undertaking the analyses. Very small sample sizes can greatly reduce the power of parametric tests. To address this problem, a modified *t* test (see Crawford, Howell, and Garthwaite, 1998) was used to compare overall mean emotion recognition scores from each of the two emotion judgement tasks (i.e. mean of all four emotions of anger, fear, happiness and sadness, as opposed to each of these emotions separately) of each individual in the insecure group (n=6) with those of the secure group (n=27). This version of the *t* test is suggested to be most appropriate when n of the normative sample (i.e. the secure group) is less than 50. In this case the n of the normative sample (the secure group) is 27. The test was conducted using

the computer programme SINGLIMS exe (Crawford & Garthwaite, 2002). The programme tests whether the score of an individual differs significantly from the normative sample (in this study, the secure group). The program also estimates the percentage of the population that would obtain a lower score than that of the individual, and produces 95% confidence limits on this percentage. An advantage of the program is that it provides an exact *p* for the test, unlike more liberal tabled values of the *t*, which only record the *t* value which must be exceeded to obtain a given significance level (see Crawford and Howell, 1998).

The analysis of the emotion language task employed only the category of mind-related comments. This category was deemed appropriate, as it focused on children's emotion vocabulary more directly than the other five categories, outlined above, where children's vocabulary for these categories was considered not to be directly relevant to emotions or feelings.

The majority of children classified as insecure were from low-middle SES backgrounds. Most children classified with a secure attachment were from middle to high SES backgrounds.

Table 2.1 Descriptive statistics for attachment orientation. Age is given as a mean age in years with standard deviations (sd) shown in parentheses. Socio-economic status (SES) and gender are given as the percentage of children out of a total of 33.

	Male		Female	
	Secure	Insecure	Secure	Insecure
n	10	3	17	3
Age	5.40 (0.516)	6.00 (0.000)	5.59 (0.507)	5.69 (0.577)
SES				
Low-middle	40.0	66.7	41.2	66.7
Middle-high	60.0	33.3	58.8	33.3

2.5 Session 1 Results

2.5.1. Emotion Judgment Tasks

Thirty-seven children from both attachment groups completed the two emotion judgement tasks. Emotion recognition accuracy on the facial expression and expressive body movement tasks was assessed by means of two separate

4 (emotion) x 2 (attachment group) mixed analyses of variance, with emotion as the within-subject variable and attachment status as the between-subjects variable. Descriptive information for these variables is presented in Table 2.2. Mauchley's test of sphericity was found to be significant for emotion in relation to the face data only, (W = .618, p <0.05), and therefore, the Huynh-Feldt corrected degrees of freedom was used for this analysis. Each analysis revealed a significant main effect of emotion, $F_{(2.741,84.975)} = 6.306$; $p < 0.005$ (facial expression recognition) and $F_{(3,93)} = 3.381$; $p < 0.05$ (body expression recognition). However, further investigation showed the magnitude of these effects to be small, $\eta^2 = 0.165$ (main effect of emotion from facial expressions) and $\eta^2 = 0.096$ (main effect of emotion from expressive body movement). Children's performance on the facial expression task did not generate a significant main effect of attachment, $F_{(1,31)} = 2.456$, $p > 0.05$, indicating that both attachment groups identified emotions from facial expressions similarly. However, even though the main effect of attachment, for the facial expression task did not reach the standard cut-off point for statistical significance ($\alpha = 0.05$) the effect size, $\eta^2 = 0.073$, did indicate that a minimal amount of the variability in children's mean scores for this task could be accounted for by attachment orientation. There was no significant interaction between emotion and attachment in this task, $F_{(2.741,31)} = .744$, $p > 0.05$. For the facial emotion recognition task, fear was the least well recognised for both groups and anger produced the highest mean accuracy scores (see Table 2.2). Overall, children's judgement for happy faces yielded the highest mean accuracy,

reflecting a ceiling effect for this emotion. These effects were further demonstrated when Bonferronni corrected comparisons of each of the four emotions was employed (anger, fear, happiness and sadness). The use of these pairwise comparisons of the data highlighted large significant differences in children's recognition of the facial emotional expressions of anger v happy, fear v happy, and sad v happy ($p < 0.001$).

Children's performance on the expressive body movement task was similar to that of the facial expression task. The ANOVA revealed no significant main effect of attachment orientation upon overall scores on this task, $F_{(1,31)} = 1.758$, $p > 0.05$, nor a significant interaction between attachment and emotion, $F_{(3,31)} = 0.816$, $p > 0.05$. However, like the facial expression task, even though the main effect of attachment for the body judgement task did not reach the standard cut-off point for statistical significance ($\alpha = 0.05$) the effect size of $\eta^2 = 0.05$, did indicate that at least a very small proportion of the variability in children's scores was accounted for by attachment orientation, albeit not significantly. As with the facial expression task, fear was least well recognised overall, in terms of negative expressions of emotion. However, group differences occurred in mean accuracy for recognition of anger in this task, compared to the facial expression task, although not significantly. Secure group accuracy for anger was comparatively higher than that of the insecure group (see Table 2.2). As with the face recognition task, children's judgment of happy facial expressions yielded the

highest mean accuracy overall, again revealing a ceiling effect in children's judgment of this emotional expression. However, unlike the facial expression judgement task, Bonferronni corrected comparisons demonstrated a small significant difference in accuracy for the judgement of happy v sad expression of emotion ($p < 0.05$). No other significant pairwise differences between emotion expressions were produced.

Table 2.2 Emotion Judgement Tasks: Emotion recognition accuracy from facial expressions and expressive body movement for each attachment group

	Secure		Insecure	
	Mean	(SD)	Mean	(SD)
	n = 27		n = 6	
Facial Expressions *				
Anger	6.63	(1.597)	7.67	(0.516)
Fear	5.93	(1.730)	6.33	(1.366)
Happy	7.96	(0.192)	7.83	(0.408)
Sad	5.81	(2.095)	6.83	(0.983)
Expressive Body Movement				
Anger	5.93	(1.796)	4.67	(2.422)
Fear	4.96	(1.808)	3.67	(2.658)
Happy	6.26	(1.810)	6.17	(3.061)
Sad	5.70	(2.109)	6.00	(1.265)

*100% intensity of expression

One-tailed modified *t*-tests (Crawford & Howell, 1998) were used to compare the mean scores of each individual child from the insecure group, with the mean score of the secure group as a whole. These analyses revealed each insecure child's mean accuracy scores for recognition of negative expressions of emotion, on both of the emotion judgement tasks, not to be significantly different from the overall mean scores of the secure group ($p > 0.05$). However, one child's mean score on the body judgment task showed a slight significant difference in the judgment of emotions from expressive body movement compared to the overall mean judgment score of the secure group $t_{(26)} = 1.821$, $p = 0.04$.

Group differences in accuracy of judgement for each facial expression of emotion at 75% and 100% intensity were measured using four separate, 2 (intensity) x 2 (group) mixed-design ANOVAs, with intensity as the within-subjects variable and group as the between-subjects variable for each emotional expression. Descriptive information for these variables is provided in Table 2.3 Mauchley's test of sphericity was found to be significant intensity only (W==1.000, $p < 0.05$) for each of the four analysis, therefore, Greenhouse-Geisser corrected degrees of freedom was employed for these analyses. No main effects of intensity were found for any of the four emotions ($p > 0.05$ for each analysis).

Table 2.3 Accuracy of judgment of facial expression of emotion at 75% of original 100% intensity and 100% of original intensity in relation to attachment group.

	Secure		Insecure	
	75%	100%	75%	100%
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
	n = 27		n = 6	
Anger	3.37 (0.792)	3.59 (0.636)	3.50 (0.548)	4.00 (0.000)
Fear	2.85 (1.134)	3.11 (0.892)	3.17 (0.753)	2.83 (0.753)
Happy	4.00 (0.000)	3.93 (0.267)	4.00 (0.000)	4.00 (0.000)
Sad	2.89 (1.050)	3.00 (1.144)	3.50 (0.548)	3.67 (0.516)

Mean judgment accuracy for negative facial emotional expressions was highest for anger, for both groups, whereas all children judged fear and sadness similarly (see table 2.3). Mauchley's test of sphericity was found to be significant ($W = 1.0$, $p < 0.001$) for No interactions between intensity of emotional expression and attachment group were revealed for any of the emotions of anger, fear, happiness or sadness ($p > 0.05$ for each analysis). Mean differences in recognition accuracy was similar at both the 75% and 100% intensity for each negative emotional expression for both groups. Both groups recognised positive (happy) emotional

expressions with almost equal accuracy. However, there was slightly more variability in secure children's mean recognition scores for this emotional expression compared to the insecure group, but only at the 100% intensity. Additionally, at both 75% and 100% intensity, sadness was less well recognised by the secure compared to the insecure attachment group (see table 2.3) but not significantly.

Relations between children's ability to recognise emotion from facial expression and their ability to recognise emotion from expressive body movement, was analysed using Pearson's correlation co-efficient. Table 2.4 (see appendices) provides a correlation matrix of relations between these key variables. No relationship was found between the two variables, for any of the four emotions of anger, fear happiness or sadness ($p > 0.05$)

2.5.2 Emotion Labelling and Emotion Perspective Taking Tasks

Thirty-seven children, from both attachment groups, completed the Emotion Perspective Taking and Emotion Labelling Tasks. Table 2.5 below, provides descriptive information about these tasks. Children's performance was measured by means of two mixed ANOVAs. A 2 (label) x 4 (emotion) x 2 (attachment group) mixed ANOVA, with label and emotion as within-subjects variables and attachment as the between-subjects variable was employed to measure group

performance in the expressive and receptive labelling task. The ANOVA did not generate any main effects for emotion $F_{(3,93)}$ =.487, $p > 0.05$, labelling, $F_{(1.31)}$ = .593 $p > 0.05$ or attachment group, $F_{(1,31)}$ = .067, $p > 0.05$. The label x attachment group interaction was not significant, $F_{(1.31)}$ = .380, $p > 0.05$. No group differences occurred in children's ability either to verbally express or receptively identify and label the four drawings portraying emotionally expressive faces. However, mean scores for the receptive labelling of the angry face were lower for the insecure group, but the difference was not significant. Additionally, mean scores for receptive labelling of the sad face drawing were comparatively lower for the secure group, but not significantly. Mean scores for children's expressive labelling of the drawing portraying a frightened face were comparatively lower than those portraying sad and angry faces. No interaction between the variables of emotion and attachment were demonstrated, $F_{(3,93)}$ = .487, $p > 0.05$ and the label and emotion interaction was not significant, $F_{(1,31)}$ = .380 $p > 0.05$. The three-way interaction between the three variables of emotion, attachment and label was not significant, $F_{(3,93)}$ = 0.575, $p > 0.05$

Table 2.5 showing mean accuracy scores on the receptive and expressive labelling tasks by attachment group.

	Secure Mean (SD)	Insecure Mean (SD)
	n = 27	n = 6
Expressive Affective Labelling		
Anger	1.96 (0.192)	2.00 (0.000)
Fear	1.85 (0.456)	1.83 (0.408)
Happiness	1.93 (0.385)	2.00 (0.000)
Sadness	1.93 (0.267)	2.00 (0.000)
Receptive Affective Labelling		
Anger	2.00 (0.000)	1.83 (0.408)
Fear	1.96 (0.192)	2.00 (0.000)
Happiness	2.00 (0.000)	2.00 (0.000)
Sadness	1.93 (0.247)	2.00 (0.000)

Group differences in performance on the Emotion Perspective Taking task were compared employing a 2 (story type, ambiguous or unambiguous) x 4 (emotion) x 2 (attachment group) mixed ANOVA, with story type and emotion as

within-subjects variables and attachment group as the between-subjects variable. Table 2.5 provides descriptive information for these variables. Mauchley's test of sphericity was found to be significant for emotion ($W = 1.0$, $p < 0.001$) and for story x emotion ($W = 0.474$, $p < 0.05$). Therefore, Greenhouse-Geisser corrected degrees of freedom was employed for this analysis. The ANOVA revealed a highly significant main effect for story, $F_{(1,31)} = 17.455$, $p < 0.001$. However, the magnitude of this effect was relatively moderate, $\eta^2 = 0.35$. Children scored significantly lower in their understanding of stories portraying ambiguous situations in comparison to stories where the situation was unambiguous. There was a main effect of emotion, $F_{(3,93)} = 5.163$, $p < 0.005$. However, further investigation showed the magnitude of this effect to be small, $\eta^2 = 0.116$. Overall, children scored lower when story situations symbolised sadness, fear and anger compared to those symbolising happy situations. Of the three negative emotions, fear-provoking stories were the least well understood (see table 2.5). Additionally, when Bonferronni-corrected pairwise comparisons were conducted, this analysis revealed a significant difference between children's understanding of stories symbolising happy v fear ($p < 0.05$) and anger v fear ($p < 0.05$) provoking story situations. No interactions occurred between story type and attachment group, $F_{(1,31)} = 1.091$, $p > 0.05$, nor between emotion and attachment group, $F_{(1,31)} = 1.590$, $p > 0.05$. Additionally, there was no significant three-way interaction between story type, emotion and attachment group, $F_{(1,31)} = 0.892$, $p > 0.05$.

Both attachment groups scored similarly, regardless of whether the story situation portrayed was ambiguous on unambiguous. Likewise, children's mean scores on this task demonstrated that their understanding of each of the four emotions portrayed within a given story situation were similar regardless of attachment orientation.

Bivariate correlation using Pearson's correlation coefficient was employed to examine the relationship between the variables of emotion perspective taking and emotion recognition, from facial expressions and expressive body movement. Tables 2.6 and 2.7 provide a correlation matrix of these relationships. Accuracy in identifying the emotional expression of happiness from expressive body movement was positively related to children's understanding of ambiguous stories symbolising happy situations ($r = .41$, $n = 37$, $p < 0.05$). Accuracy in identifying the emotional expression of anger from expressive body movement was negatively related to children's understanding of unambiguous stories portraying happy situations ($r = -0.37$, $n = 37$, $p < 0.005$). Positive relationships were also found between accuracy in identifying facial emotional expressions of sadness and children's understanding of ambiguous stories symbolising angry situations ($r = .40$, $n = 37$, $p < 0.05$), and between accuracy in identifying facial emotional expressions of sadness and children's understanding of unambiguous stories ($r = .34$, $n = 37$, $p < 0.05$).

Table 2.8 Emotion Perspective Taking Task: identification of emotional situations from ambiguous and unambiguous storie

	Secure		Insecure	
	Mean	(SD)	Mean	(SD)
	n = 27		n = 6	
Ambiguous Stories				
Happy	7.85	(0.770)	8.00	(0.000)
Sad	6.44	(5.621)	7.33	(1.633)
Anger	5.78	(2.792)	5.33	(3.266)
Fear	6.22	(2.712)	4.67	(3.393)
Unambiguous Stories				
Happy	8.07	(4.976)	10.67	(4.844)
Sad	8.67	(5.174)	10.00	(4.195)
Anger	9.78	(5.003)	9.33	(4.844)
Fear	5.78	(3.203)	5.33	(4.844)

2.6 Session 2 Results

2.6.1 Attachment and Narrative Task

Table 2.9 Attachment and narrative Task: mean coherence of mind and metacognition/mentalising scores for each story topic

	Secure Mean (SD)	Insecure Mean (SD)
	n = 27	n = 6
Coherence of Mind		
Nightmare	6.89 (1.121)	4.17 (.649)
Fall Over	6.78 (1.013)	5.00 (1.265)
Picture	7.00 (0.877)	5.00 (1.549)
Hurt Tummy	6.70 (0.775)	4.50 (1.517)
Metacognition/Mentalising		
Nightmare	2.04 (0 .649)	1.67 (0.516)
Fall Over	2.07 (0 .616)	1.67 (0.816)
Picture	2.04 (0.649)	1.50 (0.548)
Hurt Tummy	2.07 (0. 548)	1.50 (0. 548)

Thirty-three children out of the original thirty-seven, from both attachment groups, completed the Attachment and Narrative Task. The remaining four children did not complete this task for the reasons discussed earlier. Table 2.7 provides descriptive information for the key variables employed in this task. A 2 (narrative coherence) x 4 (story topic) x 2 (attachment group) repeated measures, mixed ANOVA, with narrative coherence and story type as within-subjects variables, and attachment group as the between-subjects variable, was employed to examine mean group differences in children's narratives about emotional and positive story topics. Main effects were highly significant for the variables of narrative coherence, $F_{(1,31)} = 328.780$, $p < 0.001$ and attachment group, $F_{(1,31)} = 23.831$, $p < 0.001$. The magnitude of the effect of narrative coherence was revealed to be fairly large, $\eta^2 = 0.87$, but more moderate for attachment group $\eta^2 = 0.43$. Overall, children scored significantly higher in their coherence of mind, compared to their mentalising ability. This task generated significantly lower scores from the insecure group compared to their secure peers. There was no main effect of story topic, $F_{(3,93)} = 1.932$, $p > 0.05$. Children's coherence of narrative and discourse was highest for the picture story, but not significantly. There was a small significant interaction between story topic and attachment, $F_{(1,31)} = 1.091$, $p < 0.05$. The interaction between these two variables, demonstrated a more comprehensive enactment of the positive story vignette (taking a picture drawn by the child doll home to mummy doll), by the secure group. Similarly, the secure compared to the insecure group displayed a more

comprehensive enactment of the emotion story vignette portraying the child doll experiencing a tummy ache. There was also a highly significant interaction found between narrative and attachment, $F_{(1,31)} = 15.406$, $p < 0.001$. The secure group compared to the insecure group, demonstrated significantly higher coherence of mind and metacognitive/mentalising ability. Figures 2.4 and 2.5 provide graphical information about these interactions. Two separate one-way ANOVAs were employed to further analyse the interaction between narrative and attachment. This showed a highly significant effect of attachment orientation on children's coherence of narrative $F_{(1,31)} = 20.246$, $p < 0.001$, and a smaller significant effect of attachment on children's mentalising ability, $F_{(1.31)} = 5.570$, $p < 0.05$. To further analyse the interaction between story topic and attachment orientation, four separate one-way ANOVA's were conducted. These analyses demonstrated attachment orientation to have a highly significant effect on children's enactment of each of the four story topics as follows:- the child doll experiencing a nightmare $F_{(1,31)} = 21.352$, $p < 0.01$; falling over, $F_{(1,31)} = 22.730$, $p < 0.001$; presenting a drawing to mummy doll, $F_{(1,31)} = 26.134$, $p < 0.001$; and, the child doll experiencing a tummy ache, $F_{(1,31)} = 24.440$, $p < 0.00$.

Figure 2.4 Graph representing the interaction between narrative coherence and metacognition/mentalising ablity by story topic.

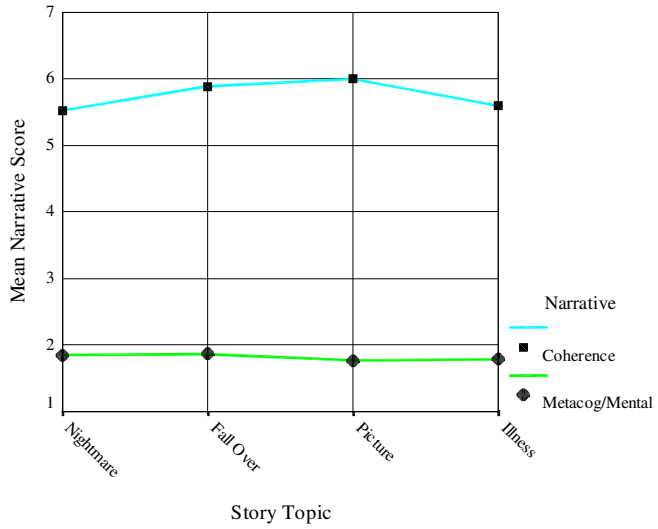
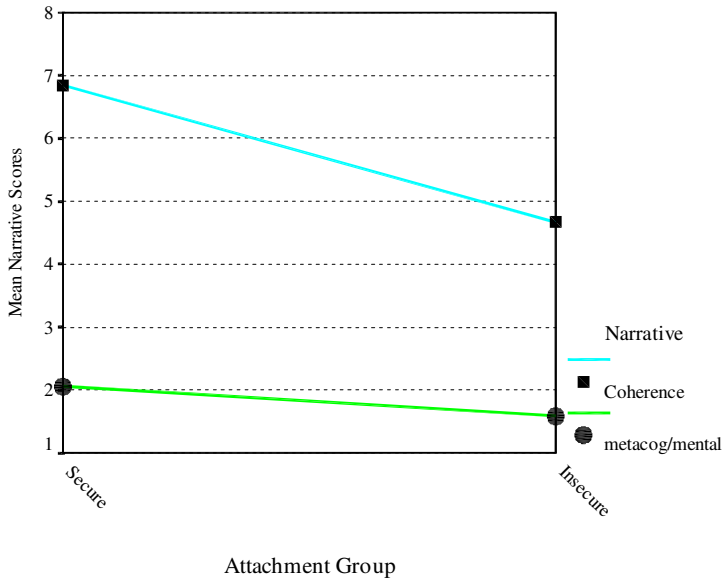


Figure 2.5 Graph representing the interaction between narrative coherence and metacognition/mentalising by attachment orientation



The relationship between the key variables of attachment and narrative and emotion recognition were examined by means of bivariate correlation using Pearson's correlation coefficient. Table 2.10 provides a correlation matrix of relations between each of these variables. Attachment and meta-cognition were negatively related (r = -40, n = 33, $p < 0.05$). Attachment was also negatively related to children's coherence of mind (r = -63, n = 33, $p < 0.005$) and finally, children's meta-cognition and mentalising were positively related to their coherence of mind (r = -42, n = 33, $p < 0.05$). Emotion recognition (facial expression of emotion and expressive body movement) attachment and narrative were not related ($p > 0.05$)

2.6.2 Emotion Language Task

As with the attachment and narrative task, thirty-three out of the original thirty-seven children participated in the emotion language task. Table 2.11 provides descriptive information of the two attachment groups' mean emotion-related comments made during this task. A one-way ANOVA showed no significant group differences for the mean number of emotion related comments made, $F_{(1,31)} = 0.167$, $p > 0.05$. However, the substantial standard deviations for the two groups demonstrate sizeable individual variation in the volume of emotion related comments produced.

Table 2.11 Emotion language task: key variables

	Secure	Insecure
	Mean (SD)	Mean (SD)
	n = 27	n = 6
Emotion Vocabulary	20.07 (10.605)	18.17 (3.471)

Bivariate correlation analysis employing Pearson's correlation coefficient was used to establish a link between children's emotion vocabulary and recognition of facial emotional expressions and expressive body movement. Table 2.11 provides a correlation matrix of each of these variables. The analysis revealed no significant relationship between these variables ($p < 0.05$).

Discussion

This chapter begins by providing a summary of the experimental findings of the study. It will then go on to address methodological issues, and conclude with a discussion of the experimental findings in relation to the literature and provide directions for future research.

3.1. Summary of the experimental findings

This thesis set out to examine emotion recognition skill in typically developing pre-school children, within the framework of attachment and internal working models (IWMs). No previous study has before examined and evaluated the link between children's emotion recognition in pre-school period within the above framework. However, as discussed in chapter 1, adult work in this domain has provided some plausible evidence that a link does indeed exist, (e.g Fraley, et al., 1999; Kafetsios, 1993; Magai et al., 2005; Neidenthal et al., 2002), and so provided a reasonable foundation from which to construct the main hypotheses. As such, the prediction that insecure children would perform less well on the key variable of emotion recognition skill was feasible. Moreover, emotional signals emerge from several channels, including the face and body, and as such this study employed both facial expressions and expressive body movement to test the main

hypotheses. In addition, the highly significant association between undergraduate student's ability to detect emotion from static facial expressions, and expressive body movement (without the face showing), reported by Rozin et al., 2005, led to, albeit somewhat tentatively, to assume a similar association to emerge in the current study.

Early detection of an emerging emotional signal, from a survival aspect, was also a point of interest in this study, therefore, the morphing of facial expressions to two separate intensities of 75% and 100% enabled the expectation that insecure children would be more accurate in their judgment of emotional expressions at the less intense facial expression of 75%.

Finally, investigations of children's internal working models, or mental representations of the attachment relationship, have in past research been able to demonstrate links with secure attachment and advanced affective-cognitive ability, in specific domains of memory, language and narrative (e.g see Meins, 1997; Nelson, 1996; Siegel, 1999; Thompson et al., 2003; van IJzendorn, 1995). As such, it was reasonable to expect that higher scores on children's narratives about the four topics addressed within the attachment vignette would be demonstrated by secure compared to insecure children. Moreover, such links between affective-cognitive ability and secure attachment enabled the prediction that secure children would out-perform insecure children in their production of

emotion words in the emotion language task. In addition, these links suggest the prediction that secure children's understanding of emotional situations would be superior to that of insecure children. Thus, it was reasonable for this investigation to expect that secure children would perform better than insecure children in each of these tasks, and that emotion vocabulary and understanding of emotional situations would be related to emotion recognition.

These predictions were evaluated by means of group comparisons and correlational analyses between emotion recognition, attachment security and IWMs. The small sample sizes, particularly for the insecure group, meant that interpretation of these statistical analyses were approached with extreme caution, and this is dicussed in more detail in section 3.2 of this chapter.

Between attachment group comparisons revealed no signficant differences in emotion judgement task performance, for either judgement of facial expressions of emotion or expressive body movement. Moreover, post-hoc analysis of the magnitude of the main effect size of attachment revealed that differences in attachment orientation accounted for only seven percent of the variability in children's performance in the facial emotion judgement task and only five percent in children's performance on the judgement of emotional expressions from expressive body movement. Nevertheless, averaged across groups, statistically significant differences in emotion identification accuracy did emerge, however the

effect size was relatively small. Averaged across groups, children recognised anger from both emotional judgment tasks with better accuracy than either sadness or fear.

Overall, the positive emotional expression displaying happy affect, was the most accurately recognised of the four emotional expressions, and by all children, albeit with evidence of notable individual differences in recognition accuracy of this emotion displayed by expressive body movement. This supported the prediction that overall, children would perform better in their recognition of this emotional expression compared to any of the three negative expressions. This prediction was based on the presupposition that this emotion category, as asserted earlier, is unlikely to hold the same adaptive and survival value as negative emotional expressions. Alternatively, it is contended that happiness is generally more easily recognised compared to negative emotions, as there are not other positive emotional categories for it to contend with (see De Sonneville, Verschoor, Njiokiktjien, Op Het Veld, Toorenaar, & Vranken, 2002, p.209).

In the current study, attachment orientation was not reported to have an effect on children's recognition of facial expressions of emotion at different intensities. Both groups were reported to recognise all four emotions with similar accuracy at both 75% and 100% intensity. Finally, no association between children's accuracy in recognising emotion from facial expression, and recognition of

emotion from expressive body movement emerged from this current study.

Although the non-significant differences reported for attachment group indicated similar performance on the emotion judgement tasks, the relatively small sample size of the insecure group made distinguishing performance reliably between secure and insecure children difficult in the current sample. However, the inclusion of the post-hoc analyses to compare each individual insecure child's task performance with the secure group performance on the emotion judgement tasks did go some way to addressing this difficulty. Ultimately, this process did not highlight a significant difference in the performance of secure versus insecure children in their judgement of emotional expressions, from either facial expressions or expressive body movement, with the exception of one insecure child's performance on the body movement task, which was slightly but nevertheless significantly lower than the mean performance of the secure group.

Coherence of narrative did differentiate between the two attachment groups. Insecure children were reported to be less proficient in their mentalising ability compared to secure children. Similarly, the secure group's coherence of mind was reported to be comparatively superior to that of the insecure group. Conversely, performance on the attachment and narrative task was not affected by the topic of the story vignette averaged across the two groups. However, the secure group demonstrated a more comprehensive enactment of the positive story

vignette (taking a picture drawn by the child doll home to the mummy doll), and the emotion story vignette portraying the child doll experiencing a tummy ache compared to the insecure group.

Children's understanding of emotions and emotional situations did not distinguish between the two groups. Both attachment groups performed at similar levels in the emotion perspective-taking task, in terms of their verbal labelling and receptive identification of the four drawings of emotionally expressive faces. In addition, children's understanding of emotional situations from stories symbolising ambiguous and unambiguous situations produce similar scores for both attachment groups.

However, significant differences were reported overall, for children's understanding of situations that were clear (unambiguous) to them, but significantly less well for those that were unclear (ambiguous). This effect was nevertheless moderate, with levels of ambiguity in situations accounting for only 35% of the variability in children's scores. In addition, children's understanding of stories symbolising happy situations were reported to be significantly better than those symbolising sadness, fear, or anger, but the effect was relatively small, with only 16% of the variability in children's scores being attributed to type of emotion being symbolised.

There was no evidence that children from the insecure and secure groups differed in their emotion vocabulary. Both groups performed similarly in the production of emotion related words in the emotion language task. Nevertheless, the individual variation in the volume of emotion-related comments reported was notable.

There was no evidence to support associations between the key variables of emotion recognition and attachment and narrative. However, there was some association between children's emotion perspective-taking ability and their recognition of emotional expressions. A positive association was reported between children's identification of happy emotions from expressive body movement and their understanding of ambiguous stories symbolising happy situations. In addition, judgement of facial emotion expressions displaying sadness was associated with the understanding of ambiguous situations symbolising angry situations. Finally, a negative association was reported between children's attachment orientation and their narrative coherence.

Whilst the lack of significant findings challenge the main predictions of this current study, the failure to demonstrate differences and relationships may, to an extent, be accounted for by the relatively small sample size of the insecure group. This methodological issue will be addressed in section 3.2.

3.2 Validity of the statistical findings

The very small sample size of the insecure group of children called for a cautious approach when interpreting the findings of this current study. Small sample sizes can substantially decrease the power of statistical analyses, therefore ideally power calculations should be conducted a priori (see e.g. Cohen, 1988, 1992). In this current study, the group size was determined from the attachment measure (the MCAST), however this was not a robust sampling method, as only 6 of the original 38 children were classified as having an insecure attachment (3 avoidant, 2 ambivalent and 1 disorganised). Nevertheless, the inclusion of single-case methodology in the main analyses addressed this problem to some extent, as did the inclusion Eta-squared (η^2) to estimate the magnitude of the observed significant main effects of the key variables.

Future investigations should aim to recruit larger sample sizes. Additionally, it would be useful for future research to employ meta-analysis to ascertain appropriate sample size for this type of research, and/or to conduct a power analysis a priori. Equal and larger sample sizes in this current study would have improved robustness, and in turn may have produced more significant and interesting results for the key comparisons between emotion recognition, attachment and narrative.

3.3 The findings in relation to the literature

Having addressed the above methodological issues, the findings can be interpreted in accordance with the available literature.

3.3.1 The effect of attachment orientation on emotion recognition

Adult attachment theory proposes that non-verbal expressions of emotion are probable activators of the attachment system (e.g. Neidenthal et al., 2002). The aim of the current research was to extend findings from adult research to typically developing child populations. However, from this current study it was not possible to determine adequately whether direct links do indeed exist between emotion recognition and attachment orientation in early childhood. Furthermore, it is reasonable to implicate the small sample size in this conclusion.

Alternatively, it is possible that, at this earlier stage of development in typically developing populations, when emotion recognition skill is still emerging, attachment orientation, simply does not play a significant part in observed variations in children's identification of others' emotional displays. Instead, several studies have implicated development factors as having a key role in the

emergence of individual differences in this skill. For example, the lack of evidence for a link between emotion recognition and attachment may be a product of individual differences in children's emotion recognition skill generally at this developmental stage, in typically developing children. In addition, it is contended that development of emotion recognition takes place over time (see Herba & Phillips, 2004). However, some studies have reported age-related improvements in emotion recognition skill (e.g. Boyatzis, Chazan, & Ting, 1993), yet, other work concludes that emotion recognition does not emerge at a given stage of development (e.g. De Sonneville et al., 2002; Smith & Walden, 1998). Moreover, work investigating emotion recognition ability in preschool children, has concluded that accurate judgement of other's emotional expressions continues to develop between 3 and 6 years of age (Macdonald, Kirpatrick & Sullivan, 1996). Therefore, it would be reasonable to suggest that individual variation is likely to occur as emotion recognition skill is emerging.

Although attachment orientation did not have and effect on children's identification of emotion expression recognition, children's more superior recognition for the angry expression of emotion compared to either fear or sadness, can be compared to findings from work examining individual attentional biases to angry faces. In one study by Cooper & Langton (2005), these authors used a dot probe task to distinguish recognition of anger from paired emotions, in a sample drawn from a typical population of undergraduate students. The authors

probed the allocation of the emotional expression stimuli for a presentation time of 100 ms and 500 ms. Ulitimately, an attentional bias was reported at 100 ms towards the stimulas displaying an angry face in angry/neutral pairs. In other work, attentional biases have also been reported towards threat related stimuli in individuals scoring high on trait and state anxiety (e.g. Bradely, Mogg, Falla & Hamilton, 1998; Mogg & Bradely, 1999). In addition, the work mentioned above, examining attentional biased for threatening stimuli in individuals scoring high on state and trait anxiety, has also been reported in adults in relation to attachment related anxiety (see Fraley, Neidenthal, Marks, Brumbaugh & Vicary, 2006).

The demonstration in recent research examining individual differences in emotion recognition of negative emotions, from facial expressions and expressive body movement, by Ross et al. (2005), did not extend to the current study. However, age related differences could be implicated in this finding, whereby it is reasonable to suggest that young adults performance on tasks of expressive body movement would be more advanced, compared to that of young children, for the reasons relating to age differences discussed earlier.

Alternatively, the abililty of children as young as four and five years to recognise emotions of anger, fear, happiness and sadness, from facial expressions in well documented (e.g. Walden, et al., 1982), whilst other work extends this finding to

expressive body movement (Thomas, Boone & Cunningham, 1996). For example, the latter investigation demonstrated that children as young as four and five years are able to recognise expressive body movement at above chance levels from dance. Therefore, this would reasonably lead to the expectation, that some association would be found between young children's recognition for facial expressions and expressive body movement. However, there is no evidence for this in the current study. On plausible explanation for this is that dance movement may be a more sensitive measure than the expressive body movement employed in the current study, particularly in terms of its ability to convey discrete emotional meaning.

3.3.2 Influences of intensity of emotional expression

The finding that children's recognition of facial emotion expression from intensity did not differ between attachment groups, opposes the assumption in the current study of an adaptive advantage for insecure children to recognise emotional expressions at the lower intensity of 75%. Conversely, related work on populations investigating emotion processing style of vigilance towards threatening stimuli as a function of attachment security (see e.g Neidenthal et al., 2002), indirectly implicates intensity of an emotional expression, as an important contributor to observed differences in recognition accuracy, between secure and insecure attachment groups. For example, in the Neidenthal study, it was reported

that individuals recognition of the offset (where a given emotional expression disappears and is gradually replaced by a neutral expression) of negative emotional expressions was achieved significantly earlier by fearful individuals, than by either preoccupied or secure individuals (i.e. at a higher intensity). Conversely, preoccupied and secure individuals perceived the offset of the emotion significantly later than the secure group (i.e. at a lower intensity). These findings were explained by Neidenthal and colleagues, in relation to the preoccupation with this kind of social stimuli, by the insecure group.

Although intensity of emotional expression failed to produce significantly different scores between the two attachment groups, this finding could have emerged out of developmental factors and/or methodological factors. For example, as discussed previously, emotion recognition in adults is comparatively more stable (where in typical populations, it is reasonable to suggest that this skill should have peaked) than emotion recognition in very young children, when the skill is still emerging (see e.g Boyatzis, et al., 1993; Herba et al., 2004).

In addition, the current study employed the onset of emotional expression (from the neutral expression to the apex of the expression). When an emotional expression emerges, it does not emerge immediately into its end state, i.e. at 100% intensity of the expression, but rather it emerges gradually. Therefore, it could be argued, that the onset of the emotion expression would be a more robust measure

of vigilant processing mechanisms than the off-set. However, it would be interesting to challenge this supposition, by replicating the current study using offset as opposed to the onset of the emotional expressions with young children, as this may help to clarify the vigilance hypothesis of Neidenthal and co-workers at an earlier developmental period.

If the small sample size did affect the ability to detect a link between emotion recognition and attachment orientation, then it is not unreasonable to suggest that it should also have affected observed differences in children's performance on other measures. An example of this assertion is discussed in terms of the significant group differences found in relation to performance on the attachment and narrative task.

3.3.3 Supporting narrative coherence and discourse as a function of attachment security

This current study implicates secure attachment as a facilitator of narrative coherence in young children. Thus, this would suggest that to some degree, the sample size was at least adequate, and that other unknown factors may have contributed to the lack of evidence for a relationship between emotion recognition and attachment orientation, for the following reasons:-

There is compelling evidence to suggest that secure children generally perform

better on tests of narrative coherence, particularly in their mentalising ability. In a study by Meins, Fernyhough, Russel and Clark-Carter (1998), these authors found evidence for superior mentalising abilities among securely attached children at five years of age. Essentially, children's ability to mentalise about other's states of mind emerges from their interactive experiences with their social enviroment. This experience is instrumental in guiding children's expectations about how others will be expected to behave, in a given situation (e.g. see Harris, 1999). In turn, the anticipated behaviour of others is thought to link to the way children's caregivers behaved when portraying specific emotional expressions, and these affective displays on the part of the caregiver, are in turn, suggested to be stored as mental event representations that form the basic structure of IWM's (Spangler & Zimmerman, 1999; Thompson, 1999). Yet, the failure of the current study, to find a relationship between attachment, narrative, and emotion expression is contrary to these assertions. Thus, the highly significant effect of attachment on children's narrative coherence would reasonably lead to surmising that methodological flaws and/or developmental factors may have contributed to the findings of the current study. This proposal warrants further investigation, and with will addressed in section 3.4.

3.3.4 Emotion expression recognition as a function of emotion understanding and emotion language

Attachment orientation has been related consistently in the literature to children's understanding of others' emotions and emotional situations. For example, secure attachment has been found to predict higher emotion understanding in five-year-old children, especially in the context of maternal discourse, and it is strongly suggested that at this developmental stage, maternal discourse within the framework of attachment security may facilitate emotion understanding substantially in preschool children (Ontai & Thompson, 2002). However, this current study failed to provide evidence for such links. There is also some suggestion that child-adult discourse becomes a potentially valuable source of information in relation to the child's social world, which in turn will aid the function of children's own thoughts (e.g. Reiber & Carton, 1987).

The finding that secure children performed similarly to insecure children in the emotion language task is also inconsistent with the current literature. In one study by Lindquist et al., (2006), it was found that accessibility of emotion vocabulary facilitated accuracy of emotion recognition. In addition, debates on the topic of self-other understanding, (e.g. Bretherton, 1999; Harris, 1999; Meins, 1997 and Symons, 2004) have consistently implicated the participation of discourse about

mental states of others to be associated with children's superior understanding of self and other, and this may include understanding others' mental states from their emotionally expressive displays.

3.3.5 Concluding Remarks

Essentially, it is difficult to conclude satisfactorily from this current study whether attachment experiences are linked to children's ability to identify others' emotional displays, and the extent to which children's mental representations of their caregiver's emotional expressive displays contribute to the acquisition of this skill. Earlier discussions would suggest that an individual's internalised experiences of an attachment figure's availability facilitates emotion recognition skill, and thus attachment should play some part in the development of this skill, from an early age (see DePaulo, Brittingham & Kaiser, 1983). However, when considering the caregiving enviroment in facilitating or debilitating emotion expression recognition, other factors should be considered, such as individual differences in cognitive ability, particularly in terms of language and narrative, as well as social factors, such as the exposure to more than one caregiver, and social experience in general. Nevertheless, the compelling evidence from work on atypical environmental experience and adult work, that individual differences in emotion recognition is affected to some extent, by differences in the quality of

maternal caregiving, provides reasonable grounds not to dismiss attachment, as a key component in either enabling or preventing the progression of development of emotion recognition skill in early childhood. It is after all, in familiar, family surroundings, that this skill first emerges, and one with aids the preverbal and later, the verbal child's capacity to make implicit judgments about others' emotion states of mind.

3.4 Future Directions

The small sample size of the insecure group of children meant that little could be concluded in terms of the relationship between emotion recognition, attachment and narrative. Nevertheless, in view of the evidence from adult research, that a relationship does exist (Kafetios, 2000; Magai et al., 1995; Neidenthal et al., 2002) further exploration of this concept is needed. For example, future research should consider longitudinal work to address this question. This would help to facilitate the recruitment of a more robust sample. Attachment status and emotion recognition could be measured at different developmental stages, and specifically, during critical periods of development. This may help to highlight more clearly, the extent to which social-emotional experience contributes to the development of this skill, and how much is a product of other factors. In addition, measures to assess perceptual processing style developmentally, could be considered in future

studies, since individual differences have been found between the different categories of adult attachment, using self-report measures and subsequent recognition of some emotions (see e.g. Neidanthal et al., 2002). In particular, these studies highlight the notion of defensive and vigilant processing style, and have reported these differences to be linked to an individual's attachment orientation.

A further limitation, in relation to the methodology used in the current study, is that it employed accuracy to measure emotion expression recognition. However, processing speed may have been a more sensitive measure of this skill, as it is proposed to be more reliable in the detection of deficient processing of emotional expressions, both in child and adult populations (e.g DeSonneville et al., 2002). For example, the current study produced near ceiling effects for the judgement of happiness from both facial expressions and expressive body movement, and this is in line with other research that has employed accuracy alone, to measure individual differences in emotion recognition ability (e.g. Chung et al., 1995). Given the proposed sensitivity of processing speed (e.g. DeSonneville et al., 2002), it would be reasonable to contend that employing processing speed alongside accuracy, might address this problem. Thus, further exploration is needed to establish this possibility.

In addition, given the recent work relating to attentional biases towards some

emotional expressions, both in general and in relation to attachment (e.g. Bradely et al., 1998; Cooper et al., 2005; Dewitte, Koster, De Houwer & Buysse, 2006; Mogg et al., 1999; van Heijnsbergen, Meeren, Grèzes & de Gelder, 2007), it would be reasonable to explore these finding further in child populations, and within the framework of attachment related anxiety.

Finally, the clear evidence from the neurodevelopmental literature regarding the influence of children's earliest experiences on the development of associated neural pathways (see Schore, 2001b, 2004), and the advancement of a number of neuroimaging techniques in recent years, suggests the possibility of employing such techniques, to further explore the existence of links between emotion recognition skill and attachment orientation developmentally.

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Appendix I

Correlation Matrices

Table 2.4 correlations (Pearson's r) between recognition of emotion from facial expressions and expressive body movement

	1	2	3	4	5	6	7	8	9	10	11	12
Facial expression												
1. Angry												
2. Frightened	.22											
3. Happy	.23	.04										
4. Sad	.00	.16	.01									
Expressive body movement												
5. Angry	.15	.16	.13	.09								
6. Frightened	.16	-.02	.15	.02	.23							
7. Happy	-.17	-.31	.31	.16	-.24	-.08						
8. Sad	.32	.05	-.66	.12	.13	.26	-.18					

Table 2.6 correlations (Pearson's r) between emotion perspective taking and emotion recognition from facial expressions

	1	2	3	4	5	6	7	8	9	10	11	12
Facial Expressions												
1. Angry												
2. Frightened	.23											
3. Happy	.23	.04										
4. Sad	.00	.17	.01									
Emotion Perspective Taking (Ambiguous Story Topics)												
5. Angry	.08	-.11	.06	.40*								
6. Frightened	.18	-.22	.06	.25	.17							
7. Happy	.44**	-.12	.09	-.12	-.14	-.48						
8. Sad	-.18	-.19	.11	.14	-.12	-.09	.29					
Emotion Perspective Taking (Unambiguous Story Topics)												
9. Angry	-.25	-.29	-.18	.16	.15	.16	-.17	-.16				
10. Frightened	.20	.02	.08	-.14	-.37*	.15	-.00	-.19	-.15			
11. Happy	.21	.17	-.16	.24	.04	-.08	.21	.24	-.28	-.15		
12. Sad	.17	.30	.05	.34*	-.12	-.21	.56**	.49**	-.13	.01	.41*	

Two-tailed probabilities *p < .05, **P < 0.005

Table 2.7 correlations (Pearson's r) between emotion perspective taking and emotion recognition from expressive body movement

	1	2	3	4	5	6	7	8	9	10	11	12
Expressive Body Movement												
1. Angry												
2. Frightened	.23											
3. Happy	-.24	-.08										
4. Sad	.13	.26	-.18									
Emotion Perspective Taking (Ambiguous Story Topics)												
5. Angry	-.08	.22	-.22	-.05								
6. Frightened	.15	.10	-.19	.14	.28							
7. Happy	.06	-.01	.25	.35*	-.14	-.12						
8. Sad	-.03	.01	-.12	.13	-.05	-.09	.17					
Emotion Perspective Taking (Unambiguous Story Topics)												
9. Angry	.00	.05	-.14	.17	.21	.24	.04	-.08				
10. Frightened	-.07	.11	-.12	.03	.56**	.49**	-.12	-.21	.41*			
11. Happy	-.43**	-.21	.20	-.05	-.17	.16	.15	.16	-.28	.13		
12. Sad	.21	-.05	-.24	-.24	-.00	-.18	-.37*	.15	-.15	.01	.15	

Two-tailed probabilities *p < .05, **P < 0.005

Table 2.8 correlations (Pearson's r) between emotion perception, attachment and narrative (IWM)

	1	2	3	4	5	6	7	8	9	10	11	12
Facial expression												
1. Angry												
2. Frightened	.22											
3. Happy	.23	.04										
4. Sad	.00	.16	.01									
Expressive body movement												
5. Angry	.15	.16	.13	.09								
6. Frightened	.16	-.02	.15	.02	.23							
7. Happy	-.17	-.31	.31	.16	-.24	-.08						
8. Sad	.32	.05	-.66	.12	.13	.26	-.18					
Attachment and IWM												
9. Attachment	.27	.10	-.21	.20	-.25	-.25	-.18	1				
Narrative(IWM)												
10. metacognition/mentalising	.27	.03	.12	.10	-.13	.07	.13	.08	-.40*			
11. Coherence of Mind	.26	.27	-.05	-.22	.00	.15	-.06	-.24	-.63**	.42*		

Two-tailed probabilities *p < .05, **P < 0.005

Appendix II

i. **Letter to Head Teacher**
ii. **Parent/Teacher Information Sheet**
iii. **Participant Consent Form**

Ms Sheena Laws
PhD Research Student
Department of Psychology
Science Laboratories
South Road
Durham, DH1 3LE

Tel:

E-mail:

Date

The Head Teacher

Dear Head Teacher

Re: Emotion Study

Thank you for your time on the telephone today, and for consenting to your children's participation in the above study.

The study has received ethical approval from the University's Ethics Committee and I would be grateful if you could allow me to start my research in the next two or three weeks.

As discussed, we are interested in how children's views about everyday experiences (being happy, proud, scared or lonely) relate to their recognition of different emotional facial expressions (showing happiness, sadness, anger etc.)

The tasks that the children will be involved in will take approximately 50 minutes to administer in total, and each child will be tested on two separate sessions in order to ensure that children are not away from normal classroom activities for prolonged periods of time.

The study has received ethical approval from the University's Ethics Committee and I would be grateful if you could allow me to start my research in the next two or three weeks.

I will deliver some parent information sheet, outlining the rationale of the study and what will be involved when administering the tasks as arranged with on

In the meantime, should you require any further information regarding the study, please do not hesitate to contact me.

Yours Sincerely

PARENT INFORMATION SHEET

The Head Teacher at your child's school has agreed for children of your child's age to take part in a study on how children process emotion information. We are interested in how children's views about everyday experiences (being happy, proud, scared or lonely) relate to their recognition and processing of different emotional facial expressions (showing happiness, sadness, anger etc.) The study is being carried out by Sheena Laws and Anthony Atkinson from the University of Durham.

What will my child have to do?

We will see your child twice. On the first occasion, your child will be shown video clips of actors expressing emotions using facial expressions Your child will be asked whether a particular emotion is being expressed and to respond by pressing a yes or no button on computer keyboard.

On the second occasion, your child will be asked about different types of emotion. The researcher will start off a story about a child being in a particular situation (e.g. being ill or going on a family trip) and your child will be asked to act out the rest of the story using dolls and props.

Both parts of the study will be video taped for later coding. The tapes will be treated as confidential. Your child's tape and coding sheet will be labelled with a number (not your child's name) and stored securely and only the people working on the study will have access to them.

What happens to this information?

The results of the project will be written up by Sheena Laws for her thesis, and they may be published in a psychology journal. The results of individual children will not be identified in these reports. We are no interested in the answers of any individual child, only in the answers of the whole group of children taking part.

What do I have to do if I do NOT want my child to take part?

Please complete the attached form and return it to your child's school as soon as possible and no later than ……..

You only have to complete this form if you do NOT want your child to take part. If you are happy for your child to take part in the study, you don't need to do anything.

Many thanks for your time. Please do not hesitate to contact us if you need more information. Ms Sheena Laws, Department of Psychology, University of Durham, South Road Science Laboratories, Durham. Tel:

I do **NOT** want my child to take part in this study

Childs name…….

Signature of Parent/Guardian……..

CONSENT FORM

Title of Project: Emotion Perception in Early Childhood: Relations with Attachment Security and Internal Working Models

(The participant's parent/guardian should complete the whole of this sheet himself/herself)

Please cross out as necessary

Have you read the Participant Information Sheet? YES / NO

Do you consent to your child participating in the study? YES/NO

Do you understand that your child will be free to withdraw from the study:

* at any time and
* without having to give a reason for withdrawing YES / NO

Are you aware that your child will be video taped YES / NO

Do you consent to your child being video taped YES / NO

Has the investigator made clear what the tapes will be used for YES / NO

Do you consent to these tapes being used for

* research purposes
* teaching purposes YES / NO

Signed ..... **Date:** ……

(NAME IN BLOCK LETTERS)

.....

Appendix III

The MCAST Vignettes

Vignette 1 Nightmare

It's nightime and here you and mum are in bed asleep.

The child can help place the dolls where he/she thinks they should be.

It's the middle of the night and everyone is fast asleep very quiet. Everything is very dark. Then suddenly X doll wakes up (experimenter act this out with the child doll). She says oohh. I've had a horrible dream…..oohh..horrible dream. And she starts to cry and she says……..oohh…..horrible dream.

The experimenter says to the child, "Now show me what happens next".

Vignette 2 Hurt Knee

For this story it's daytime and mummy's inside the house – what do you think she is doing there?

The child can help to place the doll as they see fit

X doll is outside playing in the garden. What does X like to play – What would he be playing? OK (whatever the child says it is – act it out – e.g. football). He/she's playing football in the garden, running around – kicking it here and there (There is room for creativity as the game is set up, but not too elaborate and allowing involvement of anyone else).

He/she's running along and suddenly….oohh, he/she falls over….and….."oowww! " *he/she's hurt his/her knee and he/she looks down and he/she sees it is bleeding……and it hurts…..and he/she says "oowww!" my knee's hurt…my knee's hurt…….*

The experimenter says to the child, "now show me what happens next".

Vignette 3 Achievement

For this story we're in school.

The child can help to set up the school and say who is their teacher etc.

And in school they're doing some drawing and X does a lovely drawing on his paper

(The experimenter demonstrates with a small piece of paper and makes a little drawing)

And Y (teacher's name) comes up and says "X – that's a beautiful drawing…oh yes, that's the best one I've seen today…….what a beautiful picture – you take it home at the end of the day and show your mummy".

So it's the end of the day and X packs up her bag and puts the drawing inside (experimenter demonstrates). *Then she goes home. She goes home and rings on the doorbell.*

It is important here that mummy is placed in an accessible position in the house, but that the examiner in the set up does not anticipate a reaction from her. The action of the child ringing on the doorbell is the trigger for the hand over to the child. Do not represent the mother coming to the door.

The experimenter say to the child "Now show me what happens next".

Vignette 4 Illness

In this story X doll is at home watching T. The experimenter asks the child "what's your favourite TV programme"? "X is watching that". Mum is next door – where do you think she is? Suddenly X has a pain in the tummy. And it gets worse and she says "oohhh…..I've got a pain in my tummy oowww, it's getting worse". And she feels her tummy – it's a horrible pan. Oowww…

The experimenter say to the child "Now show me what happens next".

Appendix IV

Coding Grid for the Emotion Judgement Tasks

Emotion (Faces)	Name: Age: Year: Sex: Participant Code:																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Angry																																
Frightened																																
Happy																																
Sad																																
Emotion (Body)																																
Angry																																
Frightened																																
Happy																																
Sad																																