The Relationship Between Attachment Security, Affect Sharing and Joint Attention: A
Study of Infant Development Between Fourteen and Seventeen Months

by

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Abstract

Possible associations between the attachment relationship and the infant behaviour of joint attention were investigated. It was proposed that joint attention is a form of perspective-taking. The secure attachment relationship is theorized to facilitate the ability of an infant to share mental states, a necessary prerequisite to perspective taking. In particular, the positive affect characteristically shared within the secure relationship is thought to encourage the infant's attention to adults and objects. Forty mother-infant dyads between the ages of 14 and 17 months of age were observed during two visits to their home. Play sessions between the infant and the mother and the infant and the experimenter were videotaped. Results indicated that differences in attachment security were directly related to differences in joint attention and affect sharing within the mother-infant relationship. This relationship did not occur with the experimenter. Infant affect sharing with the mother was related to increased levels of joint attention with both the mother and experimenter, as well as increased levels of affect sharing with the experimenter and higher levels of security. Joint attention frequencies with the mother predicted joint attention frequencies with the experimenter, and affect sharing levels with the mother predicted affect sharing levels with the experimenter. These findings confirm the suspected association between security and joint attention within the mother/infant relationship. Also, the results highlight the relationship between infant affect sharing and the frequency of joint attention with individuals both within and outside of the attachment relationship. It is hoped these findings will provide direction for future investigation into the influence of social factors upon the individual differences found within the development of joint attention.

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The significance of the parent's role in infant development has long been

recognized in attachment theory. An attachment, characterized as an emotional bond,

develops between the caregiver and the infant that promotes survival by motivating the

caretaker to meet the needs of the helpless infant (Bowlby, 1969). In a secure

relationship, the mother and infant anticipate the actions of the other based upon repeated

experiences. A shared understanding develops, providing a link for the infant to the

adult's mind. At present, substantial developmental literature associates secure

attachment with advances in the emotional and cognitive domains of child growth

(Frankel & Bates, 1990; Main, Tolan & Tomasini, 1979; Shaw & Vondra, 1995; Sroufe,

Fox & Pancake, 1983; Youngblade & Belsky, 1992). However, the potential impact

attachment security may have on the development of social cognition, in particular the

ability to take other peoples' perspectives, has yet to be fully explored.

One of the earliest indicators of the ability to share perspectives is an infant

behaviour called joint attention. Thought to be the forerunner of the early stages of social

cognitive development, it is described as the ability of an infant to alternate his or her

focus of attention between an object and a person during social interaction. This

coordination of concentration between an object and a person suggests the infant is aware

that he or she concurrently shares the same focus of attention with the other person

(Adamson, 1995; Tomasello, 1995). It is this understanding, that attention can be shared,

which is thought to lay the foundation for the future development of perspective taking.

This understanding may, in turn, be dependent upon an infant having been successful

previously in sharing mental states. It will be argued that the opportunity to experience shared mental states, in particular shared affect, may be what the infant requires to eventually perceive, interpret and learn to understand the perspective of another person. The repeated experiences and shared affect of the secure attachment relationship may provide the infant with this expertise.

A study investigating the impact of attachment security on perspective taking ability could serve to highlight the importance of responsive parenting and the sharing of affect in the development of social cognition. The goal of this research is to demonstrate a relationship between the level of attachment security, frequency of affective sharing in the mother-infant dyad, and the participation of the infant in joint attention episodes between the ages of 14 and 17 months of age.

Literature Review

The Development of the Secure Attachment Relationship

Children acquire much of their knowledge about the objects and events in the world around them from their immediate caregivers. In order to facilitate this mutual construction of knowledge and understanding, infants must learn to appreciate and understand a different perspective from their own. According to the mutual regulation perspective on attachment (Gianino & Tronick, 1988), this process is initiated through the infant's establishment of a social relationship with a significant other. During the first few months of life, this relationship is dominated by emotional exchanges between the infant and his or her caregivers. In harmonious relationships, infants and caregivers are observed to share or match similar affective states (Adamson & Bakeman, 1985; Brazelton, 1986; Stern, 1985; Gianino & Tronick, 1988). Interactive routines develop

based on familiar patterns of affective messages embedded within social interaction. The infant comes to learn that he or she can connect with the adult's mind through shared signals understood by them both. In other words, to learn to understand the perspective of another's mental state, one must experience alternate mental states. Thus, the establishment of social relationships is based on affect sharing. Central to the characteristics of a secure relationship are the abilities of the infant to balance and exchange emotions in an open way with caretakers (Bretherton, 1991).

Emotion Regulation

Within an interaction, the infant experiences a series of emotional states which can vary in intensity. Stern uses the term "emotional regulation" to describe the infant's attempts to modulate and cope with varying levels of emotions and in this way regulate his or her level of internal arousal (Stern, 1985). If emotions heighten to an uncomfortable level it is thought to be an overpowering situation, and until it is brought under control the infant must devote all of his or her energy to restoring balance. The infant's cry signals the caregiver to assist him or her in regulating an uncomfortable state. This assistance can be seen when a mother helps a distressed infant to calm down through stroking and cuddling. Once internal states are controlled, the infant is free once again to direct attention outward and act on the world. A mother's sensitive and prompt response to her infant's signals has been associated with the infant's healthy development of emotion regulation (Gianino & Tronick, 1988).

Infants of unresponsive caretakers are left to balance their internal states themselves. This often results in behaviors which are not necessarily conducive to continued interaction with the environment. Infants in this situation direct their attention

inward as they attempt to control and balance their internal level of arousal. Over time they develop an inattentive, withdrawn and self-involved regulatory pattern which includes looking away and fussiness as a way of coping with stimulation from the environment (Field, Healy, Goldstein, & Buthertz, 1990; Gianino & Tronick, 1988).

Interactions will differ based upon the personality and temperament of both the caretaker and the infant. While infant temperament does not necessarily determine whether or not a relationship is secure, it does influence the way in which security or insecurity will be expressed (Belsky & Rovine, 1987; Sroufe, 1985). Individual differences in attachment quality also reflect individual differences in emotional regulation. In a relationship, the social interaction between the caretaker and infant is jointly regulated and socially constructed by them both. Each learns to adjust their behavior in relation to their partner's behavior and the state of the interaction. In the case of harmonious relationships, the mother responds contingently and appropriately, serving as an important external source of regulation of stimulation. This type of coordination facilitates mutual understanding and the sharing of affect between the infant and the caregiver (Acebo & Thoman, 1995; Weinberg & Tronick, 1994).

Affect Sharing

Secure mother-infant dyads who have achieved a pattern of complementary coordination in their interactions are described as interacting in an open and unfettered manner. They participate in more affective sharing and physical contact (Pederson & Moran, 1996). Theoretically, it is thought that this is the result of a caregiver who responds sensitively most of the time to an infant's full range of affective signals, without selectively ignoring any particular cues. Affective signals are not limited to facial

expression, but also include auditory and motoric elements (Adamson & Bakeman, 1985). The sensitive mother recognizes, accepts and shares in all of the affective signals of her infant. For example, negative affect is validated through the acknowledgement that comes from the mother attending to and soothing the infant, facilitating the infant's return to an emotionally regulated state. With emotional regulation comes the internal balance, which allows the infant to focus outward to share other emotions with the caregiver. The infant comes to expect that his or her emotional cues will be responded to in an appropriate way, and that a variety of emotions are acceptable. In this way the infant learns that affect can be shared in a social relationship and is more likely to express emotions and share affect with his or her caregiver (Bretherton, 1991; Cassidy, 1985).

Mothers of securely attached infants also demonstrate a varied and wide range of emotions during a social interaction. In an early, but much-replicated study by Main, Tomasini and Tolan (1979) the characteristics of a responsive mother were outlined. Main and her colleagues found that mothers of securely attached infants were much more accepting and sensitive toward their children and were much more expressive of a range of emotions, including some anger in addition to happiness. The mothers of insecurely attached infants were much less expressive and tended to appear angry much of the time. In a more recent study, intrusive mothers were found to display high levels of angry affect, while withdrawn mothers showed more anxious affect combined with less alertness and fewer facial expressions (Aaron Jones, Field, Fox, Davalos, Malphurs, Carraway, Shanberg, & Kuhn, 1997). Infants of intrusive or withdrawn mothers are less likely to be securely attached to their mothers.

Caregiver affect typical to secure and insecure attachment relationships may have a direct effect upon infant participation in affect sharing. Cohn and Tronick (1988, 1989) examined videotapes of play sessions and found that infants younger than one year of age became positive when mothers displayed positive affect. If mothers remained either neutral or negative the infant remained neutral or negative and became less interested in the mother and the environment around him or her. The mother, by exhibiting positive affect, transformed the neutral expression of an infant to a positive expression. Interest in the mother and the immediate environment then returned. The positive expression of a responsive mother may be a direct signal to the infant that the mother is available for social engagement and affect sharing.

More recent research supports the effects of sad, angry and withdrawn mothers on their infant's interest and expression. Mothers who are depressed, and either withdrawn or angry, for the majority of their child's first year of life have infants who exhibit fewer interest expressions, make less eye contact and fuss more often (Jones et al, 1997; Murray, Kempton, Woolgar & Hooper, 1993; Pickens & Field, 1993). Possibly the lack of eye contact from the infant could indicate lowered expectations for dyadic interaction and affect sharing, coupled with fussiness resulting from difficulty regulating his or her internal state.

It has been suggested that affect sharing in the mother-infant dyad is needed in order for the infant to learn that his or her private world can be shared with others, a first step in perspective taking. Because infants are unable to speak and therefore label their experiences, face-to-face interactions in which the parent echoes, validates and demonstrates emotions is the basis upon which intersubjectivity, or perspective taking, is

built (Rochat & Striano, 1999). Travarthan (1979) differentiated the development of intersubjectivity into primary and secondary levels, with one level building upon the next. Primary intersubjectivity is defined as a basic understanding that experiences can be shared within a dyadic interaction (secondary to be described later). It would seem that the open emotional communication typical of the secure relationship coupled with the tendency of the responsive caretaker to assist the infant with disregulated states would facilitate the development of primary intersubjectivity. Over time the infant would learn that internal states can be regulated and experiences and internal states shared with others. It would follow that the accumulation of these experiences would shape the infant's conception of interpersonal interactions as positive and facilitate the generalization of this attitude towards others.

The Internal Working Model

Near the end of the first year of life, the infant begins to display a fixed pattern of behaviour during times of stress. This pattern is described as a behavioural-motivational system. The infant activates the system to monitor the physical proximity and psychological availability of the main caregiver. When the infant is in a state of balance, the main caregiver is perceived as a secure base from which the infant can move forth and explore. In times of stress, the urge to explore is overridden by the desire to seek protection and comfort from the main caregiver. The repeated affective interactions and experiences between the child and caregiver provide the infant with a mental representation, or an "internal working model", of how relationships work. The model includes the history of the caregiver's responses as well as the intent of the infant's behaviors (Bowlby, 1969; Bretherton & Munholland, 2000). The infant uses this model

in an automatic way to interpret social interactions with other people. It is this mental representation or model, observed from the typical behaviour of the infant that is assessed by existing attachment measures. When a caregiver is unresponsive and communication breaks down, the infant must learn which communication and coping strategies are effective in repairing the communication. If the infant is successful in repairing the interaction and gaining the attention of the caregiver, the infant is left with a feeling of effectiveness. Specifically, the infant develops a representation of him or herself as effective, of interactions as positive, and of the caretaker as reliable and worthy of trust (Isabella & Belsky, 1991).

The Internal Working Model (IWM) begins to develop when the infant is around one year of age. It promotes expectations about interactions with the environment (Cassidy, 1990). It is thought that the infant's experience of affect sharing directly influences his or her perception of the willingness or availability of partners to share in interactions. It is thought that securely attached children are better able to attend to and explore their environment, since they are secure in the knowledge that the caregiver is available for support and have internal working models which help them perceive, interpret and predict future interactions with others. In contrast, insecurely attached children have greater difficulty in giving full attention to the environment, as they not only have to monitor the caregiver's physical and psychological availability but have often developed inattentive, self-involved regulatory patterns (Cassidy, 1990).

Given the representational aspects of the internal working model, it may be the foundation upon which perspective taking is built. Using the IWM, the infant expects or predicts that the adult will respond to his or her behavior in certain ways. In a

rudimentary fashion the infant is attributing mental states to the other with the implicit understanding that one mind can be interfaced with another through familiar interactive patterns (Stern, 1985). The infant applies these expectations to all relationships in an automatic, unconscious way. These mental models are individually constructed and are as infinitely varied as the relationships they represent. In its ability to permit both insight and prediction, the IWM may provide the cognitive underpinning of the development of the secondary phase of intersubjectivity (Trevarthen, 1979), the ability to take the perspective of another and predict the intent of their actions (Bretherton, 1991).

<div align="center">Joint Attention Theory and Definitions</div>

The preceding account of the development of the Internal Working Model incorporates the corresponding development of intersubjectivity. It has been suggested that joint attention is a behavioural demonstration of intersubjective ability and a precursor to social cognitive development (Adamson & Russell, 1999; Tomasello, 1999). It has been noted that the behaviour appears more frequently and reliably at a time that coincides with the proposed developmental timeline of the internal working model (Adamson & Bakeman, 1984; Tomasello,1995). The seemingly simple act of simultaneously sharing attention to an object and a person, implies that the infant possesses something of an understanding of other people's minds. By choosing to join into the attention of another, the infant appears to have a sense of other people as separate agents from him or herself. As separate agents they have intentional behaviors not under the infant's control, but nonetheless some behaviours that can be predicted and entered into, which lead to the sharing of sights (Tomasello, 1995).

The nature of the link between the representational model of the attachment relationship and the emerging intersubjective abilities possibly demonstrated by the act of joint attention, has yet to be fully explored. To date, the investigation of social and emotional influences upon joint attention has been overshadowed by the study of the developmental time line and cognitive skills required by the infant to develop this ability. Many debates continue as to its function.

In reading the literature to date, there are three main definitions of joint attention, each reflecting a different interpretation of the intersubjective awareness that underlies the behaviour. It will be argued here, however, that each of these definitions actually represents a different phase in the sequence of development of the intersubjective skills required to participate in joint attention. For the purposes of this study, coordinated joint attention is considered to demonstrate most reliably the abilities of intersubjectivity. The three phases are discussed in turn.

Phase 1: Gaze Following

Simply put, according to one definition, joint attention occurs when the infant follows the adult's gaze to an object (Scaife & Bruner, 1975). Called gaze-following, it is said to occur when an infant, while interacting with an adult, observes the adult turn his or her head and subsequently turns his or her head to look in the same direction. Infants as young as 3 months have been able to briefly demonstrate this ability under optimal conditions (D'Entremont, Hains & Muir, 1997). Butterworth and Jarrett (1991) tested gaze following abilities in infants aged 6 to 18 months of age and found that 6-month-olds could gaze follow to targets in front of them if the targets were placed at eye level; however, it was not until 12 months of age that children were able to gaze follow to all

targets in front of them regardless of height placement and 18 months of age before children were able to extend their gaze following to targets located behind them.

It has been claimed that this behaviour implies a level of intersubjectivity as the infant in some sense must understand that there is a relation between the adult and the object of focus and therefore represents the adult as looking at something (Bretherton, 1991). Further, in following the direction of the gaze, the infant may understand that human actions are purposeful and directed by intentions; the intention of the adult is to view an interesting sight (Baldwin & Baird, 1999).

Others have suggested that this behavior is nothing more than a conditioned response due to the repeated reinforcement of viewing an interesting sight after following adult gaze (Moore & Corkum, 1994). However, in a study aimed at substantiating this claim, Corkum and Moore (1998) were unable to teach an infant to look to the opposite direction from a turned head, despite the reward of an interesting sight. It was suggested that learning alone could not account for the behavior. If learning and conditioning were the key to explaining this type of joint attention, the infant would have been able to learn to ignore the gaze direction of the adult and turn in the opposite direction. Some aspect of the actual head turning orientation was considered to be a powerful cue to the infant that suggests this behavior might stem in part from some sort of biological bias to follow gaze, as is seen as a survival mechanism in the animal kingdom (Baron-Cohen, 1994).

Further examination led Moore (1999) to conclude that the actual head turn remains a necessary component in successful gaze following until eighteen months of age at which time eye movements alone prompt the infant to follow the gaze. While this information lends further support to a biological base for intersubjective behaviour,

Moore does note that after nine months of age an infant will gaze follow to an object that is visually absent. He concedes that this does imply the infant has some understanding of the meaning of the other's head turning behaviour, as an identifiable target is not visible and therefore the infant must interpret the intent of the action (Moore, 1999).

Upon examination, other definitions of the behaviour may provide a more convincing argument for the use of joint attention as a measure of intersubjective abilities. According to these data, the fact that the infant follows gaze direction, and thereby creates a situation in which both the adult and infant are simultaneously looking at the same object, does not provide any indication that the infant is aware that he or she is looking at the same thing. There is no confirmation by the infant through eye contact with the adult during or after the fact that would indicate that the attention to the object is shared on a mental level (Tomasello, 1995).

A convincing demonstration of a sharing of mental states would involve more than just similar visual direction. However, it is possible that gaze following is the first step in the continuum of joint attention development. If adult head turning is an innate cue that triggers gaze-following, then it may be the basis on which infants learn that following the signals provided by an adult leads to the viewing of interesting sights (Baron-Cohen, 1994; Corkum & Moore, 1998). Once they learn that adult signals lead to the viewing of interesting sights, infants begin to attend to head-turning and other actions (e.g. gestures) that also lead to the viewing of interesting sights. Beginning with head turning and similar actions, infants may come to generalize across gestures, and this way form a bias to attend to adult's intentional behaviours in order to supply an unending

source of novel sights (Moore, Angelopoulos & Bennett, 1997). The infant, over time, may then progress to a level of initiating the event with an adult.

There is a difficulty inherent in this interpretation, however, as conditioning does not necessarily imply comprehension. Also, the presence of an innate desire to follow head turns does not guarantee that simultaneous sharing of attention will follow. Perhaps the support of a responsive caregiver is beneficial in stimulating the process. If shared attention is to be considered as a behaviour that incorporates an understanding of intention, it would require the sharing of the experience within a social interaction with another individual. The more supportive the individual, perhaps the more likely a mutual sharing would be achieved.

Phase 2: Passive Joint Attention

Bakeman and Adamson (1984) have identified a form of joint attention in which the adult takes an active role to ensure shared attention. This form of joint attention is facilitated and supported by a responsive caregiver who monitors the infant's visual attention and promotes the infant's gaze upon objects. The infant either attends to an object because he or she is otherwise unfocused and cued to attend by the actions or vocalizations of the adult, or the adult joins with the infant in focusing on an object with which the infant is already visually engaged. However, in both situations, the infant gives no indication that he or she is aware of the adult's presence (Bakeman & Adamson, 1984). Called passive joint attention because the adult initiates and supports the interaction, this behavior does not persuasively demonstrate intersubjective skills on the part of the infant as the infant does not follow or monitor the adult's attention to the object. However, it is thought that future skills in joint attention will benefit from the

practice supplied by the conscientious mother. While observing natural play sessions between mothers and their infants, Bakeman and Adamson (1984) found that attentive mothers often engaged their six-month-old infants in sustained episodes of passive joint attention, thereby facilitating their infant's skills in this ability. By using familiar and predictable interactive patterns and emotions as a guide, the adult invited the infant to join the interaction. With support, infants at six months could alternate gaze between the mother and object, a level of joint attention not normally seen until one year of age. It has also been documented that lack of support from a caretaker can have adverse effects upon the development of joint attention. Parents who consistently provide little support tend to have infants with lower levels of joint attention in later infancy (Bakeman, Adamson, Konner, & Barr, 1990; Raver & Leadbeater, 1995).

Studies have also linked maternal sensitivity during early episodes of infant passive joint attention to later language abilities. The maternal behaviours of attending to and commenting upon an object the infant was focused upon, or introducing an object when the infant was unfocused, were found to predict enhanced language comprehension for 9 to 15-month-olds. Detrimental effects were found for mothers who consistently introduced new objects while the infant was focused upon a different object (Baumwell, Tamis-LeMonda, & Bornstein, 1997; Tomasello & Farrar, 1986). The interrupting of an infant's focus upon an object resulted in a reduced ability to learn specific words linked with the objects in question. It was theorized that this effect was due to the additional cognitive demands of redirecting attention from one toy to another being placed upon these infants. Situations in which the adult joined into the already established attentional focus increased word comprehension.

A similar study also measured infant joint attention based upon whether the adult usually joined into the attentional focus of the infant, or typically shifted the infant's attention to another object (Saxon, Frick, & Colombo, 1997). Reasoning as Tomasello and Farrar (1986) had, they hypothesized that joint attention would be more prevalent in situations in which the adult entered into the existing object attention of the infant than if the adult typically switched the infant's attention to an alternate object. Studying 6 and 8-month-old infants, these authors were unable to show an increase of joint attention linked to maternal support. However, Saxon and his colleagues suggest that infants younger than 9 months may not be cognitively able to represent the attentional focus and intentions of the adult and therefore are unable to complete the task regardless of adult support.

While this may be so, it is interesting to note that this study was conducted in a laboratory setting, where the mothers were placed in a very structured environment and instructed to play naturally with their infant. Adamson and Bakeman (1984), Baumwell (1997) and Tomasello and Farrar (1986) were successful in demonstrating maternal supportive effects utilizing play sessions videotaped in the infant's home environment. Naturally occurring play interactions may be captured better in the home as they occur throughout the normal course of a day. Caregivers placed in a laboratory setting and instructed to stage a normal play session may feel pressured to perform and may be more likely to vary their typical behavior (O'Brien, Johnson, & Anderson-Goetz, 1989). Infants may sense the difference in their caregiver's demeanor and also alter typical patterns of interaction, lowering the occurrence of joint attention behaviours. While the procedure of videotaping alone can cause differences in behavior, the addition of an unfamiliar setting, coupled with instructions suggesting expected behavior is much more

likely to have an impact on results (Adamson & Bakeman, 1991). The findings of Saxon and his colleagues (1997) may be due in part to the laboratory setting in which joint attention was assessed, which may have hindered the infant's demonstration of joint attention.

Phase 3: Coordinated Joint Attention

A last behaviour to be discussed is one which seems most closely to demonstrate intersubjective abilities, and one which builds upon the abilities of passive joint attention and gaze following. According to Tomasello (1995) joint attention is a social phenomenon involving two individuals attending to the same object in time, and aware of each other's focus on that same object. The key element of the definition is the awareness the child displays of the adult's focus of attention. If a child can understand what an adult is attending to by simultaneously alternating his or her vision between the object and the person without adult provocation, and then enter into a joint attention interaction with them, it follows that the infant must comprehend something of the adult's intent. In doing so, he or she implies an understanding that the adult is a person, not an object, with separate intentions from themselves. These intentions involve choosing what to attend to, and what to ignore in a way that is directed to achieving a goal (Tomasello, 1999). The infant perceives the adult as intentionally attending to an object and can choose to share that attention. Sometimes referred to as "coordinated joint attention" (Bakeman & Adamson, 1984), it is thought that this ability does not fully emerge until the infant is around one year of age. Most theorists assert that by this time the simultaneous monitoring by an infant of an adult and an object implies the presence of the intersubjective skills. Although there is no direct evidence, this is the age at which a

group of phenomena appear which would seem to require intersubjectivity, such as social referencing (Walden & Ogan, 1988) and deferred imitation (Meltzoff, 1988). In addition, coordinated joint attention has been linked to later language development, an ability that requires symbolic representational thought (Tomasello & Farrer, 1986). Taken together as a group, these behaviours all appear to be slightly different permutations of a similar process: the infants understanding of others as intentional agents with separate goals that can be entered into or shared.

In other research with infants from a younger age range, various different methods have been used to attempt to demonstrate the budding understanding of others as intentional individuals whose actions are goal directed. Using habituation and preferential looking techniques Gergely, Nadasdy, Csibra and Biro (1995) as well as Rochat, Morgan, and Carpenter (1997) showed infants dots on a screen that were moving in a goal directed way: moving towards a specific destination and either detouring around an obstacle or chasing another dot. Infants remained habituated if the movement of the dot was goal oriented and became dishabituated if the dot moved in a random way. In other words, attention was directed to the movement of the dot if the movement appeared intentional. This preference for intentional goal directed movement underscores the possibility that at this age there may exist an understanding of the concept of intentionality. As such, Tomasello (1995) suggests that coordinated joint attention reflects this understanding and is qualitatively different from gaze following or passive joint attention in that it requires the infant to be able to mentally represent the adult as a separate being in order to perceive the attentional focus and intentions of the other. This is a cognitive ability not found in younger infants.

Tomasello (1999) also argues that the arrival of the understanding of intentionality around one year of age is supported by Piaget's theory of cognitive development, which describes specific cognitive skills developing between 9 to 12 months of age that would facilitate the representational skills required by joint attention. The first, called object permanence, is the ability of an infant to mentally represent objects as continuing to exist, even after they are removed from sight. The second development is means-end thinking which is the intentional selection of a method to achieve a desired result. Together these cognitive advances allow the infant to mentally represent the adult's intention, then choose a means (simultaneous monitoring of adult and object) in order to achieve the desired end (joint attention to an object).

Joint attention begins to emerge between 6 and 12 months, and while most 12-month-olds are capable of initiating some episodes of coordinated joint attention, not all will perform this task routinely until 18 months of age (Bakeman & Adamson, 1984; Markus, Mundy, Morales, Delgado & Yale, 2000). Differences exist between infants as to the timing and amount of coordinated joint attention they display. It is argued here that the security of the infant within the attachment relationship will influence the timing and frequency of joint attention. If, as suggested, joint attention is socially constructed, and hence fostered by a supportive social situation, then individual differences in the timing and amount of joint attention will be related to the security of the infant's attachment. Infants with secure relationships may be better able to demonstrate coordinated joint attention.

The Importance of Affect Sharing within Joint Attention Behaviour

The role of the relationship between the adult and infant and the social nature of the infant has been an area of interest for many years. Stern (1985), and Travarthen (1976), among others, have long commented upon the infant's preoccupation with participation in interpersonal exchanges involving affect sharing during the first few months. This preoccupation continues to dominate the infant's interest until at least six months of age. It is at that time that the infant begins to dramatically increase his or her interest in objects (Adamson & Bakeman, 1985). In both situations, however, the infant is able to attend only to one aspect of their surroundings, either the interpersonal exchange or the object. Eventually the two abilities are consolidated into shared attention displayed within a social context of coordinated joint attention. As Gianino and Tronick (1988) explain, social engagement in the form of affect sharing must be achieved before object engagement can be obtained. If there are deficiencies in the social engagement of the main dyad there will be difficulties encountered in object engagement. Rochat and Striano (1999) feel that this early development of a sense of shared experience through shared affect is a prerequisite for understanding other people's minds. Adamson and Russell (1999) have contributed to the clarification of the phenomenon of coordinated joint attention by suggesting that it is a new level of organization which includes the integration of engagement with social partners with the infant's interest in objects. With such importance being placed upon this ability, research into joint attention behaviour would be remiss to ignore this aspect of the process.

The important role social engagement plays in episodes of joint attention becomes evident when arguing against the possibility of conditioning as an explanation for the

behaviour. According to conditioning theory, what is described as a simultaneous monitoring of the adult's attention may simply be the infant glancing between the object and adult in anticipation of reinforcement of some kind from the adult (Moore & Corkum, 1994), or perhaps to see if the adult will engage in an interesting behaviour. In these instances the simultaneous checking may not be truly intended to share understanding concerning an object and would not rely on a foundation of social cognitive understanding. However, during coordinated joint attention, the timing, and coordination of the look, combined with the affect it contains, does not lend itself to conditioning effects. The infant does not look to the adult at random moments but in conjunction with an object that has surprised or pleased him or her. Also, the gaze alternation is initiated by the infant and often contains affect in regard to the situation. Further, the infant frequently continues looking at the adult as the adult shifts his or her attention to the object. All of these behaviours indicate that episodes of joint attention are occasions that contain social meanings that are shared (Tomasello, 1995).

The findings from a study by Mundy, Kaair and Sigman (1992) demonstrate that social engagement, in the form of affect sharing, plays an important role in joint attention. These researchers examined the ability of 20-month-olds to initiate joint attention with strangers. The ability to initiate joint attention is considered a greater developmental feat than simply joining into an existing joint attention episode. Initiating requires the infant to not only determine the end goal desired (to share attention to an object) but to understand that signaling their intent to the adult is necessary to begin. Somehow they must gain the adult's attention, either through eye contact, vocalizations or gestures. These two elements must occur without support from the partner. If a child is

capable of initiating joint attention it follows that they have a firm grasp of the ability. Mundy and his colleagues (1992) utilized the Early Social Communication Scales, a measure of joint attention designed to elicit episodes of joint attention from an infant in the presence of a stranger. Mundy and his colleagues investigated, in particular, whether infants would use more affect in conjunction with episodes of joint attention versus requesting behavior (a behaviour that also involved eye contact in regards to an object). Requesting behavior served the function of informing the adult that assistance was required to obtain an object. Joint attention was defined as an invitation on the child's part, using eye contact, to share in the observation of an interesting sight. After making eye contact with the adult, the child alternated his or her gaze between the object and the adult. Results indicated that nonverbal joint attention behaviours differed from requesting in the amount of positive affect contained in the interaction. The authors suggested that based upon this exchange of affect, the act of joint attention may serve as an observable measure of intersubjective development. One interpretation of these findings, in light of attachment security and the resulting IWM, is that the infant sought to share the internal affective state associated with the experience of the toy. If the infant holds a mental representation of social partners as available for sharing internal affective states, and meets an emotionally available partner, the infant can integrate person engagement and object interest into coordinated joint attention coupled with affect sharing.

If affect sharing is to be taken as an indication of intersubjective ability, its presence becomes an important aspect of joint attention. To the extent that the open communication that characterizes a secure attachment facilitates affect sharing, it should promote the development of intersubjectivity and, in turn, joint attention. The secure

relationship should therefore not only facilitate joint attention in general, but also the ability to share affect within the context of joint attention.

<div align="center">Conceptual Framework</div>

The following conceptual framework is drawn from the preceding literature review. A diagram (Figure 1) has been developed as a pictorial outline of the concepts represented by this study.

It is proposed that the development of a secure attachment promotes affect sharing and social interchange between partners, thereby facilitating the development of the social cognitive capabilities of an infant. During the first year of an infant's life the infant learns to regulate his or her internal physiological and emotional states through the assistance of a responsive adult (See Figure 1, Primary Phase). The responsive adult (A) assists the infant (B) in this endeavor by providing both physical comfort and appropriate displays of affect in response to the infant's cues. The infant comes to learn that his or her expressions of both positive and negative emotions are met with an appropriate affective response from the caregiver which thereby encourages the flow of emotional messages (affect sharing) between the pair (C). This assists the infant in achieving a balance of internal emotional states and in feeling secure that his or her needs will be met. The regulated infant gains the ability to share affect in the flow of emotional information provided by the relationship, thereby promoting representation of the other's mental state. By the end of the first year a secure attachment has been formed, and an internal working model, or blueprint of relationships will be used by the infant to comprehend and predict other people's actions (D).

The secure attachment promoted by the responsive caretaker lays a foundation of intersubjective skills (See Figure 1, Secondary Phase), which facilitates the development of coordinated joint attention (E). The sense of security permits the infant to focus outward to objects in the environment (Line B-C). The affect sharing experienced within the mother/infant relationship facilitates the infant's developing intersubjectivity and therefore the ability to share another person's perspective within coordinated joint attention (Angle CBA).

Secure infants who have gained a foundation of affective sharing ability during the development of the secure relationship will extend the joint attention episode to include an emotional exchange with the adult (F). Eye contact combined with positive affect on the part of the infant acts as an invitation for both participants to share the affective experience of the object (Line B-A). In this way there is a combining of the coordination of attention to objects and a sharing of affective experiences (Angle ABC).

Aim of the Study

The purpose of the study was to examine the influence of the social environment on the individual variation within the development of joint attention. It was hypothesized that due to its effect on affect sharing, a secure attachment with the main attachment figure (the mother) would facilitate the development of coordinated joint attention. To test this hypothesis, the current study examined relations between the security of the main attachment relationship between the mother and infant, and both the frequencies of affect sharing and shared attention to an object exhibited by the infant. The security of the attachment between the mother and infant was assessed using a Q-Sort rating procedure (Attachment Behaviour Q-Set: Water, 1987). The frequency of affect sharing was

measured both during normal play interaction and in conjunction with shared attention. The scoring of the affect shared within a normal play interaction was to serve as an indicator of engrained relational patterns typical of the internal working model constructed by the child. Affect shared in conjunction with joint attention was hypothesized to indicate a level of intersubjectivity during the act. Measurement of affect was limited to positive affect, eye contact with smiling, as it was considered the emotion most likely to be stimulated during play. The measure of joint attention was restricted to shared attention to an object that included the non-cued alternation of attention between the object and the adult, this being the type of joint attention considered most likely to display intersubjective qualities. Infants between the ages of 14 and 17 months of age were recruited as it was theorized that cognitively, this age group was the youngest capable of participating reliably in coordinated joint attention. These measures were collected in the infant's home (to facilitate natural behaviour) during two separate situations: a) a play session arranged for the mother and infant, b) a standardized play session between the infant and an unfamiliar adult (to investigate generalization of relationship patterns to others). During the play session with the mother the frequency of both affect sharing (infant eye contact with the mother combined with smiling) and coordinated joint attention (the monitoring of the mother's attention by the infant) were scored. During the play session with an unfamiliar adult, the frequency of both affect sharing (infant eye contact with the adult combined with smiling) and initiated joint attention (monitoring of the adult's attention, initiated by the infant) were scored.

Hypotheses

On the basis of the hypothesis that a secure attachment relationship will facilitate affect sharing and in turn the development of joint attention, it is predicted that:

1. Infants who are more secure in their attachment relationships will a) exhibit higher frequencies of joint attention with their main caregivers during a play episode; b) exhibit higher affect sharing during episodes of joint attention with their main caregiver; c) exhibit higher frequencies of joint attention with a stranger during play and d) exhibit higher affect sharing during episodes of joint attention with a stranger, than infant who are less secure in their attachment relationships.

2. Infants who display a higher level of affect sharing with their main caregiver during a play episode will a) demonstrate higher security in their attachment relationships with their main caregiver; b) exhibit higher frequencies of joint attention with their main caregiver during play; c) initiate more episodes of joint attention with a stranger during play and d) share more affect with a stranger than infants who exhibit a low level of affect sharing with their main caregiver during a play episode.

3. It is expected that the amount of coordinated joint attention and affect sharing with the main caregiver during play, along with attachment security, will make unique contributions to the prediction of the amount of a) joint attention and b) affect sharing with a stranger during play.

Definitions of Relevant Terms

1. Main Caregiver: An adult (18 years or older) who was the biological mother of the infant.

2. Infant: An infant between the ages of 14 and 17 months of age who was in the care of the main caretaker.

3. Stranger: The female experimenter who would be unknown to the infant and would interact with the infant during the course of the study.

Assumptions

The assumptions upon which this study was based included: (1) the infant had one main attachment figure; (2) the mother was the main caregiver and the main attachment figure for the infant. In our society the mother is most often the prevalent caregiver of the infant and as so was considered to be the main attachment figure for the infant for the purposes of this study.

Methods and Procedures

Design

This correlational study examined the relationship between attachment security, affect sharing and joint attention abilities. As it would be unethical to manipulate the development of a secure attachment, an experimental design was not used. The variables were coded from naturalistic and structured play sessions.

Participants

A convenience sample of mothers with 14 – to 17-month-old infants were recruited through the enlistment of volunteers. Participants were located through the use of posters (n =10), birth announcements (n = 2), previous research project participation (n = 22), and snowball sampling (n = 6). A small toy for the child and framed "graduation" certificate with infant photograph taken in "cap and gown" were offered as incentives for participation.

A total of forty mothers with their infants participated in the study. One dyad failed to complete the second home visit (due to medical complications). The majority of the participants were Caucasian (n = 33). Most were well-educated, with 82.5% of the sample having completed some university (n = 10), earned a bachelor degree (n = 17), or earned a post graduate degree (n = 6). Almost one half of the sample (42.5%) reported an average total family income exceeding $60,000 per year. Another 50% reported between $25,000 to $59,000 per year. The majority of the mothers reported white-collar employment (60%), with another 27.5% having opted to stay at home with their children on a full-time basis.

The majority of the biological infants were fourteen and fifteen months old (Mean: 15 months 21 days; SD: 1.01). The sample consisted of 20 boys and 20 girls. A separate information sheet was completed with each subject to determine sex, number of siblings and number of words spoken (See Appendix A), as literature has indicated these variables can be correlated with joint attention performance (Adamson & Bakeman, 1991). Most of the infants were only children (67.5%) with 27.5% having one older sibling. It was noted that 90% of the infants spoke only a few words (0-29 words).

<div align="center">Setting</div>

The study consisted of two visits to each participant's home. During visit one, a structured play session with the experimenter was completed at either a kitchen or dining room table. During visit two, an unstructured play session between the mother and infant was held in the area of the home in which the child typically played. Both of these play sessions were videotaped for later coding. Mothers were discouraged from having visitors during the procedure.

Measures

Attachment Behavior Q-Set (Version 3.0)

The Attachment Behavior Q-Set (AQS) (Waters, 1987) is a measure of attachment security for infants (Waters & Deane, 1985; Vaughn & Waters, 1990). A somewhat new measure of attachment security, it has been used in research with mainly middle-class, normally developing populations. It has proven to be a reliable measure with moderate to strong correlations (.72 to .95) for intercoder agreement. Validity tends to be moderate, with the AQS corresponding to maternal sensitivity more so than the strange situation. However, studies have reported its ability to classify infants as secure or insecure as measured by the strange situation (Solomon & George, 1999). Conducted in the infant's home environment, the measure reflects the diverse behavioral patterns of responsiveness. The AQS produces a score which falls along a continuum of security, thereby reducing the tendency of the infants to be rated using the limited categories of secure versus insecure. The range of scores permits subtle variations within the categories to influence findings thereby reducing the need to seek out infants that represent both insecure and secure categories. The scoring is completed after an individual, who has knowledge of attachment theory, completes observation periods in the home. On the basis of two, two-three hour observations, ninety descriptive statements are sorted by the observer into nine piles of ten behavioural descriptors each, weighted from most characteristic to least characteristic of the observed relationship. A measure of attachment security in the form of a correlation score is calculated by comparing the child's Q-sort with a criterion sort of a securely attached child. The behaviors are clearly described with specific contexts included. Experimenter expectancies are controlled by the nature of the

Q-sort procedure. Sorting requires that ten items at the most be placed in each pile. This procedure guards against the sorter placing an overabundance of items either too high or too low in the sort. Such an error could result in the findings confirming the experimenter's bias.

The Q-sort was completed on thirty-nine of the forty dyads observed (insufficient observation was completed on one dyad as they did not complete the second visit). A volunteer graduate student, blind to the hypotheses of the study, was trained in the Q-Set procedure and allowed to view videotaped mother/infant and experimenter/infant play sessions for ten randomly selected infants. Inter-rater reliability was established using the Q-Stat 2 program supplied by the author of the measure. A correlation agreement score of $r = .95$ was achieved.

The Early Social-Communication Scales (ESCS)

The Early Social-Communication Scales (ESCS): (Mundy, Hogan, & Doehring, 1996) are scored from a structured play observation designed to measure the non-verbal communication abilities of infants between 8 and 30 months of age. An unfamiliar adult, during a sequential presentation of specified toys and activities, elicits the communication abilities of the infant by presenting toys just out of reach of the infant. The majority of toys are wind-up, providing movement to stimulate interest. The session lasts approximately twenty minutes and is videotaped for later coding. To date, the ESCS has been used in research with both normal and developmentally delayed samples and has been found to be both a reliable and valid measure (Mundy, Sigman, Kasari, & Yirmiya, 1988).

Joint attention with a stranger.

Three major communication skills are identified by the ESCS; joint attention, requesting behaviour and social interaction. For the purposes of this study, only joint attention measures were coded from the complete ESCS taping. Within the joint attention classification there are two categories, initiating joint attention and responding to joint attention. As 'initiating joint attention' most closely matched the definition of coordinated joint attention, only this category was used. Initiating joint attention is defined as eye contact with the experimenter while either touching an inactive toy, or alternating a look between an active toy and the experimenter's eyes. Infant pointing combined with eye contact is included within the category of initiated joint attention but was excluded due to its infrequent occurrence. Joint attention was scored as a total frequency from the videotape of the session using a shortened form of the score sheet provided with the ESCS (See Appendix C). A volunteer graduate student coded joint attention for ten randomly selected sessions (approximately one quarter of the sample). Inter-rater reliability was determined using intra-class correlations (ICC) which were determined to be more appropriate than Kappa for frequency data. This measure, which is related to the Spearman-Brown measure, partitions the variance into variance explained by raters, variance explained by the infants observed and error variance (Ottenbacher, 1995; Bakeman, & Gottman, 1986). An agreement score of .96 was achieved.

Affect sharing with a stranger. Affect sharing with the unfamiliar adult was also coded from the videotape of the ESCS session. Affect sharing with the unfamiliar adult was defined as infant eye contact with the experimenter during the play session, combined with infant smiling (upturned corners of the mouth). Each instance of smiling

was further categorized as occurring either during a joint attention episode or during social interaction/game play. Intra-class correlations were computed to determine reliability. An agreement score of .98 was reached using ICC for the scoring of both affect sharing that occurred during joint attention and affect sharing that occurred during social interaction/game playing.

Play Session with the Caregiver

A 15 to 20-minute videotape of a natural play session between the mother and infant was videotaped. Novel toys were provided for the session. Initially, for standardization reasons, only the center 10 minutes of each recording were to be used to code instances of joint attention and affect sharing with the main caretaker. However, after determining that the behaviours under study were occurring at very low frequencies, it was decided that the first five minutes of the play session would also be coded in order to increase possible observations of the target behaviours. To standardize the observations, and since all tapings ran between 16-20 minutes in length, only the first 15 minutes were coded. Joint attention and affect sharing were coded according to the following definitions:

Joint attention with the main caregiver (Bakeman and Adamson, 1984). The frequency of infant coordinated joint attention to toys was coded using Bakeman and Adamson's (1984) joint attention coding scheme. Coordinated joint attention was defined as instances in which the infant looked back and forth between the mother and toy during play, and where the mother did not cue the gaze alternation. If the infant looked back and forth multiple times in sequence, it was counted as one incident. If there was a delay of one second within a sequence, it was counted as more than one incident. Joint attention

was also recorded for instances in which the infant responded to an unplanned sound, such as the telephone ringing or a family member entering the room. These were not considered alerting responses as the infant was not alarmed; the situations were familiar, and eye contact from the infant alternated between the event and the mother's eyes. Intra-class correlations on ten play sessions were completed to determine reliability. Using ICC an agreement score of .96 was reached matching the reliability score for joint attention with a stranger.

Affect sharing with the main caregiver. The frequency of affect sharing was measured by noting the instances during play in which the infant directed gaze at the main caregiver, combined with smiling (upturned corners of mouth). It was further noted whether the sharing occurred either during coordinated joint attention as defined on the previous page, or during social interaction/game playing, in which the face of the partner or ritual of a game was the focus (for example turn taking or teasing). Intra-class correlations resulted in agreement scores of .96 for affect sharing during the play session outside of joint attention, and .84 for affect that was shared during episodes of joint attention.

Procedure

Visit One

Each family was contacted by telephone to have the procedures explained and two convenient in-home visits were arranged. On the first visit to the home, which lasted for two to three hours, the experimenter explained the consent forms, ethical guidelines, and the procedure of the visits. Consent forms (Appendix B) were then completed. To be eligible for the study, the adult participant was required to be the

biological mother of the infant. To ensure the likelihood that she was the main attachment figure, she was to be the person most responsible for the infant's care. The infant was to be full term and free of any known neurological and sensory abnormalities. Sex of the infant, the presence of siblings and language abilities were recorded. A demographic questionnaire confirmed the above information (See Appendix A). All participants met the above requirements.

The Early Social-Communication Scales (ESCS); (Mundy, Hogan, & Doehring, 1996) were administered first. This measure takes the form of a play session and is designed specifically to elicit incidences of joint attention and early communication skills through the structured presentation of toys to the infant by the experimenter. The play session was videotaped using a camcorder mounted on a tripod. This concluded the formal session of the visit. The remainder of the time was spent observing social interaction between the mother and infant as the experimenter put away the ESCS toys and recording equipment. Casual conversation between the experimenter, mother and infant was encouraged. As recommended by the author of the measure, the observer compiled notes detailing aspects of the social interaction both during and immediately after the visit to assist with the completion of the Attachment Behavior Q-Set (AQS) (Waters, 1987). This is a measure of attachment security designed for use in the infant's home environment.

Visit Two

The second visit was conducted within one or two weeks of the first visit and lasted two to three hours. Prior to the visit, the participant was contacted by telephone to re-confirm consent to participate. The visit began with a one-hour long period of

observation to allow the mother and infant to readjust to the presence of the experimenter. Informal conversation with the mother and infant was encouraged. This was followed by a 15-20 minute videotaped play session between the mother and the infant, using toys novel to the infant as well as toys from the ESCS procedure. Although the camcorder was mounted on a tripod the experimenter remained in the room to monitor taping and attempted to appear absorbed in reading material so as not to draw attention from the infant. If a sibling was present, the experimenter occupied the sibling nearby. At the end of the visit, the mothers were notified that a summary of results detailing group findings (not individual) would be mailed to them after thesis completion. Notes detailing the mother-infant social interaction were compiled both during and after the visit. Within 24 hours of the second visit and after reviewing all of the notes, the observer completed the Attachment Q-Set.

<div align="center">Ethical Considerations</div>

Consent for this study was obtained from the thesis committee, and the University of Manitoba, Faculty of Human Ecology, Ethics Review Committee. Participants were provided with both written and verbal explanations of the procedure to ensure informed participation and all parents were required to sign ethics approved consent forms. The responsibility of the experimenter to report suspicions of child abuse or neglect was explained to the parent. Confidentiality was ensured by assigning participants identity numbers, and further by keeping all data that was collected in a locked cabinet. Participants were notified that they could withdraw from the study at any time without penalty. Children were not forced to participate if they become uncomfortable with any testing procedures.

Results

Descriptive Statistics for Study Variables

Attachment Behavior Q-Set (Version 3.0): After the calculation of scores utilizing the Q-Stat procedure provided by the author of the measure, it was found that all infant scores correlated in a positive way with the criterion sort of a securely attached infant (mean r = .65, SD = .22, range = .10 - .94) Q-Sort. The distribution however, was skewed to the left and tended to be platykurtic (See descriptive statistics of study variables in Table 1).

The Early Social-Communication Scales (ESCS): While scores varied widely, all infants demonstrated joint attention with the experimenter during the ESCS procedure to a varying degree (Mean = 12.1; SD = 6.81; Range: 3 – 28). The distribution was skewed to the right but was only slightly platykurtic.

While all of the infants participated in joint attention during the ESCS, this was not the case for affect sharing with the experimenter. Some infants did not display positive affect during the taping of the ESCS procedure. However, these infants were in the minority and most displayed positive affect at some time during the procedure: Affect shared during joint attention (Mean = 5.1, SD = 5.34, Range = 0-20); Total affect shared during the ESCS (Mean = 21.2, SD = 13.8, Range = 0-58). Both distributions were leptokurtic, with the distribution of affect sharing during joint attention moderately skewed to the right (See Table 1).

Coordinated Joint Attention with the Main Caregiver: During the play session with the mother infants were observed to have a range of coordinated joint attention scores. Overall the amounts were less than joint attention shared with the experimenter during the ESCS. The majority of the infants scored at the lower end of the frequency

distribution so the data was excessively skewed to the right and appeared leptokurtic (Mean = 8.9, SD = 8.49, Range = 0 – 36) (See Table 1).

Affect Sharing during Play with the Main Caregiver: Similar to the infants' performance with coordinated joint attention, the majority of infants displayed low frequencies of total affect sharing. Affect shared during the play session including social interaction and game playing resulted in a mean of 6.1, standard deviation of 6.34 and range of 0-19. Affect that was combined with joint attention resulted in a mean of 3.0, a standard deviation of 3.92 and a range of 0-14 occurrences. The distributions were excessively skewed to the right and appeared both platykurtic (affect sharing with mother) and leptokurtic (affect sharing combined with joint attention) (see Table 1). Questions were raised as to whether the experimenter's presence behind the camera, as opposed to playing nearby with a sibling, affected the infant's behaviour. A t-test revealed a significant effect of lowered affect sharing when the experimenter was present, despite attempts to remain unobtrusive.

<div align="center">Preliminary Data Analysis</div>

A sample size of 137 infants was required to detect a medium population effect size of .30 using three predictors in a multiple linear regression with an 80% probability (using a two-tailed significance level of .05). In the case of bivariate correlations, a sample size of 88 infants is required to detect a medium population effect size of .30 with an 80% probability (using a two-tailed significance level of .05). As this was not possible, given time and resource constraints, data was collected from 40 infants which reduced the power to a 30% probability of detecting a significant finding for multiple linear regression and a 50% probability of detecting a significant finding for bivariate

correlations. These probabilities were further reduced for the bivariate correlations, as the established alpha of $p < .05$ (two-tailed) was then adjusted to $p < .01$ using the Bonferonni-Dunn procedure to guard against increased chances of observing significant results due to multiple correlation analyses on the same data. In some cases, the sample size was reduced to 39 due to one dyad failing to complete the study.

Bivariate correlational analyses were first computed in order to determine if possible pre-existing relationships existed between the suggested confounding variables of siblings, sex, and language ability and the variables under study. While there were three significant positive relationships noted (siblings/security: $r = .39$; $p < .05$, siblings/joint attention with mother: $r = .32$; $p < .05$ and words spoken/joint attention with mother: $r = .33$; $p < .05$) these relationships failed to retain significance after adjusting the alpha to account for multiple correlations. When these variables were further analyzed using partial correlations, no significant effects were reported. These variables were dismissed as possible confounding variables for this study.

Analyses were to involve both bivariate correlations to determine whether the variations of one variable were associated with the variability of another, and multiple regression to specify the degree to which the variability could be explained by the related variables. The correlational analyses utilized for data analyses in the present study required the data to meet a number of assumptions which included: random sampling of participants, interval level variables, normality, linear relationship between variables, and data that was free of outliers. The proposed multiple regression analysis required the above-mentioned constraints and in addition homogeneity of variance, and independence of observations.

Due to resource limitations, a random sampling of participants was not possible. The sample consisted of volunteers, and the recruitment of previous research participants. This creates the limitation of generalization to similar populations, however, it should not adversely affect actual data analysis integrity. In actuality, not all samples drawn at random from a population will be identical to the population. Further, it is often the case in social research that random sampling is not possible and therefore this requirement is widely violated and ignored (Polit and Hungler, 1999). While this method of sampling is not as desirable as a random process, to reject the findings from the present study on this basis would be to reject the findings of many previous research efforts in this area. It should be sufficient to exercise caution when considering the results of the study.

Another requirement was the assumption that the variables under study are normally distributed in the larger population. In order to determine the univariate normality of each of the seven variables involved, frequency distributions were examined for shape and obvious outliers. Although the Statistical Package for Social Sciences (SPSS) had statistical indexes available to determine whether the shape of the distribution deviated significantly from a normal distribution, these were not computed. It is the case that most parametric tests are considered robust to deviations from the normality assumption, provided the deviations are not extreme, and therefore a visual inspection of graphs is sufficient (Polit and Hungler, 1999). Unfortunately, upon inspection, the majority of the variables were found to be quite positively skewed, varied from normal kurtosis, and four of the variables showing possible outliers.

With concerns raised as to whether these deviations equated to a gross violation of the normality assumption, a bivariate examination of the variables was undertaken. By

visually inspecting the bivariate scatterplots, it became apparent that many of the plots displayed wide scatter in addition to possible linear relationships.

Upon consideration, and in an endeavor to meet the required assumptions, it was decided to transform the variables in order to make the univariate distributions more closely approximate a normal distribution. It is often the case that raw data requires transformation before it is acceptable for statistical analysis. Also, while it is important to measure variables on the highest measurement scale possible, at times it is appropriate to convert data to a lower level of measurement (Polit and Hungler, 1999; Norusis, 1998). Using the analysis capabilities of the SPSS software program, all seven variables were transformed from discrete ratio-level data to lower level ranked scores.

Lowering the level of measurement of the variables required reconsideration of the methods chosen for data analysis. While the Pearson correlation coefficient was appropriate for the original data, the Spearman correlation coefficient, a nonparametric alternative, was ideal for the ranked data. As for the multiple regression, it was decided to undertake the analysis with the ordinal data. While in the strictest sense only continuous interval or ratio level data is acceptable for multiple regression analysis, there are many research articles that support the use of a lower level measurement, such as ordinal. It is stated that the ordinal scale is a continuous measure in that it expresses gradations that have meaning; that is more or less of a particular attribute and it is therefore appropriate for linear regression (Norusis, 1998; Pedhazur, 1982). Given this assurance, the data was transformed to an ordinal (ranked) scale. The resulting univariate distributions and bivariate scatterplots were visually analyzed. The ranked data more closely approximated

normal distributions with no outliers for all seven variables. In addition, the scatterplots revealed stronger linear relationships, with reduced random scattering of points.

Next, the additional assumptions required by multiple regression were addressed by examining residual scatterplots, normal probability plots, and histograms of the standardized and studentized residuals. Although it was considered possibly advantageous to use the ranked data in place of the raw scores, tests for the assumptions were applied to both sets of data for comparison. Regression assumptions require residuals to be a) normally distributed; b) residual variance should be the same for all values of the independent variable; c) there should be no pattern when plotted against the predicted values; and d) successive residuals should be independent. Also, variables should be inspected for missing data, multicollinearity and outliers (Norusis, 1998).

The distributions, probability plots and scatterplots of the standardized and studentized deleted residuals were examined for normality. All of the distributions met the requirements except for slight deviations from normal distributions noted for the raw data. As noted previously, however, as long as the normality assumption is not badly violated, the results of the regression analysis will not be seriously affected (Norusis, 1998).

To check whether the variance of the dependent variable was the same for all values of the independent variable, studentized residuals were plotted against predicted values, using scores from both the raw and transformed data. Variance is constant if no pattern emerges in the data points. There were no patterns observed for the scatterplots examined, indicating that this assumption was met by both the raw and ranked data.

Next, studentized residuals were plotted against the independent variables in the regression model to test linearity. The majority of plots revealed no relationships. However, once again, two of the plots using the raw data residuals revealed a very slight relationship between affect sharing with the main caregiver and both ability to initiate joint attention and share affect with a stranger r = .10. This raises some concern as to the strength of the linearity in this data set.

Independence of the successive residuals was assured after the studentized residuals for both the raw and ranked data were plotted against the sequence of observations. No significant relationships were found and the Durbin-Watson test reported all scores between 1.7 and 2.2. This test of correlations between successive residuals has a range of 0 to 4. Values between 1.5 and 2.5 are considered acceptable (Norusis, 1998).

The Cook's distance statistic was used to identify outliers. This test uses both the studentized residual and the leverage values. It measures the change in all of the regression coefficients when a case is eliminated from the analysis (Norusis, 1998). After analysis of the probabilities for the Cook's distances two outliers of concern were identified for the raw data. Given such a small sample size, deleting these cases was not considered prudent. As a result, the regression analysis using the raw data would contain outliers.

Next addressed was the issue of multicollinearity for the data. By definition, multicollinearity is a problem of independent variables being very highly correlated. When variables are correlated at about .70, multicollinearity is a slight problem. This situation becomes a serious problem, when variables are correlated above .80 (Norusis,

1998). An examination of a correlation matrix for both the raw and transformed data revealed one correlation within the .70 range (total coordinated joint attention with total affect sharing with the mother). Collinearity was considered a slight problem for the data. After running the collinearity diagnostics on the regressions, concerns were appeased. All tolerance scores, which indicate the strength of the relationships between predictors, had values of at least .36 or higher. If tolerances had been less than .1 a problem would have been indicated (Norusis, 1998). Multicollinearity was dismissed as a concern for both the raw and transformed variables.

At the completion of the diagnostics, and in an effort to provide a basis of comparison between the levels of measurement, it was decided to utilize both the raw and transformed data for the bivariate and multivariate analyses and report both sets of findings. To lend further support to the decision to utilize the raw data despite difficulties with normality and linearity, it is reiterated that literature suggests regression is robust to the point that even a fairly substantial departure from the assumptions in general does not effect its ability to closely identify the true populations relationships (Dometrius, 1992; Cohen and Cohen, 1983). With this claim stated, neither the use of the original or transformed data was expected to raise concerns.

<u>Hypothesis One</u>

All calculations had family-wise significance rates set at alpha .05 (adjusted to p<.01 using the Bonferroni Dunn Procedure due to numerous correlations) and were two-tailed. A two-tailed test was preferred to a one-tailed as this area of research is somewhat unprecedented and a conservative approach was preferred. Four Pearson product-moment correlation coefficients and four Spearman Rho correlations were calculated to determine

the direction and magnitude of the relationship between the level of attachment security and a) frequency of joint attention with the main caregiver; b) frequency of affect sharing during episodes of joint attention with the main caregiver; c) frequency of joint attention with a stranger and d) frequency of affect sharing during episodes of joint attention with a stranger.

As presented in Table 2, it was revealed that infants in the age range of 14 to 17 months who were more secure in their attachment relationships exhibited a higher frequency of coordinated joint attention ($r = .44$, $r_{(s)} .49$, $p < .01$)) and affect sharing during joint attention ($r = .46$, $r_{(s)} = .53$, $p < .01$) with their mother during a play episode in relation to infants who were less secure in their attachment relationships. Attachment security was not found to be significantly related to joint attention or affect sharing during joint attention with a stranger. There was a tendency for infants who were more secure in their attachment relationship to exhibit more affect sharing during joint attention with a stranger ($r = .32$, $r_{(s)} = .34$, $p < .05$) however alpha was greater than .01. The relationship between attachment security and joint attention with a stranger was not significant at either alpha level.

Hypothesis Two

Four Pearson product-moment correlation co-efficients and four Spearman Rho correlations were calculated to determine the direction and magnitude of the relationship between the amount of affect sharing with the main caregiver and a) the level of attachment security; b) the frequency of joint attention with the main caregiver; c) the frequency of joint attention with a stranger; d) the frequency of affect shared with a stranger.

As documented in Table 2, significant relationships were discovered. Infants who had a high frequency of affect sharing with their main caregiver during the play episode demonstrated higher security in their attachment relationship ($r = .50$, $r_{(s)} = .50$, $p < .01$), had higher frequencies of joint attention with their mother during a play session ($r = .79$, $r_{(s)} = .78$, $p < .01$), had more episodes of joint attention with a stranger ($r = .59$, $r_{(s)} = .53$, $p < .01$) and shared more affect with that same stranger ($r = .69$, $r_{(s)} = .58$, $p < .01$) than infants who exhibited less affect sharing with their main caregiver.

Hypothesis Three

Predictive relationships were examined by applying stepwise multiple linear regressions to assess the relative contributions of joint attention, level of attachment security and affect sharing with the main caregiver during the play session to the prediction of a) the infant's ability to initiate joint attention with a stranger (see Table 3) and b) share affect with a stranger (See Table 4). Stepwise regression provided a method by which all of the potential predictors were considered in determining which combination of variables provided the greatest predictive power.

In the first analysis the variables of security, affect sharing with mother and joint attention with the mother were regressed with the frequency of joint attention demonstrated with a stranger (Hypothesis 3a). Only coordinated joint attention remained in the model. It was revealed that the frequency of coordinated joint attention demonstrated by an infant with his/her mother during a play session accounted for 42% (raw data) or 39% (ranked data) of the variability in the amount of joint attention the infant entered into with a stranger during a play session (see Table 3). The variables of

affect sharing with the mother and attachment security were not significantly predictive and excluded from the model.

The second analysis involved regressing the variables of infant security, joint attention, and affect shared with the mother with the level of affect sharing the infant entered into with a stranger (Hypothesis 3b). The number of predictor variables included in the findings were found to be different for the two types of data. When utilizing the raw data only affect sharing remained in the model. It was revealed that the amount of affect sharing episodes an infant participated in with his/her mother accounted for 47% of the variability in the amount of affect sharing episodes the infant entered into with a stranger. When considering the ranked data, both affect sharing and security remained in the model. The frequency of affect sharing between infant and mother, combined with the infant's level of attachment security, accounted for 41% of the affect the infant shared with a stranger during a play session. (affect shared 33%, security = 8%; see Table 4).

Discussion

It was the purpose of this study to draw attention to the potential influence of the attachment relationship upon the development of intersubjective abilities. The findings of this research study indicate medium to strong relationships exist between both attachment security, affect sharing and the infant's ability to demonstrate joint attention behaviour with others. This research is at the forefront of a growing debate concerning the influence of social factors upon the individual development of joint attention. The following discussion will explore these findings, emphasizing the social aspects of joint attention behaviour.

The first hypothesis explored the possible relationship between attachment and the ability of the infant to enter into joint attention episodes with his or her main caretaker and an unfamiliar experimenter. It also was investigated whether the more securely attached infant would be more likely to combine affect with these same joint attention episodes. As the results indicated, attachment security was significantly related in a positive way to the number of episodes of joint attention observed in an informal play session with the mother. Further, infants who scored higher levels of security also were more likely to share affect with their mother in conjunction with the joint attention. These effects did not carry over to play sessions with the experimenter.

While the correlations were not strong, these moderate relations are worth noting, given the small sample size. Power analysis predicted a fifty percent chance of detecting a significant finding, which was further reduced by adjusting the alpha. Consequently, the relationship between security and joint attention must have been influential in order to detect a significant relationship.

One interpretation of the significant correlation between attachment and joint attention (with and without affect) is that it reflects the outcome of the attachment relationship, or more specifically the caregiver's availability. A sense of security in the caregiver's availability is thought to facilitate exploration of the environment by the infant as the infant is secure in the knowledge that the caregiver will provide assistance if required. This exploration of the environment promotes possible encounters with objects (an essential ingredient for the act of joint attention). Couple infant object encounters with a responsive and attentive mother typical of the secure attachment relationship, and increased joint attention is the result.

This finding also lends support to the notion that a secure relationship may facilitate the development of a certain level of intersubjectivity during infancy. The repeated patterns of interaction, which are generalized and stored within the memory of the infant (Stern, 1985; Waters and Cummings, 2000), are used to anticipate the actions of the other in an insightful and predictive way. Synchronized into the internal working model the IWM provided a representational basis of interpreting and predicting future interchanges with others (Bowlby, 1969; Bretherton, 1991). The representational abilities theorized to develop from the attachment relationship are similar to those defined by secondary intersubjectivity. Described as the ability to take the perspective of another person and predict the intent of his or her actions (Travarthen, 1979), it is this behaviour that is argued to be the foundation of joint attention abilities. If joint attention is indeed an indicator of the beginnings of social cognitive development, the infant would require a sense of others as separate beings, with intentional behaviours, which lead to outcomes that can be shared (Tomasello, 1995).

Following this line of reasoning it was not surprising that a significant relationship was found to exist between attachment security and joint attention with the mother. Yet, a similar significant relationship was not found between attachment security and joint attention with a stranger. Heidi Kern-Schwartz (1999) announced corresponding results in a recent Ph.D. dissertation. She investigated the association between joint attention (measured by the ESCS) and attachment security (measured by the Ainsworth Strange Situation) in infants at 15 months of age, and found no relationship. In another study, Claussen, Mundy, Sangeeta, and Willoughby (2000) found similar results with infants observed at 12, 15 and 18 months of age, using both the ESCS and the Ainsworth

Strange Situation. No significant relation was found between joint attention skills with the experimenter and attachment status. Interestingly, however, infants classified as disorganized did score lower joint attention frequencies during the ESCS. A disorganized classification is considered to be a more extreme disturbance in socio-emotional and cognitive development than either secure or insecure attachment. According to their findings, only infants with severe attachment disturbances experienced difficulties with joint attention substantial enough to impact social interactions outside of the attachment relationship.

The question remains as to why, in repeated research efforts, attachment is not found to be related to joint attention outside of the attachment relationship, except in extreme cases such as disorganized attachment. Perhaps the answer lies in the method chosen to measure joint attention. In order to measure joint attention with the mother in the current study, its frequency was obtained from a natural play session. The ESCS was chosen as the measurement of joint attention between the infant and experimenter. Although the definition of the joint attention behaviour in the ESCS and as defined by Bakeman and Adamson (1984) appeared similar, upon consideration, the context in which they were demonstrated actually differed widely. The joint attention coded during the play session with the mother occurred within the familiar patterns of the established relationship. With the mother given no direction except to play as she normally would, the joint attention behaviour may have been more reflective of the nature of the relationship. A responsive, nurturing mother would more likely have acted as a scaffold for joint attention skills by positioning toys within reach for exploration and providing encouraging responses once joint attention was initiated by the infant. All of these

interactions would have been housed within predictable routines. Although the definition of the behaviour included only instances in which the mother did not prompt the joint attention, a more responsive mother would be more likely to anticipate and join into the behaviour. The frequency of the behaviour in such a situation would therefore be more greatly influenced by the existing relationship. Given that the joint attention may have been more reflective of the relationship, it is not surprising that a significant relationship in the current study was found between attachment and joint attention with the mother.

Within the ESCS testing procedure a different atmosphere was present. According to standardized testing procedures, the experimenter, while not inanimate, rarely provided direct participation during play which was intended to stimulate initiated joint attention behaviour. Active toys were displayed just outside of the reach of the infant with the expectation that the infant, if capable, would enter into joint attention in regard to the object. The onus was upon the infant to initiate the process without assistance of any kind from the experimenter. Further, the experimenter was unknown to the infant and therefore familiar interaction routines are unavailable as a reference for behaviour. Given this situation, initiated joint attention during the ESCS was a greater cognitive challenge for the infant than coordinated joint attention during natural play with the mother. However, it was not the case that infants were unable to engage in joint attention with the experimenter, for they did, which demonstrates they possessed the cognitive ability to do so. It was the frequency of such that was not related to their level of security. Therefore, it may be the lack of a familiar relationship within which to act that may have resulted in the lack of significant results between the attachment score and joint attention on the ESCS.

Also noteworthy is the marginally significant tendency for more securely attached infants to engage in affect sharing during joint attention with the experimenter. When infant joint attention with a stranger (without affect sharing) was analyzed, it was not related to attachment security. However, with the inclusion of affect sharing in the definition of the variable, associations surfaced. When contemplated, this is a logical trend as attachment security is a relational concept with its assessment based upon the social interactions between the infant and his or her mother. The very purpose of the Attachment Q-Set is to measure the mother infant relationship. While it does not measure smiling directly, it contains descriptors of infant behaviours that portray a level of trust and ease of emotional communication within the relationship. This ease of emotional communication within the attachment relationship would go far in explaining the trend for infants with higher levels of attachment security to not only enter into joint attention more often with their mothers, but to be more likely to enter into joint attention combined with affect sharing with their mothers, and strangers. It would seem that an attachment measure is most strongly related to behaviours that clearly include either the attachment relationship itself, or a dyadic social aspect such as smiling. In fact, these findings appear to support the revised definition of joint attention proposed by Adamson and Russell (1999) which describes joint attention as a new level of organization which includes the integration of engagement with social partners with the infant's interest in objects. If engagement with social partners is to be interpreted as affect sharing combined with joint attention then the nature of the attachment relationship may indeed be the foundation upon which this ability is built.

This brings the discussion to the second hypothesis of the study. Anticipating the possibility that a measure of security may in fact have been too relationship specific for the purposes of the study, and recognizing the importance of affect sharing in both the development of a secure relationship and the representational skills in joint attention, the behaviour of affect sharing was selected as a variable for study. Associations were investigated between affect sharing with attachment security, joint attention with the mother or stranger, and affect sharing with a stranger.

The results from the study confirmed the suspected association between attachment security and affect sharing. As predicted infants who had a higher level of affect sharing with their mothers were more likely to have higher levels of attachment security. This finding, although medium in effect due possibly to the small sample size, replicates earlier work by researchers such as Main (1979) and Pederson and Moran (1996). Secure relationships are often described as having an open emotional flow. It was this factor drawn from the established work of these researchers, which encouraged the current study's use of affect sharing as a subset variable of the attachment relationship.

Attachment theory also states that with the repeated experiences of affect sharing with the main caretaker, comes the expectation that other social interactions in the environment will be similar (Cassidy, 1990). Encoded into the child's internal working model, this expectation promotes similar behaviour with other people. This aspect of the theory appears to be supported by the findings of this study, in that infants with higher levels of affect sharing with their mothers were also more likely to share affect with the experimenter.

Lastly, affect sharing with the main caregiver was found to be moderately to strongly related to the level of joint attention demonstrated not only with the mother, but also with a stranger during a play session. These findings may suggest that the ability of the infant to share mental states with the mother (primary intersubjectivity) is related to the ability of the infant to share attention with another person (secondary intersubjectivity). These findings also lend support to the representational versus conditioning account of joint attention behaviour. While conditioning may indeed play some part in the encouragement of joint attention behaviour; as no doubt a responsive partner praises efforts and supplies interesting sights; conditioning does not imply comprehension. The present findings suggest that infants who are more likely to share affect with their mother during social interaction are more likely to share attention with adults in general. It may be that the infant is accustomed to sharing mental states and as such is sharing the affect associated with a reaction to a situation that pleased him or her.

Before proceeding to further explanation of the findings from this study, it is important to discuss the possibility that the association between affect sharing and joint attention with either the mother or stranger resulted from both variables including eye contact as a component of their definition. It could be argued that both affect sharing and joint attention are contingent upon eye contact, and relationships between these variables may simply be due to the propensity of some infants to engage in more eye contact than others. It is a fact however, that eye contact was but one component within each definition and further, the style of eye contact differed in each situation. The definition of affect sharing specified *direct* eye contact in conjunction with *smiling*. Joint attention specified *alternating* eye contact between an object and the adult and included *no*

smiling. These are clearly separate independent variables. Further, differences exist theoretically between the variables in the intentions underlying the behaviour. Affect sharing involves an attempt to express an emotional state directly to another individual with the implied desire to share the *emotion.* Joint attention, involved eye contact alternated with an object, in an implied effort to share *attention* and thus gain information in regards to the object.

The final and third hypothesis was intended to evaluate the relative weight of each of the mother-infant variables for predicting joint attention and affect sharing with other adults in the environment. While all three variables were considered important within the equation, it was thought that security or affect sharing would prove to be the strongest predictors. Affect sharing within the mother/infant relationship provides the intersubjective skills necessary to joint attention, and the IWM within the attachment relationship determines the propensity of the infant to generalize these skills to others. The infants' affect and attention sharing behaviours with the mother, as well as their security scores were thus entered into a regression equation as a means of predicting both joint attention and affect sharing demonstrations with a stranger.

Despite the proposed importance of all three variables, only joint attention with the mother surfaced as a predictor of joint attention with a stranger. This finding should not be surprising, as it is logical to assume that the ability to display the behaviour with one person will predict, to a certain extent, its display with another. Possibly it could be stated that the behaviour was generalized as such but whether this was due to the existing attachment relationship or the ability of the infant to affect share cannot be determined from these findings.

The second portion of the hypothesis was proposed to evaluate the relative

contribution of each of the mother-infant variables for predicting affect sharing with other

adults in the environment. As before, affect sharing and security were considered to be

the strongest predictors of this behaviour. The infants' joint attention, affect sharing and

attachment score with the mother were entered into a regression equation as a means of

predicting affect sharing with other adults. When using the raw data, affect sharing with

the mother was found to be the only variable of the three that predicted to a certain extent

affect sharing with other adults. Alternately, when scores from the ranked data were

entered into the regression equation, affect sharing with the mother and attachment

security remained as significant contributors to the prediction of affect sharing with

others. In this analysis, affect sharing and attachment security were found to account for

33% and 8% respectively of the variability in affect sharing demonstrated with the

experimenter. Although affect sharing accounted for the largest portion of variance in the

equation leading to the assumption that this behaviour was simply generalized from the

mother to another adult, the presence of attachment security attests to its importance as a

predictor. As independent variables, affect sharing and security were correlated with each

other and as a result most of the variability of security within the regression equation was

redundant with that of the stronger predictor of affect sharing. Yet, not all of the variance

was attributed to affect sharing. The variable of security accounted for a portion of

variation that remained unexplained by affect sharing. Possibly attachment security is

influential in the development of this ability, but is less strongly related to interactions

which take place outside of the attachment relationship (i.e. strangers). However, caution

should be used when interpreting these findings since the results of the analyses of the raw and ranked data differed.

<div align="center">Limitations</div>

A major disadvantage of this study is the limited generalizability due to the nature of sample collection. The convenience sample resulted in a homogeneous sample of mainly Caucasian, middle-class, well-educated parents with their children. Results can, therefore, be generalized only to individuals with similar attributes. Consequently, caution should be exercised when considering these findings in relation to mother-infant dyads in the general population.

A second limitation is the one-time measurement of the variables of interest. While the results were significant and of interest, a longitudinal design would shed light on the nature of the attributes' stability or transformation over time. If re-measured at twenty four and thirty months of age for example, would the variables of security or affect sharing with the mother still show significant relationships with joint attention or perhaps emerging language development? This would serve as a much more thorough developmental and comprehensive understanding as to the nature of social cognitive development and shed light on causal relations.

A further limitation of this study was the failure to control for temperament or other possible social variables. The effects of other factors, such as having a father in the home, participation in day care, infant temperament or multiple attachment figures to name a few, were not addressed and therefore may have confounded results. Temperament may have impacted the willingness of the infants to participate with the experimenter during the ESCS; participation in daycare could possibly enhance social

skills; and the presence of a father in the home, or multiple attachment figures might have provided the infant with practice at generalizing his or her IWM to others.

The impact of the experimenter upon the data collection process is also a concern. Although significant results were found, it will remain unanswered as to how much more abundant the affect sharing demonstrated between mother and infant may have been had the experimenter left the room during taping. In defense, it must be stated that the recording equipment demanded the presence of the experimenter. Also, one has to wonder how much more intrusive a laboratory visit may have been upon the play session compared to the impact caused by the mere presence of the researcher. Despite lower scores, this author remains convinced the decision to film in the home remains preferential to the restrictive setting of the laboratory which has been noted to impact typical play patterns (O'Brien, Johnson, and Anderson-Goetz, 1989). In the future, efforts should be made to arrange for a protective barrier to be placed around the recording equipment so that the experimenter is able to leave the room.

Most importantly, however, was the unintended difference in soliciting joint attention from the infant for measurement. The possible differences between the joint attention collected during the natural play session with the mother and the structured method utilized by the experimenter during the ESCS has raised doubt as to whether this study accurately measured the association between attachment security and the relational aspect of joint attention with a stranger. The frequency and nature of joint attention collected in a supportive and familiar relationship may indeed differ from the frequency and nature of joint attention collected with an unfamiliar and unsupportive adult.

Contributions and Conclusions

This study is significant because it is on the threshold of a shift in current research trends from focusing upon the general development of joint attention to individual differences in this ability. Many prominent researchers in this field of study have suggested the investigation of the possible influence of social factors upon differences in this ability.

The ongoing debate surrounding the underlying nature of joint attention, as mentioned, divides the majority of researchers along two camps. Is the behaviour simply a conditioned response or could it possibly reflect the beginnings of social cognitive development? Further, if indeed the behaviour reflects an understanding of other people as separate intentional beings, what is the foundation for this social cognitive development? This research has provided findings which demonstrate clear relationships between behaviours which are proposed to underlie social cognitive development and the demonstration of joint attention by infants. The associations revealed also suggest that within the mother/infant dyad, attachment security could quite possibly be the foundation upon which this social cognitive development is built.

It is also proposed that the results of this research effort be interpreted as supporting the revised definition of joint attention recently proposed by Adamson and Russell (1999) in which joint attention is defined as a new level of organization which includes the integration of engagement with social partners with the infant's interest in objects. Given the ongoing debate, these authors felt that an updated definition of joint attention should include the integration of partner social engagement with the infant's interest in objects which is supported by the associations found between attachment and

joint attention. To the knowledge of this author, this study is unique in its attempts to provide research data to support such a definition.

Contributions of this study not only include the findings regarding attachment security and joint attention within somewhat secure relationships, but also highlight the importance of focusing upon affect sharing. Previous research had shown the tendency for joint attention to be more likely to contain affect sharing than other communicative behaviours (Mundy, 1992); however, to this author's knowledge, correlating these two variables with each other is an original research effort. The significant positive relationships discovered between affect sharing and joint attention indicate the importance of having done so, and point the way for further research into the role of social variables in the development of joint attention.

As such, by undertaking this study it was hoped that differences in attachment security, and/or affect sharing will be considered by future researchers as a possible explanation for joint attention behaviour. As noted, however, future endeavors would be wise to ensure similar unstructured play environments for the collection of joint attention behaviour for both the mother and experimenter and allow for a time period to elapse in which the experimenter familiarizes themselves with the infant. The use of the Attachment Q-Set over the Ainsworth Strange Situation is also promoted as it provides additional opportunities. Besides providing a range of scores as opposed to static security ratings, the measure lends itself to subdivision into behavioural subscales which may prove beneficial in determining which particular behaviours within the attachment relationship are predictive of joint attention behaviour. In time and with repeated results,

the Attachment Q-Set may even prove to become a reliable means of measuring and predicting joint attention.

With the identification of attachment security and affect sharing as being significantly related to joint attention, future research can now focus more directly on their role. The question could now become not one of what variables are related to joint attention development, but how do these variables promote its development. For if indeed affect sharing displays a primary level of intersubjectivity, and joint attention reveals a secondary level of intersubjectivity, an infant who is able to display these behaviours in conjunction with each other is more likely to demonstrate a behaviour that is cognitively different from a simple learned behaviour. Initiated by the infant, these actions are a clearer indicator of a social cognitive behaviour intended to share perspectives.

In conclusion, this research project was successful in demonstrating significant relationships between attachment security, affect sharing and joint attention in infants. As the body of literature in this area expands, more specific aspects of these behaviors may be isolated as relevant to joint attention. Until that time, however, this author is pleased to have been able to lay a foundation that will perhaps stimulate future study in this area.

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Table 1: Descriptive Statistics for Study Variables.

	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis
Security	39	10.00	94.00	64.72	21.98	-.43
J/A with Stranger	40	3.00	28.00	12.08	6.81	-.11
A/S during J/A	40	.00	20.00	5.05	5.34	1.61
A/S with Stranger	40	.00	58.00	21.18	13.18	1.08
J/A with Mother	39	.00	36.00	8.90	8.49	2.69
A/S with Mother	39	.00	19.00	6.05	6.34	-.50
A/S during J/A	39	.00	14.00	3.03	3.92	2.54

J/A = Joint Attention
A/S = Affect Sharing

<u>Table 2: Correlation table :</u>   A) Hypothesis One: Correlations among security, and joint attention, affect sharing during joint attention.

B) Hypothesis Two: Correlations among affect sharing with mother, and security, joint attention, affect sharing with stranger.

<u>A.</u>

	Security	
	Pearson's <u>r</u>	Spearman's <u>r_s</u>
<u>Mother</u>		
Joint attention	.44*	.49*
Affect sharing during joint attention	.46*	.53*
<u>Stranger</u>		
Joint attention	.21	.21
Affect sharing during joint attention	.32**	.34**

<u>B.</u>

	Affect Sharing with Mother	
	Pearson's <u>r</u>	Spearman's <u>r_s</u>
Security	.50*	.50*
Joint attention with mother	.79*	.78*
Joint attention with stranger	.59*	.53*
Affect sharing with stranger	.69*	.58*

*   Significant at the .01 level (2-tailed).
** Significant at the .05 level (2-tailed).

Table 3. Multiple Linear Regression Tables Generated for Hypothesis Three (a).

Summary Statistics

Model	Variables Entered	Variables Removed	Method
a. (IJA) ESCS	Coordinated JA Affect Sharing Security (AQS)	Affect Sharing Security	Stepwise

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
a. (IJA) ESCS	.647	.419	.403	5.2503
	.625 ®	.391 ®	.374 ®	9.16752 ®

® = ranked data values

Anova Table

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	735.512	1	735.512	26.682	.000
	1995.467 ®	1	1995.467 ®	23.743 ®	.000 ®
Residual	1019.924	37	27.566		
	3109.610 ®	37	84.044 ®		
Total	1755.436	38			
	5105.77 ®				

® = ranked values

Regression Coefficients

Variables	Unstandardized Coefficients B	Std. Error	Standardized Coefficients	t	Sig.
Constant	7.648	1.226		6.239	.000
	8.101 ®	2.999 ®		2.701 ®	.010 ®
Coordinated JA	.518	.100	.647	5.165	.000
	.637 ®	.131 ®	.625 ®	4.873 ®	.000 ®

® = ranked values

Table 4. Stepwise Multiple Linear Regression Tables generated for Hypothesis Three (b).

Summary Statistics

Model	Variables Entered	Variables Removed	Method
b. Affect Shared ESCS	Coordinated JA Affect Sharing Security (AQS)	Coordinated JA Security (raw data only)	Stepwise

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
b. Affect Shared ESCS	.685	.469	.454	9.7864
® Model 1	.576 ®	.332 ®	.313 ®	9.64216 ®
® Model 2	.642 ®	.412 ®	.379 ®	9.16697 ®

® = ranked data   Model 1 = affect sharing (ESCS)   Model 2 = affect sharing (ESCS) + security

Anova Table

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	3127.930	1	3127.930	32.659	.000
	1706.229 ®1	1	1706.229 ®1	18.352 ®1	.000 ®1
	2120.967 ®2	2	1060.483 ®2	12.620 ®2	.000 ®2
Residual	3543.660	37	95.775		
	3439.937 ®1	37	92.971 ®1		
	3025.200 ®2	36	84.033 ®2		
Total	6671.590	38			
	5146.167 ®1	38			
	5146.167 ®2				

®1 = ranked data (model 1)   ®2 = ranked data (model 2)

Table 4 continued...

Regression Coefficients

Variables	Unstandardized Coefficients B	Std. Error	Standardized Coefficients	T	Sig.
Constant	12.778	2.180		5.862	.000
Affect Sharing	1.431	.250	.685	5.715	.000
Model 1 ®					
Constant	8.993	3.166		2.840	.007
Affect Sharing	.592	.138	.576	4.284	.000
Model 2 ®					
Constant	5.672	3.361		1.688	.100
Affect Sharing	.423	.152	.411	2.783	.009
Security	.335	.151	.328	2.222	.033

Figure Captions

Figure 1. The conceptual relationship proposed between affective sharing and attachment

security, and the ability of the infant to enter into coordinated joint attention with affect

sharing.

Primary Phase – Secure Attachment

Secondary Phase (E) – Coordinated Joint
Attachment
(F) – Affect Sharing

D)Secure
Relationship:
IWM

A)
Responsive
Mother

C)
Shared
Affect:
Shared
Mental
States

B)
Emotionally
Regulated
Infant

Intersubjectivity

Adult looks at
the Object.

A) Adult
or Mother

C)
Object

F)
Shared
Affect
with
Adult or
Mother.

B) Secure
Infant

E) Infant sees
the Object and
alternates
looks between
Object and
Adult.
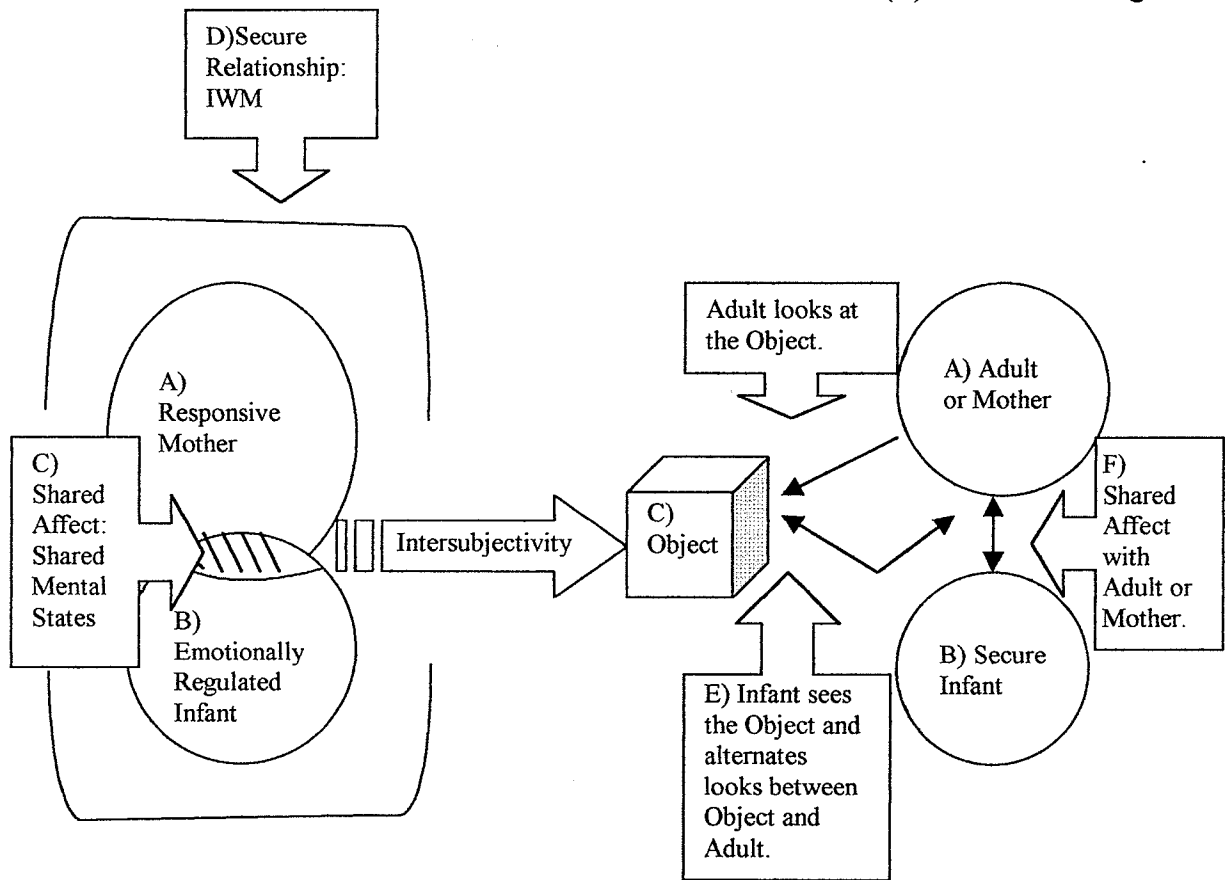
Appendix A

Background Information

It is helpful to record summary data on research participants in order to understand how well the findings represent society in general. Your responses to the following questions will remain confidential and will not be linked to your name or your infant's name in any way. Please do not put your name on this form. We will store this form separately from other signed consent forms.

1. What is your occupation? _____ Can you provide a brief

   job

   description?_____

   _____

   _____

2. Is there a significant other in the household?   Yes ___ No_____ If yes, what is

   your significant other's occupation? _____ Can you

   provide a brief job

   description?_____

   ____ _____

3. What is your highest level of education (please circle)

   a. Without High School Diploma
   b. High School Graduate without University Education
   c. Some university education
   d. Degree from 4 year university

e. Post-graduate degree

4. What is your significant other's highest level of education (please circle)

a. Without high school diploma
b. High school graduate without university education
c. Some university education
d. Degree from 4 year university
e. Post-graduate degree

5. Are you the biological mother of the infant? Yes _____ No_____

6. What is the biological mother's Race/Ethnicity?
a. White/European
b. Hispanic
c. Black (African-Canadian)
d. Native Canadian
e. Asian/Pacific Islander
f. Other (Please Specify_____)

7. What is the biological father's Race/Ethnicity?
a. White/European
b. Hispanic
c. Black (African-Canadian)
d. Native Canadian
e. Asian/Pacific Islander
f. Other (Please specify _____)

8. Are you aware of any health concerns regarding your infant? Yes ____ No_____
If yes please specify _____

9. What is your household annual income? (Please circle)

a. 24,999 or less
b. 25,000 to 39,000
c. 40,000 to 59,000
d. 60,000 or more

Thank you for your cooperation.

Consent Form - **Appendix A continued**

Subject Identity Number_____

_____

What is the sex of the infant: Male _____ Female _____

Does your infant say any words? Yes_____ No _____

If yes, how many: (1) 0-29   (2) 30-59   (3) 60-100 (4) more than 100
(Circle the response category)

How many children live with you in your home? _____

If you have more than one child, what are their ages? _____

Consent Form - **Appendix B**

Carol Hartung   and Dr. Barbara D'Entremont:
Department of Family Studies, University of Manitoba, Winnipeg, Manitoba

We are interested in learning how infants share interesting sights with interested adults. We think that the early social interactions between you and your infant are important in helping your infant learn to take perspectives of other people. We would like to visit you on two separate occasions to watch you interact with your baby. If you choose to participate we will:

1. Observe your interactions with your infant on two separate occasions, with each visit lasting three hours.

2. Assess your child's early social communication skills by presenting him/her with different toys and seeing how he tries to communicate. This assessment will be videotaped.

3. Ask you to play with your child for 10 – 15 minutes with several toys which we will provide. This play session will be videotaped.

All information is confidential, videotapes are kept in a locked cupboard, accessible only to the researchers involved in this study. You are free to stop the procedures or withdraw from the study at any time.

Please tick yes or no in response to each of the following questions:

1. Do you understand that you have been asked to be in a research study?   Yes__ No___

2. Have you read the information sheet or heard the verbal explanation of the investigator?   Yes__ No__

3. Do you understand the benefits and risks involved in taking part in the research study? Yes___ No __

4. Have you had an opportunity to ask questions and discuss the study?   Yes___ No____

5. Do you understand that you are free to withdraw from the study at any time without having to give a reason and without any detriment to your ongoing association with the University of Manitoba? Yes__ No___

6. Do you understand that you can refuse to answer any questions or provide information or samples during your participation in the study?   Yes____ No_____

7. Has the issue of confidentiality been described to you and do you understand; a) who will have access to the information you provide, b) that no reports will identify you as an individual? Yes____ No___

Note: The Faculty of Human Ecology Ethics Review board requests that all parents be advised that researchers are under obligation to report any cases of suspected child abuse or neglect.

I agree to take part in this study: Yes__ No____

_____ Name of Infant   _____ Date of Birth

_____   _____   _____
        Signature   Signature of Researcher   Date

Appendix B continued...

I have been given reasonable opportunity to view the videotape made of my infant.

_____   _____   _____
Name   Signature   Date

I agree to allow Carol Hartung or Dr. B. D'Entremont to use the videotape of my infant, and/or pictures made from the videotape of my infant, for the following purposes:

1) Publication in a journal   Yes_____ No_____

2) Demonstration at a conference   Yes_____ No_____

3) Demonstration at a Thesis Defense Yes_____ No_____

I understand that neither my name nor my infant's name will be associated with the work.

_____   _____
Signature   Date

I prefer not to have the videotape of my infant shown at conferences or reproduced in any form.

Signature: _____

Would you like a summary of the results mailed to you?   Yes_____ No _____

Appendix C – Modified Coding Sheet (ESCS)

Early Social Communication Checklist   (Modified from Mundy & Hogan, 1992, University of Miami)

Date: _____   Subject Number:_____   Rater: _____
Study:_____

Initiating Joint Attention

Score: Total _____ High_____ Ratio: High/Total _____   Total Smile & EC _____ Total Smile & Alternates _____ Total Smiles _____

Low:

Eye Contact	B makes eye contact with the E while manipulating or touching an <u>inactive</u> <u>mechanical/windup toy.</u> (or novel sounds)
Smile & EC	Smile combined with Eye Contact
Alternates	B alternates a look between <u>active</u> object and E's eyes.
Smile & Alternates	Smile combined with alternates

_____High

Points & EC	B points to <u>active</u> toy combined with EC.
Points & Smile/EC	B points to <u>active</u> toy combined with eye contact with E and smile

----

(Book and Posters) Points & EC	(Book and Posters) B points to pictures in the book, wall posters <u>before</u> E, combined with EC

Points & EC/ Smile	B points to pictures in the book, wall posters <u>before</u> E, combined with EC and Smile

----

Show with & EC	B raises toy to E's Face
Show & Smile	B raises toy to E's face with eye contact and smile

Affect Sharing

EC/Smile	B makes eye contact combined with smile with the E during the play session but outside of initiated joint attention