

AN OBSERVATION OF EARLY PARENT-INFANT SOCIAL INTERACTIONS IN  
RELATION TO THE EMERGENCE OF JOINT ATTENTION  
IN THE NATURAL ENVIRONMENT

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Early interactions between parents and infants are thought to be critical of later development. In particular joint attention has been an area of research and investigations. This study sought to measure joint attention behaviors in infants from 5 to 33 weeks of age under naturalistic conditions: in the home with the mother as the interaction partner given no instructions. Videotapes of the infant-parent interactions were observed and data were collected on behaviors related to joint attention. Given observations occur at younger ages than other studies considered, engagement data results indicate increasing trends for 3 of the 5 infants observed while the direction of infant gaze results indicate patterns consistent with descriptions currently in the literature. Parent behavior data indicate high levels of support in engaging infant attention. Furthering an understanding of joint attention by observing at earlier ages in infant development may be useful in informing teaching programs for infants who have not developed joint attention skills.

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## INTRODUCTION

What happens between the parent and infant in the early years of life appears to be important. For example, Hart and Risley (1992) conducted a study with 40 families representing American families in terms of size, race, and socioeconomic status. At the start, the children were 9 months old and upon completion of the study they were 3 years old. Experimenters placed an emphasis for the families to “do what you normally do” during a typical day. Observations occurred in the families’ natural environment for one hour one time per month over 2.5 years. The same observers were used each month and the observers carried a tape recorder and a clip board recording continuous notes on the child’s behaviors and interactions. Given both the continuous nature of the observations and the naturalistic conditions under which these observations occurred, data are more likely to capture naturally occurring behaviors as compared to data collected in a different setting, such as a laboratory setting. The results of their study indicate a relationship between how parents spoke to their children and the children’s vocabulary; the more parents spoke to their children, the greater the amount and complexity of the children’s vocabulary.

In addition to the quality of vocal interactions between parents and infants, nonvocal interactions have been studied and are considered of importance as a means of understanding typical and atypical social development (Keller et al., 2004). In particular, children with autism show extreme differences in the way they orient to their parents and the environment (Charmin et al., 1998; Clifford & Dissanayake, 2008; Dawson et al., 2004; Jones & Carr, 2004; Klin et al., 2009; Mundy et al., 1986). According to Keller and his colleagues (2004), during face-to-face exchanges infants



and their mothers engage in mutual eye contact and frequent use of language. During object stimulation, Keller et al. describe parents direct their infants gaze toward objects. This is thought to be relevant for the child to learn to adapt to the cultural environment. Two types of interaction styles are described as dyadic (face to face) to triadic joint attention (two parents and an object or a third person).

Joint attention is “the ability to coordinate attention between interactive social partners with respect to objects or events in order to share an awareness of the objects or events” (Mundy et al., 1986, p. 657). It has been described as triadic attention (Bakeman & Adamson, 1984) with observed behaviors that include gaze following, alternating eye gaze, and directing the attention of others through the use of comments and gestures (Bono, Daley, & Sigman, 2004; Dawson et al., 2004, Holth, 2006; Mundy et al., 2007; Taylor & Hoch, 2008). Bono, Daley, and Sigman (2004) describe two types of joint attention. Responding to joint attention (RJA) involves the child responding to the interaction partner’s point by looking in the direction of the point. Initiating joint attention (IJA) involves the child’s attempt to direct the interaction partner’s attention toward an object through the use of pointing, showing, gaze shifts, or verbalizations for a purpose other than requesting. Most of these definitions are topographical, however, and functional definitions are needed (Dube et al., 2004).

According to Jones and Carr (2004), “in order to fully define joint attention, one must consider function as well as form.” Meaning, in order to measure instances of joint attention, the consequences should also be assessed as joint attention is more than gesture and gazing repertoires. Researchers identify a difference between an infant that points toward an item and gaze shifts resulting in obtaining the item, and an infant

that points toward an item and gaze shifts for the purpose of “sharing the experience.”

Consider the distinction between two types of behavior involved in joint attention:

protoimperative gestures and protodeclarative gestures. Protoimperative gestures are defined as the “child’s request or rejection for social interaction, objects, or actions” (Warren & Yoder, 1998 in Bruinsma, Koegel, & Koegel, 2004). These gestures are maintained as they benefit the speaker directly rather than to serve a social function and are comparable to what Skinner referred to as a mand, “a verbal operant in which the response is reinforced by a specific consequence” (1957, p. 35). Protodeclarative gestures are described as commenting, indicating, referencing, including pointing, showing, and giving (Bates, Camaioni, & Voltera, 1975). These gestures are maintained by the generalized social reinforcers and are comparable to what Skinner referred to as a tact, “a verbal operant in which a response form is evoked by a particular object or event or property of an event” (1957, p. 81-82).

The view that social behavior of an individual is maintained by the social behavior of the interaction partner is described by Novak and Pelaez (2004). “Social transactions” involve reciprocal interactions in which one person’s behavior functions as a discriminative stimulus and/or a reinforcer for another person’s behavior (p. 323).

When considering the nature of social interactions between parents and infants, the maintaining variables are likely conditioned social reinforcers. According to Dube et al., “discriminative and conditioned reinforcing functions of stimuli generated by adult behavior, and socially mediated reinforcers may maintain joint attention behaviors.”

This is similar to the discussion in the developmental literature regarding joint attention episodes occur “for the purpose of sharing an experience with a partner” (Bakeman &

Adamson, 1984; Corkum & Moore, 1998; Mundy et al., 1986, p. 657). These functional descriptions of joint attention may be relevant to consider when working toward and understanding of the emergence of these skills and even more relevant when considering how to teach these skills to infants who have not acquired them.

In Jones and Carr (2004), “compared with children with mental retardation or specific language delay, matched for developmental level, only children with autism show deficits in joint attention” (Charman et al., 1998). Joint attention is absent or severely impaired in children with autism (Clifford & Dissanayake, 2008). Without the development of joint attention skills, language and social skills are severely negatively impacted. Data indicate the earlier the intervention the better the outcome for children with autism (Fenske, Zaluski, Krantz, & McClannahan, 1985; Lovaas, 1987; Dawson & Osterling, 1997; McGee, Morrier, & Daly, 1999). This point helps make clear how the identification of joint attention deficits as early as possible becomes extremely relevant. Through an understanding of the development of joint attention in typically developing infants, we will be better able to identify infants who are not developing joint attention skills and need intervention.

There have been two general ways to study joint attention: 1) testing joint attention responses at various points in development (Bakeman & Adamson, 1984; Striano & Stahl, 2005; Striano & Bertin, 2005/2005; Mundy et al., 2007) and 2) by training to produce joint attention in children that have not developed it (Whalen & Schreibman, 2003; Taylor & Hoch, 2008). What follows is a description of the methods employed within each of these approaches.

Bakeman and Adamson (1984) were interested in identifying how infants 6-18 months old coordinate their attention between people and objects. Twenty eight infants were observed at three month intervals at 6, 9, 12, 15, and 18 months of age. In the families' homes, the experimenters videotaped playtime sessions using two video cameras obtaining 10 minutes of usable footage. Three conditions were arranged: 1) the mother condition, 2) peer condition, and 3) an alone condition. No instructions were provided. Six categories of engagement were defined. Data for the infants were combined for each age group and were then reported in terms of the average percent of time all infants at a particular age were observed to spend in each of the various engagement states. Data indicate infants spent less time in person engagement and significantly more time in coordinated joint engagement as they got older.

In 2005, Striano and Stahl were interested in identifying the establishment of developmental patterns prior to 9 months old. As a result, 54 infants at 3, 6 and 9 months old were selected to test for the presence of joint attention behaviors. In a laboratory setting, infants were seated in car seats or highchairs, depending on their age, while the infant's mother sat out of sight observing the procedure from a video monitor. The experimenter, who was a stranger to the infant, engaged the infant for 5 minutes. At Minutes 2 and 4 either a joint attention condition or a look away condition occurred. In the joint attention condition, the experimenter turned her head to shift gaze from the infant toward a brightly colored toy positioned 3 feet away and smiled for 3-4 seconds while continuing to talk using a positive tone of voice before turning her head to shift gaze back toward the infant. After the experimenter re-established eye contact with the infant, the procedure was repeated for 1 minute. The look away condition was

the same as the joint attention condition except in the look away condition, gaze shifts back to the infant did not occur. One data collector scored data for all measures of gaze, smiling, and gaze following from videotapes with another data collector scored reliability for a random 20% of all infants and measures, also from the videotapes. Results are reported as “percent of time spent gazing as a function of age group and episode.” Infants were found to gaze more often at the experimenter during the initial interaction and joint attention condition and least during the look away condition across ages.

Striano and Bertin (2005) conducted a study investigating the presence of joint attention. The researchers explain that prior studies investigate joint attention after the onset of the skill, around 9 months old. Similar to the current study, the researchers were interested in assessing joint attention skills in infants younger than 9 months old. Seventy two infants between 5 and 10 months old were brought to a testing room in a laboratory setting. It should be noted that three infants were excluded as they were unable to sit up without support. A digital video camera filmed testing sessions during which the infants sat on a soft mat with their caregiver behind them to provide physical support if needed. Every 20 to 30 seconds, a female experimenter who was unknown to the infant presented toys one at a time in a sequence every 20 to 30 seconds. When all toys were presented, experimenters scored “coordinated attention” when the infant alternated gaze from the toy to the experimenter and back to the same toy at least one time during the 6 minute free play episode. All data were recorded during the sessions with video recordings used to score reliability. The infants earned a pass or fail based on whether or not the infant engaged in at least one coordinated attention look during

the test. Data are reported in terms of the number and percentage of the infants that passed or failed each of the presented tasks as well as the mean ages at which the infants passed the tasks. For coordinated gaze, reported results indicate 53 infants, or 73.61% of infants at 8 months old passed the coordinated gaze task meaning those infants engaged in at least one coordinated attention response during that task presentation.

Another study conducted by Striano and Bertin, also published in 2005, was a longitudinal study involving 69 infants when they were 5, 7, and 9 months old. In this study, infants and their mothers came to a laboratory setting and were videotaped during 2 minute free play sessions. For one session, the infant engaged with the mother and in the other session, the infant engaged with an unfamiliar person, the experimenter. The dependent variables included joint engagement looks (gaze shifts between the toy and the face and back to the toy) and joint engagement looks with a smile. If the infant engaged in the target behavior at least one time during the 2 minutes playtime session, a "1" was scored; if the infant did not engage in this behavior at least one time during the 2 minute playtime session, a "0" was scored. Results are reported in terms of the frequency and percent of total infants for each target behavior for the mother condition and the stranger condition across the three observations. Data indicate infants joint engagement looks toward strangers became more reliable as age increased. This is also true for joint engagement looks toward the mother between the 5 and 7 month assessments but no increase continued into the 9<sup>th</sup> month of age.

In 2007, Mundy and his colleagues conducted a longitudinal study investigating the joint attention repertoires of 95 infants. This study is unique compared

with previous studies described as 32 of the infants in this sample were identified as being at risk for developmental delay (ARDD) and the other 63 infants in this sample were typically developing (TD). Infants participating in this study included 9, 12, 15, 18, and 24 month olds. This age range was chosen as the researchers believe this to be “the formative period of infant joint attention development during which important age related shifts in social cognition are thought to be a primary influence on joint attention development.” The goals presented include investigating age-related, individual, and cognitive differences and the effect of these on the development of joint attention as well as an examination of the predictive associations between joint attention and language development. The infants were observed in a laboratory setting where the Early Social Communication Scales (ESCS; Mundy, Delgado, Block, Venezia, Hogan, & Seibert, 2003) were presented to assess various aspects of nonverbal communication, followed by various standardized tests. Large amounts of data were compared, manipulated, and conclusions were presented. Results indicate typically developing infants appear to have age-related patterns of development compared to the infants that were ARDD. The ARDD group of infants developed joint attention at different frequencies across time; their development did not indicate age-related patterns. In addition, responding to joint attention at 12 months and initiating joint attention at 18 months predicted language development at 24 months old.

According to Baer, Wolf and Risley (1968) “the analysis of behavior...requires a believable demonstration of the events that can be responsible for the occurrence or nonoccurrence of that behavior.” The testing literature previously described helps move us closer to understand joint attention. This literature is then used to inform the

development of teaching procedures designed to produce joint attention in repertoires where joint attention has not developed. The following studies present initial demonstrations of teaching procedures used to generate joint attention behaviors in children with autism.

Whalen and Schreibman (2003) conducted the first study investigating a teaching procedure for responding to joint attention bids and initiating joint attention in children with autism. Participants included five 4 year old children with autism. Training occurred for 1.5 hours per day 3 days per week. Posters were positioned on the walls and toys were identified through informal reinforcer assessments to use as the items of interest. Participants were taught to respond to joint attention bids by responding to their hand being placed on the object, the object being tapped, showing of the object, making eye contact, following a point, and following a gaze. Participants were taught to initiate joint attention while they were engaged with an object. They were required to gaze shift between the item and the experimenter within 10 seconds of engaging with a toy or the toy was removed. Prompts were delivered after two incorrect responses. Additionally, the participants were required to engage in protodeclarative pointing in a continuous novel environment (e.g. posters were changed after each 25 minutes) and prompts were delivered if the participants did not point within 10 seconds. Results indicate children with autism could learn to respond to joint attention bids but initiating joint attention was more challenging to teach. The reinforcers used in teaching initiating joint attention were not social and the result was participants initiations were mands rather than maintained by social reinforcers.



Taylor and Hoch (2008) used a multiple baseline design to teach three children with autism to respond to joint attention bids and initiate joint attention. The children were taught to look toward a target item the experimenter pointed toward, comment about the item, and look back toward the experimenter within 5 seconds through the use of gestural, physical and verbal prompts. Initiating joint attention behaviors were more challenging to teach and the experimenters implemented a checklist which was eventually faded successfully while behavior was maintained by social reinforcers. Results indicate acquisition of the responding to joint attention behaviors of looking at the item, commenting, and looking back toward the experimenter while there was an increase in initiating joint attention behaviors across participants. However, the impact of teaching procedures on initiating joint attention was not nearly as strong as the responding to joint attention results. Aside from successfully demonstrating that children with autism could be taught joint attention behaviors, the maintaining variables in this study were social reinforcers consisting of appropriate social comments (e.g., the experimenter smiled and said, "Wow, that doll looks funny up there!"). According to Taylor and Hoch, "the findings support the hypothesis of Dube et al. that socially relevant stimuli are necessary and functional reinforcers for some of the responses associated with joint attention."

Given the literature reviewed, the importance of conducting repeated observations of infants at early ages during naturally occurring interactions with their mothers in order to observe joint attention becomes a valuable addition. With the purpose of increasing our understanding of the acquisition of joint attention, we must observe its emergence rather than its presence. By employing similar methods as Hart

and Risley (1992) to observe parent-infant interactions more frequently and at a time that is earlier than the point at which the skills are present we might be more capable of describing joint attention emergence. The benefits of such a capability might be that we become more effective in designing procedures to teach these skills to children with autism. The purpose of this study was to observe early social interactions between infants and their mothers in their natural environment in relation to emerging joint attention related behaviors as well as furthering the development of the joint attention observation code.

## METHODS

### Participants

The data in this manuscript represent behaviors measured across five mother–infant dyads. Each mother-infant dyad was assigned a number and is presented in order of the infant’s age in weeks at the start of the study beginning with the youngest infant. The five mother-infant dyads in this study participated voluntarily and were recruited via public flyers (see Appendix B) and by word of mouth.

Each of the mother-infant dyads in this study came from intact, Caucasian families. The infants’ ages at the start of the study ranged from 5 weeks old to 18 weeks old. The intention was to conduct play time observations for 12 consecutive weeks but for various reasons, some sessions were missed. Play time observations continued on the next scheduled weekly visit possible until 12 observations were completed. By the end of the study the infants’ ages ranged from 18 weeks to 33 weeks old. The mothers reported ages ranged from 21 to 31 years old. The educational backgrounds of the mothers include at least a high school diploma with one mother taking college classes and another mother taking graduate level classes while participating in this study. The families each report annual incomes of less than \$50,000.

Developmental tests were administered by a licensed speech and language pathologist with the purpose of ensuring that each child was typically developing. The tests administered in the families’ homes was the Rossetti Infant-Toddler Language Scale™, which measures communication and interaction (L. Rossetti) and the Hawaii Early Language Learning Profile® (HELP) assessment tool (VORT Corporation, Palo

Alto, CA). The results of the tests indicated the children were all developing typically (see Table 2).

### Setting and Materials

Each session was recorded in the families' homes. The living room or the bedroom was the typical setting for each of the five participating dyads. Across sessions, various age appropriate toys and other baby paraphernalia were available.

To record each 10-minute play session, a 60 minute Flip Video™ digital camera (Pure Digital Technologies, Inc., San Francisco, CA) was used. Lap top computers were then used to transfer the videos to DVDs. All videos were later saved to a computer in the Department of Behavior Analysis at the University of North Texas. Data presented for Mother-Infant Dyads Number 1 and 5 were recorded from lap top computers and data for Mother-Infant Dyads Number 2, 3, and 4 were recorded by me from the computer in the Department of Behavior Analysis all using data sheets (see Table 3) and pencils.

## Measures

The complete observation code used can be found in Appendix C (Suchomel, 2009). The behaviors defined in the observation code were adapted from previous research and categorized into three categories including child behaviors, parent behaviors, and types of engagement, which are derived measures. Child behaviors scored include gaze, reach, grasp, gesture, and vocalizations. Parent behaviors scored include gestures and verbalizations. It should be noted that both parent and child measures are required in order to understand both the child's responding to joint attention as well as initiating joint attention. Types of engagement include unengaged, parent engagement, object engagement, supported engagement, and coordinated engagement. These types of engagement were previously referred to as states of engagement (Adamson, Bakeman, & Deckner, 2004; Bakeman & Adamson, 1984) and are adapted here.

The child's gaze is defined in four categories including: toy, parent, watching the parent, and camera with a derived measure of gaze shift. (a) Toy involves the child looking at the toy the parent is not holding or playing with. (b) Parent involves the child's gaze being directed toward the parent's face. (c) Watching the parent involves the child looking at the object or the parent's hands while the parent is manipulating the object. (d) Camera involves the child's gaze directed toward the camera. Gaze shift is then derived from the gaze behaviors and is scored when the child looks from the play object to the parent's face in less than 3 seconds.

The child's gestures are defined in five categories including: reach, grasp, point, show, and give. (a) Reach involves the extension of the arm(s) with a closed or open

hand. Distal reach is scored when the child reaches but does not actually touch an object. Contact reach is scored when the child reaches and touches something. Toy, clothing, or body part are scored for a contact reach. (b) Grasp involves the child wrapping at least one hand around a toy, clothing, or body part with one or two hands and maintains that contact for at least 1 second. (c) Point may be either Point Type P or Point Type H. Point Type P involves the child using an isolated finger to gesture to an object and the finger is extended and adjacent fingers are splayed downward and outward, as to separate the isolated finger from adjacent fingers. This point type may be a contact or a distal point. Point Type H involves the child gesturing to an object with more than one finger extended, and the selective part of the gesture is the finger(s). This point type may be contact or distal. (d) Show involves the child holding an object in hand and extending it toward the parent, or tipping toward the parent, or rotating to expose a part of the object to the parent. (e) Give involves the child putting an object into the parent's hand, or touching the item to the parent's body, or moving the object in front of the parent in a way that transfers possession to the parent.

The child's vocalizations are defined within three categories including verbalizations, hiccups, and protests. (a) Verbalizations are scored when the child emits an auditory sound such as cooing, babbling, or gurgling. (b) Hiccups are scored anytime an auditory sound is made when the child inhales air and it sounds similar to a hiccup. (c) Protests involve vocalizations such as yells, whines with distress, or screams which may or may not accompany physical retreating or protesting.

The parent behaviors measured include gestures which are categorized as point, show, and give. Vocalizations are also included. (a) Point involves the parent using an

isolated finger to gesture to an object and the finger is extended and adjacent fingers are splayed downward and outward, as to separate the isolated finger from the adjacent fingers. Points may be contact or distal. (b) Show involves the parent holding an object in hand and extending it toward the child, or tipping it toward the child, or rotating to expose a part of the item to the child and must be at least one second in duration. (c) Give involves the parent placing an item into the child's hand, or touching the item to the child's body part, or moving the object in front of the child in a way that transfers possession of the object to the child. Parent verbalizations involve the parent making a comment or asking a question that is directed toward the child.

All target behaviors were scored using one-second interval recording. Five types of engagement are then derived measures resulting from scoring each of the behaviors in one-second intervals. (a) Unengaged involves the child not being involved with a specific person, object or activity for 2 consecutive seconds. (b) Person engagement involves the child interacting with the parent but without engagement with the current object or activity for at least 3 consecutive seconds. This type of engagement involves non-toy related interpersonal behavior meaning the child is engaged in social interaction that is dyadic (i.e. child and mother) but is not triadic (i.e. child, mother, and object). (c) Supported engagement involves the child and parent both actively engaged with an object but the child does not contribute enough behavior for coordinated joint engagement to be scored. (d) Coordinated joint engagement involves the child and parent both actively engaged with the object and with each other. This type of engagement begins with gaze shift and a gesture point, show, or give. It is then

maintained by the child's gaze shifts with no gaps in gaze shifting that lasts longer than 15 consecutive seconds.

In some instances, intervals in the gaze category were marked off-camera indicated by shading the gaze interval on the data sheet. This was done if 1) the infant's face was literally off camera, 2) the infant's eyes were not in view to determine where gaze was being directed.

### Data Collection Procedures

The principal investigator and another graduate student held an initial meeting with each family in their home. During the meeting, the methods and purpose of the initial study were explained. A parent interview form designed to help the principal investigators get to know the family was completed (see Appendix D). A list of guidelines to follow for each observation session was presented explaining, for example, why the investigators could not play with or hold the children until all twelve 10-minute playtime sessions were recorded (see Appendix E). When the family agreed to participate, informed consent (Appendix F) was signed. The principal investigator stressed the parents should "do what you normally do with your child." The parents were in control of where the play sessions occurred and what toys if any were used. The investigators never interacted with the children.

Upon completion of all developmental testing, families were scheduled for 12 weekly 10 minute playtime sessions. Confirmation phone calls or e-mails were sent a few days before each scheduled session. Prior to the play sessions, parents filled out a session log (Appendix H) including the child's pseudonym, the date and time and any other relevant information (e.g. the baby just woke from a nap). The investigators then



explained to the parent “Play with your child as you normally would. I will state when I am going to begin taping and when I am finished taping. I will not speak to you during the 10 minutes that I am videotaping you and your child.” Sessions were then recorded and were stopped only if the parent made that request or if the camera ran out of batteries, in which case the session continued when batteries were available. Upon completion of the session, the next playtime session was confirmed and the investigators thanked the family before leaving.

Once the play sessions were completed, the licensed speech and language pathologist visited the families’ homes once again to administer the HELP® and the Rosetti™. All playtime sessions were given to the family on video. A post participation questionnaire (Appendix I) was completed obtaining information regarding the family’s socioeconomic information as well as feedback to the investigator regarding the family’s participation in the study.

#### Data Recording

Scoring the videos for Infants 2, 3, and 4 involved minimal training on the observation code. An initial meeting occurred between the principal investigator and me. During that 30 minute meeting, the data sheets were described and an overview of the code was discussed. Independently, I watched several videos while following along with the completed data sheets. The next step included another meeting with the principal investigator as she answered questions I had based on the videos I studied. For 2 hours, we looked at various video segments for one dyad, Infant 3 while we discussed examples and non-examples for each behavior across the data sheet. I practiced scoring data independently and met next with a graduate student enrolled at

the University of North Texas in the Department of Behavior Analysis who scored interobserver agreement with the principal investigator in the first study. She and I met four times over the course of 2 weeks as we 1) alternated between watching segments together while discussing examples and non examples, 2) independently scored one to 2 minutes at a time and then compared and discussed differences. She then independently scored one randomly selected play session for each of Dyad 2, 3, and 4 while I independently scored all play sessions for those dyads. Dyads 1 and 5 were scored by the primary investigator using laptop computers, data sheets, and pencils.

## RESULTS

### Interobserver Agreement

Interobserver agreement (IOA) was calculated by dividing the smaller number of occurrences of each behavior by the larger number of occurrences of each behavior and then multiplying by 100 (Cooper et al., 1987/2007; Alberto & Troutman, 1990). The formula was  $\frac{\text{agreements}}{\text{disagreements} + \text{agreements}} \times 100$ .

Interobserver agreement for each participating dyad is presented in Table 4. The overall IOA across all measures is 86.86%. The top portion includes IOA for each of the child behaviors of gaze, reach, gestures, and grasp with a range of 0% to 100%. The next section presents parent initiating behaviors including point, show, and give with a range of 33% to 100%. Parent and child vocalizations are presented next with a range of 62.32% to 99.62%.

### Data Analysis

Data in Figures 1 and 2 are presented in percentage of 1 second intervals. First, off-camera intervals were subtracted from 600, the total number of possible intervals. Then the number of intervals including the engagement states or target behavior occurrences were divided by the total number of valid intervals.

Data in Figures 3 and 4 are presented in rate per minute. The total number of occurrences of the target behavior per session was divided by 10, the total number of minutes per session.

In each figure, the x-axis represents the infant's age in weeks. The youngest infant is presented first with the first data point at 5 weeks old and the last data point at 18 weeks old. Infant 4 begins playtime sessions at 18 weeks old. It should be noted

that space between data points indicates a missed session. For example, no playtime session occurred when Infant 2 was 14 and 15 weeks old.

### Figure 1

The data in Figure 1 represent the percentage of 1 second intervals for each observation session that each infant spent engaging in supported engagement (the closed square) and coordinated engagement (the open square). Time spent in the supported engagement state means the infant and the parent were actively engaged with an object but not with each other. When observing this engagement state, the parent is showing an object to the child and commenting while the child is watching the object in the parent's hand but gaze shifts are not present. During coordinated engagement, the child and the parent are actively engaged with the object and with each other evidenced by gaze shifting, pointing, and giving, in addition to showing and commenting.

For all infants, supported attention is increasing while coordinated attention is present but occurs less frequently. During playtime sessions for Infant 3, supported and coordinated engagement are emerging together with a range of supported engagement of 0 to 28% and a range of coordinated engagement of 0 to 28%. The first appearance of supported attention occurs for Infant 1 at 7 weeks of age at 9%. The first appearance of coordinated occurs for Infant 2 at 5% of intervals when the infant is 12 weeks old. This is the only case across infants where coordinated attention occurs prior to supported attention. The highest percentage of time across all infants spent in supported engagement occurs in Infant 5 at 54% at 21 weeks old followed by Infant 4 at 53% at 33 weeks old and then, Infant 1 at 47% at 17 weeks old. The highest

percentage of time across all infants spent in coordinated engagement occurs for Infant 3 at 28% at 21 weeks of age and for Infant 1 at 21% at 17 weeks old.

### Figure 2

The data presented in Figure 2 represent the infant's focus of attention. The percentage of 1 second intervals the infants spent directing their gaze toward objects (solid square), the parent's face (open square), or something else (an x) is represented.

For each infant observed prior to 13 weeks old, data indicate the majority of time was spent directing their gaze toward a parent's face. Infant 1 and 2, the youngest of the infants, continued to spend much of their time gazing at their mothers with Infant 2 maintaining gaze with his mother for the most time throughout the duration of this study. As time passes for each infant, the amount of time they spent gazing at their parents decreases while gaze toward objects and other things increases.

### Figure 3

The data presented in Figure 3 represent the infants' rate per minute of vocalizations (solid square) and all reaches and grasps combined (open square). Vocalizations include any auditory sound such as cooing, babbling, gurgling, hiccupping, yelling, whining or screaming. Reaches and grasps include all extensions of the arm with open or closed hands, either distal or proximal and wrapping at least one hand around a toy, clothing, or body part for at least 1 second.

Data indicate that for each infant, vocalizations are consistent across sessions while reaches and grasps increase in frequency over time across almost all infants. For Infant 3, the first three data points are the highest at 25, 26 and 33 per minute due to high rates of crying during those sessions. The widest range of vocalizations occurs for

Infant 3 with a range of 1 to 33 per minute and the tightest range of vocalizations is with Infant 5 at 2 to 7 vocalizations per minute. Data indicate occurrences of reaches and grasps are more variable than vocalizations however, for all infants except Infant 4, the trend is upward.

#### Figure 4

Figure 4 represents the rate per minute of parent responses directed toward the infants including vocalizations (solid square) and nonvocal responses (open square) such as pointing, showing, or giving an item to the infants.

Data indicate the rate of vocalizations is extremely high for each parent and nonvocal responses occur less frequently. Across all children, vocalizations range from 14 to 50 occurrences per minute; the parents are talking to their infants consistently at high rates during playtime sessions. Nonvocal responses occur at a range of 0 to 7 per minute across all infants.

## DISCUSSION

The methodology employed in this study was similar to the methodology Hart and Risley utilized when they observed family-child interactions in the natural environment. Compared to other investigations of joint attention, this methodology was unique in terms of the extent to which naturalistic conditions were used. Other studies have investigated joint attention in infants with interaction partners who are unfamiliar to the infant and in laboratory settings (Mundy et al., 2005; Striano & Bertin, 2005/2005; Striano & Stahl, 2005). This study conducted more frequent observations of young infants interacting with their mothers in the home setting.

According to Johnston and Pennypacker, when it comes to the question of how often and how long data should be collected, the answer is “as long as possible and as often as possible” (1993, p. 124). The current study conducted 12 observations over 12 weeks measuring 12 infant behaviors, 4 parent behaviors, and derived measures of gaze shift and 5 engagement states. Given the number of data points obtained, the resulting data allow observations of patterns of responding. Studies that observe only one or two times measuring the presence or absence of a target behavior (Striano & Bertin, 2005) help us understand whether the target behavior is present or absent at the particular observation moment observed in the particular infants observed. The current study attempted to identify emerging skills requiring observations of trends indicating acquisition.

The majority of the studies investigating joint attention observed infants starting at 9 months old (Adamson, Bakeman, & Deckner, 2004; Johnson, Slaughter and Carey, 1998; Mundy et al., 2007; Slaughter & McConnell, 2003). There is some evidence of

observations of joint attention at earlier ages. For example, Striano and Bertin found many infants passed some triadic social tasks prior to 9 months of age. In the current study, observations conducted with infants at ages earlier than 9 months revealed the initial presence of joint attention in these five infants. Preliminary results from data in the current study indicate increasing trends in supported engagement for three of the five infants. In addition, the data indicate infant gaze toward objects and other things in the environment trend upward for four of the five infants observed. Bakeman and Adamson report passive engagement, referred to as supported engagement in the present study, and object engagement did not change with age. The age range of the infants in the present study demonstrating increasing trends was 1.5 months to 8 months old as compared to Bakeman and Adamson's observations of infants ranging in age from 6 to 18 months old. Bakeman and Adamson may have observed no change as the observations they conducted were after the infants acquired the behaviors compared with the current study which repeatedly observed the infants beginning at younger ages allowing for the acquisition of those skills to be observed.

Similar to Bakeman and Adamson's study, observations were conducted in the infant's home with their mother as the interaction partner. Their data indicate infants first engage in person engagement which decreases over time as infants begin to direct gaze toward objects in the environment. Data in the present study support this finding. All three infants observed prior to 15 weeks old direct their gaze toward their mothers more so than anywhere else. Over time, this focus of attention toward the mother's face decreased as more time was spent directing gaze to other things in the environment. In addition to observing infants interacting with their mothers, a peer condition was



arranged. The data indicate infants spent more time in supported engagement as well as in coordinated engagement when interacting with their mothers as compared to their peers. Bakeman and Adamson offer a possible reason might be related to the stronger competence of the mother in supporting the infant's engagement.

In consideration of parent behavior in engaging infants, there were qualitative differences noted regarding the proximity of the object the mother presented in relation to the mother's face and the mother's affect. For example, while the other parents' showing behavior involved presenting an object in front of the infant's face and commenting, Infant 3's mother's showing behaviors looked very different. She placed the object in front of the infant's face with her face right next to the object and with a big smile she commented. She would then move the toy away from her face slowly and using differentiated voice tones and her smiling face, she shaped a tracking response to the object as it moved while making it easy for her infant to shift gaze between the object and her face given the close proximity between the two. The pattern of emergence for Infant 3's engagement is unique in comparison to the other infants in that supported and coordinated engagement appear to be increasing at the same time rather than an increase in supported engagement with occasional time spent in coordinated engagement appearing. Whether or not the qualitative differences in this mother's showing behavior is responsible for the pattern in acquisition of coordinated engagement is unclear; however, further investigation around the presentation of objects in proximity to the mother's face in addition to her affect is recommended.

Through a more complete and well developed account of the emergence of joint attention, identification of autism at earlier ages may result. The preliminary

demonstration in this study that infants as young as 12 weeks old may be spending even a very small percentage of time in supported engagement with their mothers requires further investigation. More observations of larger numbers of infants at 5 months old and younger are needed. Investigations regarding the relationship between supported and coordinated attention may increase our understanding of joint attention emergence. What role does supported engagement play into the development of coordinated engagement? Is supported engagement a prerequisite to coordinated engagement? The answers to these questions may also lead to greater understanding of the maintaining variables in joint attention allowing for the development of more effective teaching procedures.

Challenges that were present during this study involve the reliability of the measures and the quality of the videos. The code was initially developed and tested with two infants (Suchomel, 2009). The data for those infants is presented in the present study as Infant 1 and Infant 5. Data presented for the other infants were collected by me with the help of a data collector from the first study. There were situations that occurred where scoring was not clear given Infants 2, 3, and 4 presented behaviors that were not observed in the first two children, resulting in questions regarding how to score that were not addressed in the code. For example, in one case, the parent used her hands to clap and the infant directs gaze toward the parent's moving hands. The code specifies to score "watching" if the infant directs gaze toward the parent's hands while the parent is manipulating a toy, or "toy" if the infant directs gaze toward a toy. Given the parent used her hands as the toy, the code was unclear. The principal investigator was consulted and it was determined the parent's hands were

the toy and scoring “toy” was the best choice. Reliability in scoring infant reach behaviors was another challenge. The code specifies that reach is “the extension of the arm(s) with a closed or open hand.” It also specifies to score reach as duration. Identifying when one instance of a reach began and ended was a challenge resulting in low reliability. Fine tuning the observation code by adding more examples and non-examples as well as stating start points and end points for behaviors that are scored in terms of duration is needed to improve the reliability. Also, video recordings of the playtime sessions using multiple cameras with time codes embedded into the image and eye tracking devices will improve the ease of data collection, the reliability, and the completeness of the data as scoring “off camera” when the infant was out of view would be reduced or completely eliminated.

The acquisition of joint attention has been linked to greater language development and vocabulary (Slaughter & McConnell, 2003; Jones & Carr, 2004) and better social skills (Raver, 1996). The significance of joint attention in the early development of infants makes it an area we need to understand so we can intervene in cases where joint attention is not developing, as in the case of infants with autism. The data from this study provide confirmation of results of other studies including the initial direction of gaze toward the parent and then toward objects and events (Bakeman & Adamson, 1984, Striano & Bertin, 2005). One contribution of the present study involves furthering the development of the observation code. By implementing this code with three more infants independent of the code developer, modifications can be made to improve the reliability. The benefits of increasing our understanding of joint attention

skills are related directly to the early identification of autism and the increased ability to develop a strong technology of teaching joint attention to children with autism.

Table 1

*Matrix of Joint Attention Testing Methods in the Literature*

<b>Reference</b>	<b>Recording Devices</b>	<b>Behaviors Measured</b>	<b>Results</b>
Bakeman & Adamson (1984)	2 black and white video cameras (Sanyo VCM-20N50 with Newvicon tube), a standard time code and 2 microphones	Six categories of engagement: unengaged, onlooking, persons, objects, passive joint, coordinated joint	Data were reported as average percent of time infants spent in each engagement state at each age tested. Person engagement decreased while coordinated engagement increased over time.
Hart and Risley (1992)	tape recorder and a clip board and a pretrained code	10 measures of parenting were scored	Found a relationship between the parent language use and frequency and the children's amount and complexity of language.
Mundy, Block, Delgado, Pomares, Van Hecke, and Parlade (2007)	A video recorder through a one way mirror.	Responding to Joint Attention (RJA), Initiating Joint Attention (IJA), Initiating Behavior Regulation/Requests (IBR), Responding to Behavior Requests (RBR)	Age-related patterns in joint attention development were observed in TD but not so in infants who were ARDD; RJA at 12 mo and IJA at 18 mo predicted language development at 24 months

*(table continues)*

Table 1 (continued).

Reference	Recording Devices	Behaviors Measured	Results
Striano and Bertin (2005)	digital video camera was positioned	Coordinated Attention, Gaze Following, Point Following	Infants passed or failed tasks depending on whether they engaged in the target behavior at least one time per session. For coordinated attention, 74% of infants at 8 months old passed.
Striano and Bertin (2005)	4 digital video cameras filmed at various angles	Joint Engagement Looks, and Joint Engagement Looks with a Smile	JE-Looks toward the stranger increased across more infants over time. This occurred also for the mother from month 5 to 7 but not into 9 months old.
Striano and Stahl (2005)	video recording	Gazing, Smiling, and Gaze Following	Across ages, infants spent more time gazing toward the experimenter during the initial interaction and the JA condition and the least during the look away condition.

Table 2

<i>Developmental Testing Results</i>										
	<b>Infant 1</b>		<b>Infant 2</b>		<b>Infant 3</b>		<b>Infant 4</b>		<b>Infant 5</b>	
<b>Rossetti</b>	1 month	4.75 month	1.25 months	6 months	2.25 months	5.75 months	4.5 months	8 months	4.5 months	8.75 mo
Interaction – Attachment	0-3 mo	3-6 mo	0-3 mo	3-6 mo	0-3 mo	3-6 mo	6-9 mo	6-9 mo	3-6 mo	9-12 mo
Pragmatics	0-3 mo	6-9 mo	0-3 mo	3-6 mo	0-3 mo	3-6 mo	3-6 mo	6-9 mo	3-6 mo	9-12 mo
Gesture	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9-12 mo
Play	0-3 mo	6-9 mo	0-3 mo	3-6 mo	0-3 mo	6-9 mo	3-6 mo	6-9 mo	3-6 mo	9-12 mo
Language Comprehension	0-3 mo	6-9 mo	3-6 mo	3-6 mo	0-3 mo	6-9 mo	3-6 mo	6-9 mo	3-6 mo	9-12 mo
Language Expression	0-3 mo	6-9 mo	0-3 mo	3-6 mo	0-3 mo	3-6 mo	3-6 mo	6-9 mo	3-6 mo	6-9 mo
<b>Hawaiian Early Learning Profile</b>	1 month	4.75 month	1.25 months	6 months	2.25 months	5.75 months	4.5 months	8 months	4.5 months	8.75 mo
Cognitive	1-2 mo	4-6 mo	1.5-4 mo	5.5-7.5 mo	2-3 mo	4-5 mo	5-6.5	6-9 mo	3.5-5 mo	11
Expressive Language	1-5 mo	5-7 mo	1-5 mo	6.5-8 mo	2.5-5.5 mo	5.5-6.5 mo	5-6 mo	6.5-8 mo	5-7 mo	6.5-8 mo
Gross Motor	1.5-2.5 mo	3-5 mo	1-2 mo	6-7.5 mo	1.5-2.5 mo	4-5 mo	5-6 mo	6-9 mo	1.5-2 mo	6-10.5 mo
Fine Motor	2-3 mo	4-5 mo	2-3 mo	5-6 mo	2-3 mo	5-6 mo	4-5.5 mo	6-9 mo	4-5.5 mo	Can't find
Social - Emotional	1.5-4 mo	5.5-8.5 mo	0-3 mo	5.5-7.5 mo	3-5 mo	5-6.5 mo	3-5 mo	7-12 mo	Can't find	Can't find
Self-Help	3-5 mo	6.5-9	0-3 mo	5-8 mo	3-5 mo	5.5-9 mo	4-5.5 mo	6-9 mo	Can't find	9-12 mo

Table 3

Data Sheet

Joint Attention Data

Nicole Suchomel

Child: \_\_\_\_\_  
 Session #: \_\_\_\_\_

Data Collector: \_\_\_\_\_  
 Date of Session: \_\_\_\_\_

IOA: \_\_\_\_\_  
 Minute #: \_\_\_\_\_

time	gaze			child behavior						parent behavior			vocalizations				time	states of engagement											
	T	P	W	C	reach	grasp	point	show	give	follows	point	show	give	parent ve	child vert	hiccup		protest	per	obj	supp	coop	un						
0:01	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C									0:01						
0:02	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:02					
0:03	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:03					
0:04	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:04					
0:05	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:05					
0:06	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:06					
0:07	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:07					
0:08	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:08					
0:09	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:09					
0:10	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:10					
0:11	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:11					
0:12	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:12					
0:13	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:13					
0:14	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:14					
0:15	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:15					
0:16	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:16					
0:17	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:17					
0:18	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:18					
0:19	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:19					
0:20	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:20					
0:21	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:21					
0:22	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:22					
0:23	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:23					
0:24	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:24					
0:25	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:25					
0:26	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:26					
0:27	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:27					
0:28	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:28					
0:29	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:29					
0:30	T	P	W	C	D	C	T	BP	C	1	2	T	BP	C										0:30					



Table 4

*Summary of Interobserver Agreement by Topography*

		Infant 1	Infant 2	Infant 3	Infant 4	Infant 5	Overall Average
Child Gaze	Toy	100	100	100	48.15	81.25	85.88
	Parent	98.38	91.06	81.04	75	98.65	88.83
	Watching	100	100	86.27	90.12	61.64	87.61
	Camera	94.74	83.33	100	94.37	91.55	92.8
Child Reach	Distal	66.67	84.91	58.33	63.48	84.62	71.6
	Contact Toy	100	100	57.14	75	94.44	85.32
	Contact Body	42.86	71.43	58.62	72.72	100	69.13
	Contact						
	Clothing	25	66.67	0	42.11	100	46.76
	Other	100	100	100	100	66.67	93.33
Child Gestures	Point	100	75	100	100	100	95
	Show	100	100	100	100	100	100
	Give	100	100	100	100	100	100
Child Grasp	1 Toy	100	100	62.5	71.43	66.67	80.12
	2 Toy	100	100	100	100	50	90
	1 Body Part	100	100	50	100	100	90
	2 Body Part	100	75	100	100	100	95
	1 Clothing	100	100	67	50	100	83.4
	2 Clothing	100	100	100	80	100	96
Parent Gestures	Point	100	88.24	80	100	33.33	80.31
	Show	100	100	92.86	100	55.56	89.68
	Give	100	100	67	75	100	88.4
Parent Verbalizations		85.8	97.66	99.6	98.93	99.62	96.32
Child Vocalizations		75.68	65.71	62.32	86.21	85.81	92.19

Overall IOA = 86.86%

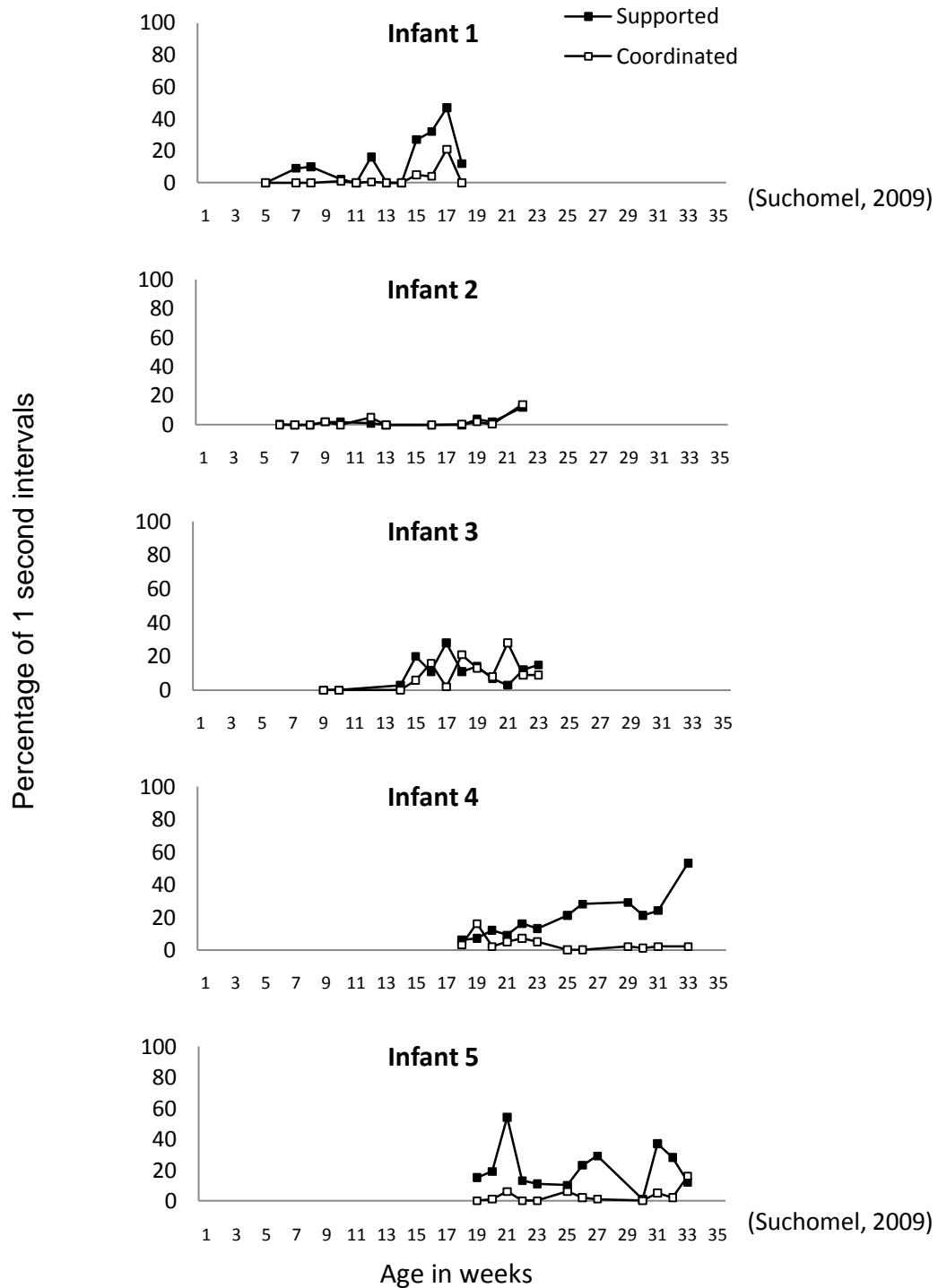


Figure 1. Joint attention. Percentage of 1 second intervals in which supported attention, when the infant and the parent are actively engaged with a toy but not with each other, and coordinated attention, when the infant and the parent are both engaged with each other and a toy occurred across playtime sessions.

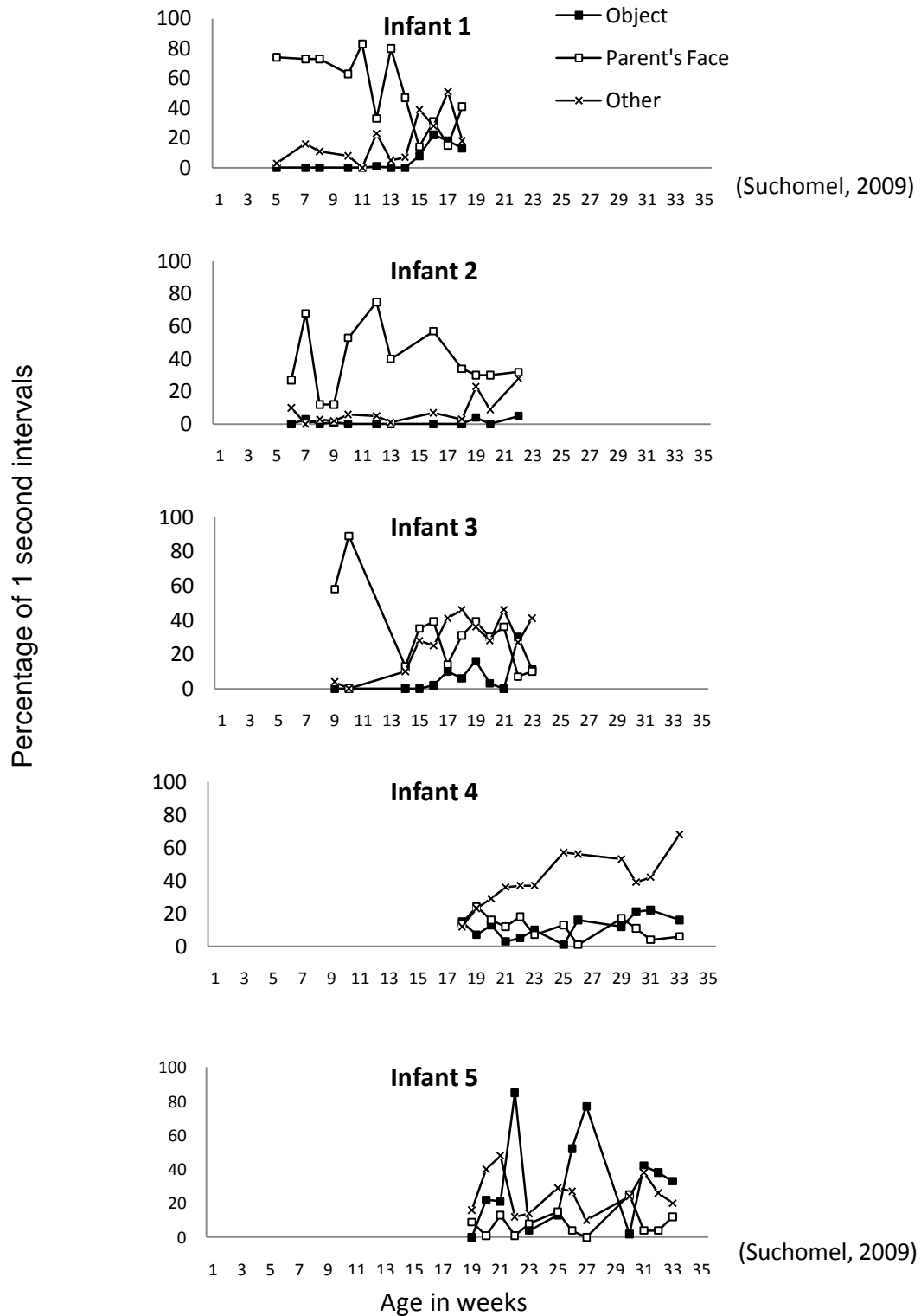


Figure 2. Focus of attention. Percentage of 1 second intervals each infant spent directing their gaze toward an object, parent's face, or something else.

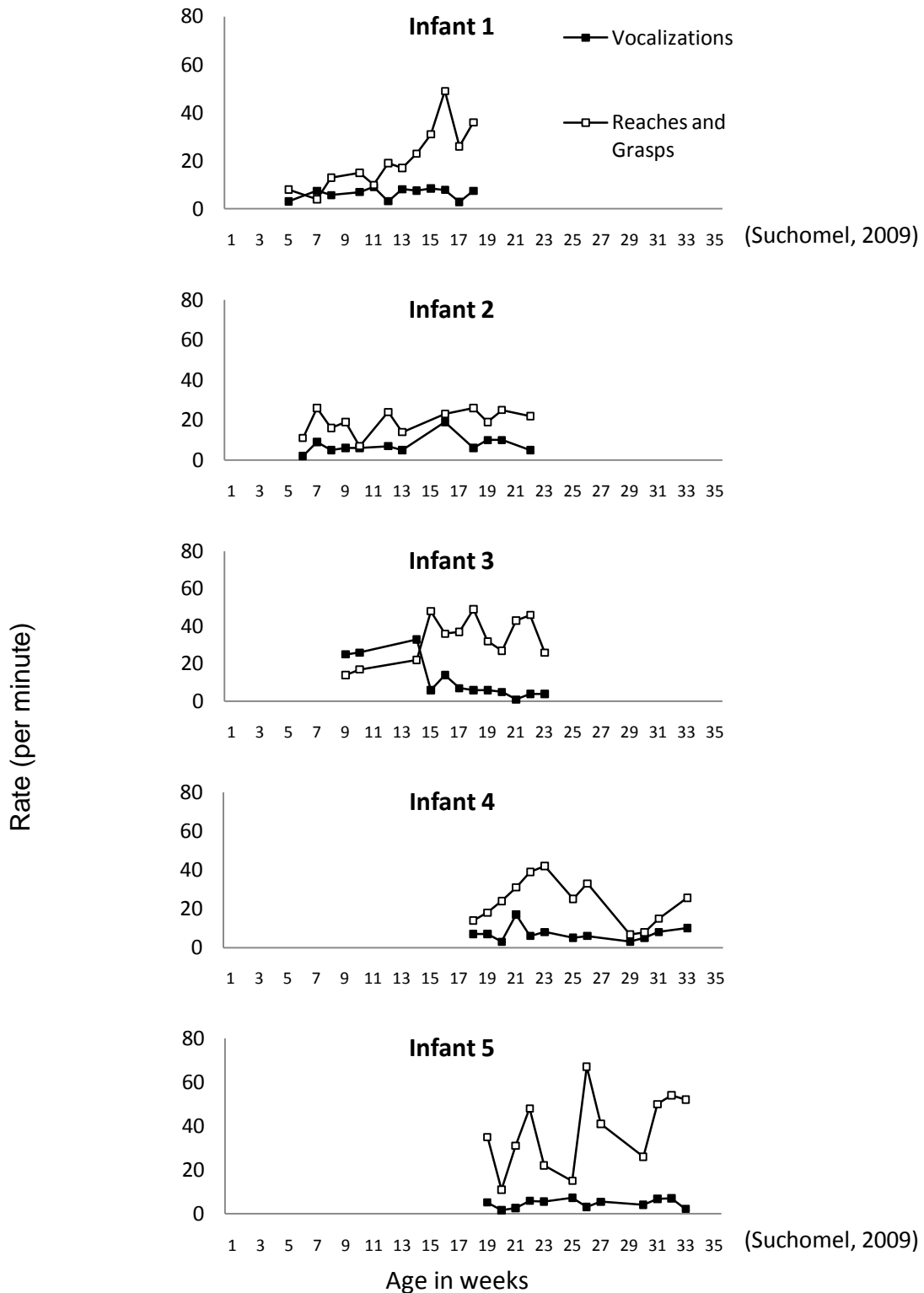
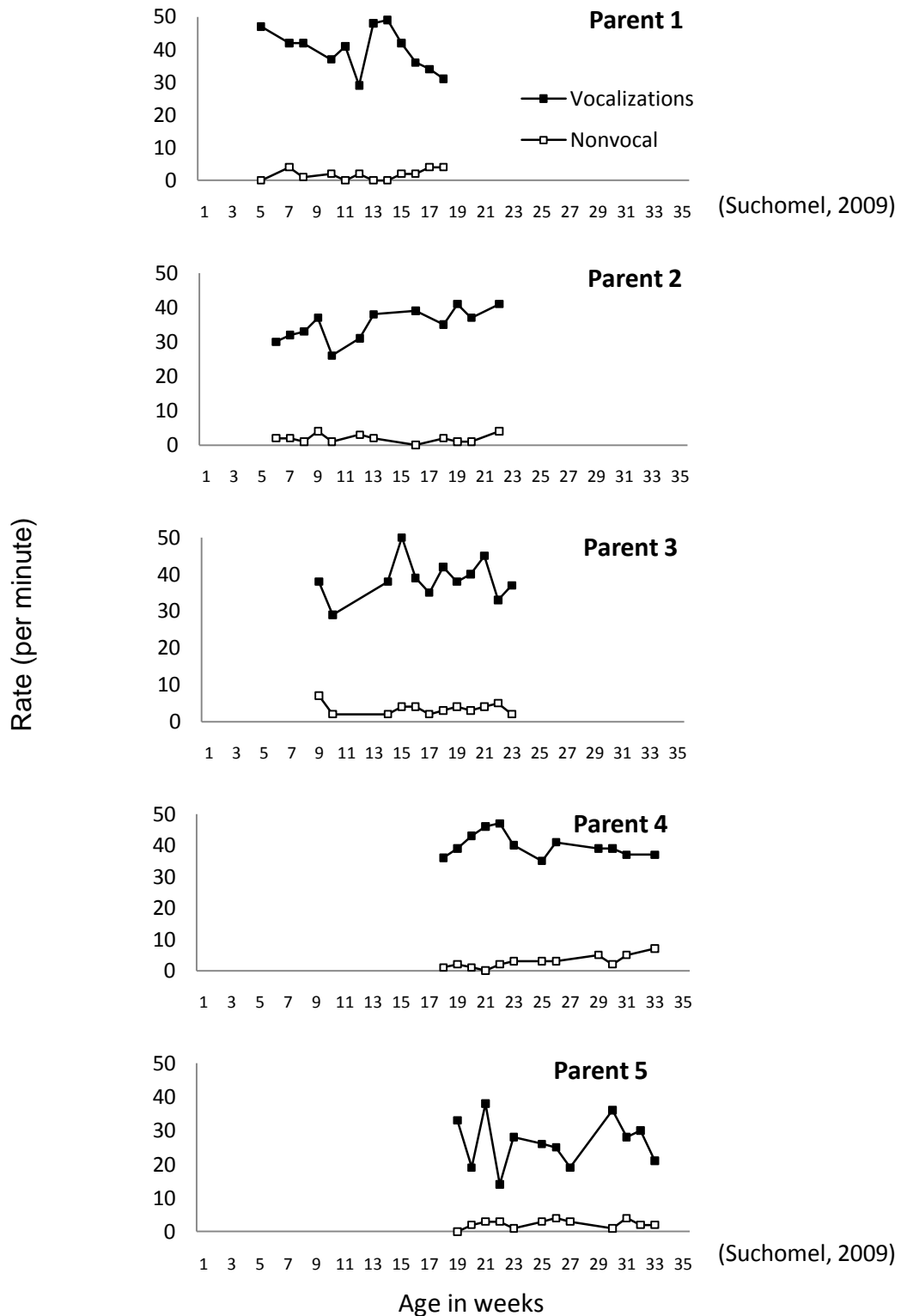


Figure 3. Infant responses. Rate (per minute) of infant responding including vocalizations, and reaches and grasps combined.



*Figure 4.* Parent responses. Rate (per minute) of parent responses including vocalizations directed toward the infant and nonvocal responses including pointing, showing, or giving an item to the infant.

APPENDIX A  
LITERATURE REVIEW OF JOINT ATTENTION

## Ages and Skills

<b>References</b>	<b>Infant's Age</b>	<b>Skill</b>
Fantz (1963)	within 5 days of birth	infants discriminate faces
D'Entremont, et al. (1996)	4 months old	gaze shifting
Gredeback, et al. (2008)	5 to 6 months old	gaze shifting
Morales, et al. (1998)	6 months old	infants match head turns to visible targets
Corkum & Moore (1998)	8 months old	infants can learn to follow eye gaze
Murphy (1978)	9 months old	pointing emerges
Corkum & Moore (1998)	11 to 12 months old	infants reliably follow adults gaze
Leung & Rheingold (1981)	12 months old	pointing and vocalizing to IJA
Johnson, et al. (1998)	12 months old	infants discriminate and do NOT follow "head" turns when there is no face
Carpenter, et al. (1998)	12 months old	joint attention
Slaughter & McConnell (2003)	between 9 and 14 months old	infants "spontaneously exhibit joint attention behaviors"
Dunham and Moore (1995)	between 9 and 15 months old	joint attention
Bakeman & Adamson (1984)	between 9 and 18 months old	joint attention
Murphy (1978)	14 months old	vocalizations are added to pointing

*Development of Joint Attention*

Reference	Development of Joint Attention
Adamson, Bakeman & Deckner (2004)	Attention moves from intimate people to immediate objects and events → responding to and initiating object directed gaze through supported engagement → pointing and social referencing → the ability to sustain periods of coordinated joint engagement
Bakeman & Adamson (1984)	1.) Dyadic interactions a)attention is confined to the <i>interaction</i> with the person 2.)move to object exploration a)still attention is to <i>one aspect</i> of the environment 3.)object focus "becomes embedded in social contexts" - gaze shift between person and object leading to gestures clearly indicating the child is sharing the object/event as the "topic of joint concern". 4.)"the ability to coordinate attention becomes consolidated"
Moll & Tomasello (2007)	"The experimenters question what infants understand about the perception, attention, and even knowledge of others"
Mundy, Block, Delgado, Pomares, Kecke, & Parlade (2007)	Descriptions of various models are presented: <i>Universal Cognitive Model (UCM)</i> - joint attention is an "expression of general aspects of cognitive development" and can predict later outcomes, IQ. <i>Social Cognitive Model (SCM)</i> - suggests that infants have an early understanding of others' intentions. <i>Multiple Processes Model (MPM)</i> - joint attention development is related to frontal brain activity, involved with inhibiting and switching behavioral responses, attention regulation, self-monitoring, learning and reward sensitivity.
Raver (1996)	Parents are responsive to their child's social cues → the parent and child then use gestures and alternate their gaze between object and partner to coordinate and sustain joint attention.

*(table continues)*



*Development of Joint Attention (continued).*

<b>Reference</b>	<b>Development of Joint Attention</b>
Slaughter & McConnell (2003)	Between 9 and 14 months old infants "spontaneously exhibit joint attention behaviors". Gaze following, object-directed imitation and social referencing are all involved. The question is to what extent are joint attention behaviors developmentally related? An awareness of other minds vs joint attention behaviors develop through learning - reinforcement contingencies.
Striano & Bertin (2005)	1.) At some point, humans follow the attention of others; 2.) Engage in social referencing; 3.) Imitate; 4.) show and share objects with partners. The question presented is whether or not "the manifestation of joint attention skills implies an awareness of others' intentions".
Taylor & Hoch (2008)	1.) Gaze shift between an object or event in the environment and a person 2.) Responding to bids for joint attention (SD for adults mand for child's attention and maintained by generalized reinforcers) and initiating joint attention (mand for the adult's attention being directed toward the object or event of interest) in response to an interesting object or event (MO)

APPENDIX B  
PUBLIC FLYER USED TO RECRUIT PARTICIPANTS

## Do you enjoy watching your child learn and develop?



If so, you may be interested in participating in a study on the development of social behaviors in infants. Babies and their parents in this study will be videotaped once per week for 3 consecutive months.

The purpose of this study is to see how social behaviors, such as joint attention and imitation, develop across time in typically developing children. If you are interested and your child is under 2 months of age, please contact

**In gratitude for your time and contribution, each participating family will be presented with a video of you and your child over the course of 3 months!**

APPENDIX C  
COMPLETE OBSERVATION CODE

## Child Behavior

### Observing Behavior

**Watching the Parent** occurs if the child is looking at the object or at the parent's hands while the parent is manipulating the object.

#### Examples of Watching the Parent

- The child is looking at the toy that the parent is holding.
- The child is looking at the toy while the parent is manipulating it.
- The child looks at the parent's hands while the parent spins the toy.

#### Non-examples of Watching the Parent

- The child looks at the toy after the parent lets go of it.
- The child looks at the parent's face while the parent is manipulating a toy.
- The child looks at the toy they are holding.

**Toy.** Looking at the toy is defined as the child looking at a toy that the parent is not holding or playing with. The child can be holding the toy, the toy can be hanging from a mobile, a play mat, or the toy can be an object near the child that they are looking at.

#### Examples of Toy Gaze

- Child is holding a toy cow and their gaze is fixed on the cow.
- The child is looking at a starfish that is attached to the play mat that they are laying on.
- The parent hangs a mobile on the child's bouncy seat and then places the child in the seat. The child looks at the toys hanging from their bouncy seat.

#### Non-examples of Toy Gaze

- The child is looking at the toy that the parent is holding (this is watching).
- The child is looking at the parent's face (this would be scored as P – gaze shift to parent).
- The child is looking at their own hand.

**Parent.** Looking at the parent is defined as the child's gaze being directed towards the video camera.

**Camera.** Looking at the camera is defined as the child's gaze being directed towards the video camera.

**Gaze shift.** A gaze shift occurs if the child looks from the play object to the parent's **face** in less than 3 seconds. That is, there is less than 3 sec between breaking gaze with the object and fixing gaze on the parent's face.

### Examples of Gaze Shift

- The child looks from the toy the parent is holding to the parent's face.
- The child looks from the parent, to a toy, and back to the parent.
- The child looks from the toy they are holding to the parent's face.

### Non-examples of Gaze Shift

- The child looks from the toy to the parent in 5 seconds.
- The child looks at the toy the parent is holding.
- The child looks at the parent's shirt.

If the parent is not looking at the child, then eye contact is not required.

### **Scoring observing behavior**

- "T" for looking at the object is scored while the parent is not holding or playing with it. (NOTE: coding sheet has "T" for toy, but this also applies to other objects that are the focus of joint attention, such as a fan or the family dog).
- "P" for looking at the parent's face.
- "C" for looking at the video camera.
- Both "T" and "P" for intervals with a gaze shift from the toy to the parent's face.
- "W" (Watching) for looking at the object or parent's hands while the parent is holding or manipulating the object.
- If both the child and the parent are holding or manipulating the same object AND the child is looking at the toy, score the second as both "W" (watching) and "T" (toy).
- Leave blank if none of these apply (e.g., looking at the ceiling and not manipulating a play object).
- If you cannot see the child's eyes, you cannot score gaze. Use your pencil to darken the seconds in which you cannot see the child's eyes.
- IOA for gaze shifts will be calculated on the frequency of T-P shifts, with a plus-or-minus 1 sec window of agreement. For purposes of IOA for gaze shifts, "T" and "W" are equivalent. For example,
  - No agreement: T/P/P/P and P/P/T/P
  - Agreement: T/P/P/P and P/T/P/P
  - Agreement: P/P/W/P and P/T/T/P
  - Agreement: P/T/P/P and T/P/P/P.

## Gestures

**Grasp.** Child wraps at least one of their hands around a toy, clothing, or body part and maintains contact with that object for at least 1 second. The child can grab a toy, clothing, or body part with one or two hands. Score the material that the child grasps as a toy, clothing, or body part.

### Examples of Grasp

- Child reaches for a toy on the floor and picks it up.
- Parent shows a toy to the child and the child removes it from the parent's hand.
- Child wraps their hand around a parent's finger.

### Non-examples of Grasp

- Child extends their hand toward an object but does not make contact with the object.
- Child extends their hand toward an object and makes contact with the object, but does not grab it.

**Reach.** A reach is defined as an extension of the arm(s) with a closed or open hand. The child may reach for an object and never actually touch it (distal reach). The child may reach for an object and touch it (contact reach). If it is a contact reach, score what the child contacted as a toy, clothing, or a body part.

### Examples of Reaching

- Parent shows a toy and the child extends their hand and arm towards the object.
- A toy is lying on the floor and the child extends their hand and arm towards the toy.
- The child extends their hand towards the parent's mouth and touches the parent's mouth.
- Child extends their arm(s) away from the side of their body and does come into contact with anything.

### Non-examples of Reaching

- Child grabs their clothing.
- Child turns their hand with their elbow bent.

**Point Type P.** Child uses isolated finger to gesture to an object and the finger is extended and adjacent fingers are splayed downward and outward, as to separate the isolated finger from adjacent fingers. This could be a contact point or a distal point.

### Examples of Point –P

- The child points to the dog as it enters the room.
- The child extends their arm and points at the toy on the mobile.

### Non-examples of Point-P

- The child grasps a toy with both hands.
- The child touches an object with an open hand.

**Point Type H.** Child gestures to an object with more than one finger extended, and the selective part of the gesture is the finger(s). This can be contact or distal.

### Example of Point-H

- The child touches book picture with whole hand or multiple fingers and this appears a referential gesture.

### Non-examples of Point

- Spitting and rubbing spit on stimuli
- Child touches finger or hand to picture book in order to turn the page
- Gestures with whole hand (e.g., head, elbow)

**Show.** Child holds object in hand and extends toward parent, or tips toward parent, or rotates to expose a part of the object to the parent. Object remains less than half the distance between the child and the parent (the child does not touch object to parent). If the parent attempts to take the object and child resists, score as Show.

### Examples of Show

- Child holds up a toy cow in the direction of the parent.
- Child turns a toy phone to expose the part that is lighting up to the parent.

### Non-examples of Show

- Excludes showing that occurs as part of a behavioral request such as showing the toy to a parent for assistance.

**Give.** Child puts item into parent's hand, or touches item to parent's body part, or moves object in front of parent in a way that transfers possession of the object to the parent. *Possession* includes anything in the parent's hands. Eye contact is not necessary. Object must be extended more than half the distance between the child and the parent. The object can be physically present or imaginary.



If the parent attempts to take the object and the child resists, score as Show.

### Examples of Give

- The child gives their pacifier to the parent.
- The child holds out a toy and places it in the parent's hand.'

### Non-examples of Give

- Excludes requests that are not part of play such as giving a toy to a parent for assistance.

**Following the parent's lead.** This occurs when some aspect of the child's non-verbal behavior changes in response to the parent's behavior. The behavior of Following indicates that the child is aware of what the parent is doing.

**NOTE:** Following is coded to help define the Supported type of engagement. Following shows that the child "is aware" of the parent's activity with respect to the object, but in a way that does not give rise to the level of Coordinated, i.e., no Gaze shift, Point, Show, or Give).

### Examples of Following

- A response to a parent's comment:
  - Parent says, "I see the puppy running" and the child looks in the direction of the puppy.
  - Parent says, "Your turn" and the child plays with the toy.
  - Parent says, "Look at this cool toy" and the child looks in the direction of the toy.
- Taking an object from the parent's hand; this may be during a parent's Give but also at other times.
- Taking turns or other sequential play gestures; e.g., the parent puts a ring on the tower and the child puts another ring on the tower
- Parent opens and hold out a toy and the child takes something from it.
- Following is likely after a parent's Point; the parent points at an object and says, "Look" and the child looks at the object.

### Non-examples of Following

- Pointing, Showing, or Giving are not following because they can initiate or maintain the state of Coordinated JA.
- Moving the head while watching the parent is not Following- it is Watching.
- Parent places a toy on the floor, lets go of it, and the child grabs it. This is not Following because the toy is already in place when the child grabs it; the child's behavior does not indicate awareness that the parent put it there.

### **Scoring gestures**

Score Grasp as duration. If the child grasps a toy, blanket or other object with one hand, put a line through 1 and score the duration of the grasp. If the child grasps a toy, blanket or other object with 2 hands, put a line through 2 and score the duration of the grasp. Document the item that the child is grasping as a toy, clothing or body part by putting a line through the corresponding letter.

Score Reach as duration. If the child extends their arm away from their body but does not touch anything, put a line through D for Distal Reach. If the child extends their arm away from their body and touches a stimulus, put a line through C for Contact Reach. Document the item that the child is in contact with as a toy, clothing or body part by putting a line through the corresponding letter.

If the Point is type H than write "H" in the Point column. Use either "P" or a check mark for type P. For IOA: P=H=agreement.

The entire duration of gestures should be coded. Use a line or arrow to indicate the duration of any gesture lasting longer than a second in which it began.

"F" for Following the parent's lead.

NOTE: Following may co-occur with Watching; if so, code both. This may happen during a parent's Show and Give.

### Examples of Watching and Following together

- Parent Shows a toy, and the child looks at it and reaches out to take it.
- Parent holds out a toy to Give to the child, and the child looks at it and reaches out to take it.
- Parent is putting a ring on the ring stacker and the child is watching the parent put theirs on, and then the child puts their ring on the ring stacker.

NOTE: Following may co-occur with Giving; if so, code both.

### Examples of Giving and Following Together

- Parent gives a ring to the child, and then the child gives one to the parent.

### **Vocalizations**

**Verbalizations.** Child makes an auditory sound such as cooing, babbling, or gurgling.

#### **Examples of Verbalizations**

- Child blows a “raspberry”.
- Child says, “da da da”.
- Child makes a grunting sound as reaching for a toy.

#### **Non-examples of Verbalizations**

- Child crying.

**Hiccup.** An auditory sound made when the child inhales air, sounds similar to a hiccup.

#### **Non-examples of Hiccup**

- Child says, “da da da”.
- Child says, “oooooooo”.
- Child laughs.

**Protests.** Child engages in vocalizations such as yells, whines with distress (example but not limited to fear, etc.), or screams which may or may not be accompanied by physically retreating or protesting.

#### **Examples of Protests**

- The child starts crying while playing with a stuffed animal.
- Child vocalizes while protesting.
- Child cries while getting their diaper changed.
- Child makes a whining sound when parent sits them up.

#### **Non-examples of Protests**

- Child is giving their pacifier and the child throws it.
- Child gets excited and vocalizes when being tickled.
- Child babbles extremely loudly.

\*If the parent assists the child in any of the gestures or vocalization (i.e. hand-over-hand the child to grasp an object, helps the child grasp their foot, hand-over-hand the child to give the parent a toy, or manipulates the child’s mouth to make a vocalization) put a star in that second and score the duration of the prompt.

## Parent Behavior

### Gestures

**Point.** Parent uses isolated finger to gesture to an object and the finger is extended and adjacent fingers are splayed downward or outward, as to separate the isolate finger from adjacent fingers. This could be a contact point or distal point.

**Give.** Parent puts item into child's hand, or touches hand, or touches item to child's body part, or moves object in front of child in a way that transfers possession of the object to the child. *Possession* includes anything in the child's hands or mouth (such as a pacifier). Eye contact is not necessary. Object must be extended more than half the distance between the child and the parent.

If the child attempts to take the object and the apparent resists, score a Show.

### Example of Give

- The parent gives a pacifier to the child.
- The parent holds a toy and places it in the child's hand.
- Parent places a bumble bee in the child's lap.

### Non-examples of Give

- Parent points to a toy on the play mat.
- Parent holds up a bumble bee and makes a buzzing noise.

**Show.** Parent holds object in hand and extends toward child, or tips toward child, or rotates to expose a part to the child. The object may be fixed to a play mat or saucer: the parent manipulates a part of the object to expose the object to the child. A show must be at least 1 second in duration. The object may touch the child if the parent is showing the toy and then using it in an anticipatory game.

### Examples of Show

- Parent holds object in front of the child and says, "Look...", "See, it's a ...", or makes a comment about the toy.
- Parent manipulates a toy in the correct manner to model for the child and then says "boop, boop, boop" while the parent moves the object closer and closer to the child before kissing the child on the cheek with the caterpillar.

### Non-examples of Show

- Parent picks up a toy, turns it so that the front of the toy is facing the child but immediately puts it down; does not hold up the toy and display it.
- Parent holds an item closer to their body (not half way between the child and parent) so that the child can see it.
- Parent places a toy cow in the child's lap.

### **Vocalizations.**

**Verbalizations.** Parent makes a comment or asks a question that is directed toward the child. The comment or question may be redundant (i.e., "spin, spin, spin") or it may be "nonsense" words and sounds (i.e., "boop, boop, boop", "adieu").

### **Examples of Verbalizations**

- The parent says, "Well good morning".
- The parent says, "I hear your brother laughing in the other room".
- The parent says, "Here comes the bee. Buzz, buzz, buzz".

### **Non-examples of Verbalizations**

- Parent speaks to another child or spouse in the room.
- Parent looks at the camera operator and asks to stop the session.

### **Scoring Parent Behavior**

Score the duration of adult gestures and verbalizations by checking contiguous seconds or putting arrows to next interval. Score in the second that the parent begins to speak or gesture.

Score comments by adults that occur as part of gestures. Example, adult points and says, "look".

## Types of Engagement

**Unengaged** – Child is not involved with specific person, object, or activity. The minimum duration for Unengaged is 2 seconds. That is, the coding sheet must have at least 2 consecutive seconds in which there are no coded occurrences of T, P, W, F, Comments, Conventional Gestures, Point, Show, or Give. Therefore, a brief, 1 second look away from the toy and parent will not trigger a change to the Unengaged state.

**Person engagement** – Child interacts with parent, but without engagement with the current object or activity (i.e., dyadic, not triadic). The Person state is similar to Unengaged, except that it includes social interaction. *Social interaction* includes looking at the parent, touching the parent (tickling, etc.), or other non-toy-related interpersonal behavior. The minimum duration of the Person state is 3 seconds. That is, the coding sheet must have at least 3 consecutive seconds in which there are no coded occurrences of T, W, F, Conventional Gestures, Point, Show, or Give (only P or other vocalizations is coded).

**Coordinated joint engagement** - Child and parent are both actively engaged with the object and with each other. Must begin with the child's Gaze shift, Point, Show, or Give gesture. This type of engagement is maintained by the child's gaze shifts, Point, Show, or Give gestures, with no more than a 15 seconds gap between any two of these behaviors. This type may be maintained for a maximum of 15 seconds by the child's Comments or Conventional Gestures alone. If there are Comments but no gaze shift, Point, Show, or Give gesture within 15 seconds of the initiating behavior then the Coordinated state ends after the last Comment within the 15 seconds (even if the comments continue).

Coordinated is initiated by: Gaze shift, Point, Show, or Give

Coordinated is maintained by: Gaze shift, Point, Show, or Give with <15 s gap

Coordinated is maintained *for max* 15 sec by: Comments, Conventional Gestures

**Supported joint engagement** – (equivalent to Passive joint) Child and parent are both actively engaged with the object, but the child does not contribute sufficient interaction to qualify as Coordinated joint attention. This type of engagement is initiated or maintained by both (a) the parent's Comments and gestures AND (b) the child behaviors of Watching the parent, Following the parent's lead, Comments, or Conventional Gestures, with no more than a 15 second gap between any two of these behaviors.

Supported is initiated by: Watching, Following, Comments, Conventional

Gestures

Supported is maintained by: Watching, Following, Comments, Conventional  
Gestures with <15 s gap

**Object engagement** - Child interacts with object, without any behavior directed toward the parent or acknowledgment of the parent's presence (i.e., solitary play).

**Scoring Types of Engagement.** If the sample ends before the criteria for a type change can be evaluated (e.g., 15 seconds to maintain Coordinated), then continue to score the end of the sample the same as the most recent type of engagement.

Note that a shift in the object does not necessarily mean a shift in Type of Engagement. For example, given Coordinated Joint Attention to a toy, if the child shifts in focus to the camera by initiating JA, and the parent follows the child's lead and also shifts to the camera, then Coordinated engagement may be maintained.

APPENDIX D  
PARENT INTERVIEW FORMS





8. Where do you prefer us to park?
  
9. Are there any house rules we should know about?
  - a. Shoes in the house:
  - b. Knock or ring the doorbell:
  - c. Drinks (water):
  - d. Others:
  
10. Do you have any pets?
  
11. Severe allergies of any family members (i.e. perfume, cats, peanuts, etc.)?
  
12. Questions or concerns of parent:

APPENDIX E  
INSTRUCTIONS TO PARENTS

**Protocol**  
**Instruction to Parents**

- You are welcome to ask any questions before and after the 10 minute playtime session.
- We are not allowed to talk to you during the 10 minute playtime session
- We are not allowed to give you any sort of feedback regarding your interaction with your child.
- We will reserve 1 hour for the playtime session and any questions or comments you may have. You are welcome to use the entire hour for questions or comments, or you may choose to just complete the 10 minute playtime session and we will leave. Please let us know your preference.
- We are not allowed to engage in play interaction with any of your children. While we would love to play with all of the children, it may affect the goals of this thesis.
- Please feel comfortable to be you! Move around and play as you normally would.
- Do not worry about house cleanliness. It is okay if the house is lived in!

APPENDIX F  
INFORMED CONSENT FORMS



OFFICE OF THE VICE PRESIDENT FOR RESEARCH  
Office of Research Services

April 25, 2008

Nicole Suchomel  
Department of Behavior Analysis

Enclosed is the consent document with stamped IRB approval. Please copy and use this **form only** for your study subjects.

It is your responsibility according to U.S. Department of Health and Human Services regulations to submit annual and terminal progress reports to the IRB for this project. Please mark your calendar accordingly. The IRB must also review this project prior to any modifications.

Please contact Shelia Bourns, Research Compliance Administrator, or Boyd Herndon, Director of Research Compliance, at extension 3940, if you wish to make changes or need additional information.

Sincerely,



Kenneth W. Sewell, Ph.D.

Chair  
Institutional Review Board

KS:sb  
CC: Dr. Shahla Ala'l-Rosales

University of North Texas Institutional Review Board

Informed Consent Form

Before agreeing to you and your child's participation in this research study, it is important that you read and understand the following explanation of the purpose and benefits of the study, as well as how it will be conducted.

**Title of Study:** Development of an Observation System to Measure Joint Attention

**Principle Investigator:** Nicole Suchomel, University of North Texas, Department of Behavior Analysis

**Purpose of the Study:** You and your child are being asked to participate in a research study designed to identify and measure attention-seeking and attention sharing (joint attention) behaviors in infants. My goal is to develop a measurement system that reliably counts skills related to joint attention (eye contact, smiles, gaze shifts, vocalizations, imitations, hand movements) in the natural environment. Joint attention is defined as the ability to coordinate attention between an object and another person in a social context. Joint attention can be thought of as a social interaction between child and adult that involves sharing, following, and/or directing attention by pointing or gazing. It has been documented that typically developing children exhibit joint attention around 12 to 15 months of age. The first signs of joint attention will begin around the 9<sup>th</sup> month of age and continue until the 15<sup>th</sup> month of age. My hope is that this observation system will capture joint attention as it emerges in an individual child. I am interested in joint attention because it is thought to be one of the earliest social behaviors. Children with autism spectrum disorders, which is my area of study, have profound deficits in social skill development, language development, imitation skills, and play skills. One of the most pronounced deficits typically lies in the area of social skill development. Children with autism usually need to be taught how to engage in and respond to socially appropriate behavior. The behaviors of interest will be counted by graduate students in the department of behavior analysis and analyzed in order to answer the two experimental questions. In order to better serve children with autism, I am trying to answer these questions. The first question is: are there clear, identifiable attention-seeking behaviors that appear in infants prior to joint attention? The second question is: Can prerequisite attention-seeking joint attention behaviors be reliably and consistently measured in an infant's natural environment? This information should help us better design teaching programs for children with autism.

**Study Procedures:** My interest is in documenting the development of joint attention in typically developing children. For that reason, before your child participates in the study as well as at the completion of the study, a developmental screening, provided by a faculty member at the University of North Texas, will need to be conducted. This screening will document your child's developmental profile at the beginning and end of the experiment. You will be provided with a copy of the results and if there are any

concerns regarding your child's development, we will provide you with the necessary information to pursue further evaluation.

You and your child will be asked to engage in a typical playtime session that will take about 10 minutes a day, every week, for 6 months. The procedure involves a 10-minute videotaped playtime session of you and your child interacting. All videotaped sessions will take place at the child's daycare or home.

**Voluntary Participation:** Participation in this research study is voluntary. Refusal to participate or a decision to discontinue participation will not involve a penalty or loss of benefits to which you are otherwise entitled.

**Procedures for Maintaining Confidentiality of Research Records:** All records including signed consent forms and video tapes will be kept in a locked filing cabinet in Dr. Shahla Ala'i-Rosales' office in Chilton Hall Rm. 360. No documents will be posted on the internet and any electronic copies will be given to the family immediately upon completion of the study. All research participants will be given a pseudonym that will be used when referring to that participant's data and will be maintained throughout the course of research. Following the research study, all personally identifiable data will be marked with the participant's pseudonym and remain in The Department of Behavior Analysis records for at least 3 calendar years. Because of the extensive data collection involved in the research study, a team of graduate student may view the participants' records at any time during and after the study. All of these graduate students are supervised by Dr. Shahla Ala'i-Rosales. Personally identifiable data will not be disclosed to anyone outside of The Department of Behavior Analysis. The confidentiality of the participants' personal information will be maintained in the master's thesis defense and in any public dissemination, such as appearance in academic journals and/or academic conferences.



**Questions about the Study**

If you have any questions about the study, you may contact Nicole Suchomel at [nickysuchomel@yahoo.com](mailto:nickysuchomel@yahoo.com) or (715)-271-2442, Carley McAnally at [carleymichele@gmail.com](mailto:carleymichele@gmail.com) or (972)-672-6717, or the faculty advisor, Dr. Shahla Ala'i Rosales at [srosales@unt.edu](mailto:srosales@unt.edu) or (940) 369-7454.

**Review for the Protection of Participants:** This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

\_\_\_\_\_  
Signature of Parent

\_\_\_\_\_  
Date

**For the Principal Investigator or Designee:** I certify that I have reviewed the contents of this form with the participant signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the participant understood the explanation.

\_\_\_\_\_  
Signature of Principal Investigator or Designee

\_\_\_\_\_  
Date

APPROVED BY THE UNT IRB  
FROM 4/25/08 TO 4/24/09  
NB

APPENDIX G  
OBSERVERS PROTOCOL

## **Protocol**

### **Intake Session**

- Parent Interview
- Parent Protocol
- Sign Informed Consent Form
- Provide them with Nicky and Carley's contact information

### **Day before Session**

- Call to confirm scheduled session.

### **Prior to Arrival**

- Always arrive on time!
- Dress appropriately.
- Call Carley/Nicky when arriving and leaving the house EVERY time!
- Do not leave cell phone ringer on when in the house.
- Review parent questionnaire.
- Review session log from previous session.
- Maintain confidentiality at all times.
- Smile and compliment the cuties 😊
- Make sure all materials (camera, session log, battery, tri-pod, etc) are available and ready.

### **In the Home**

- Greet family members.
- Follow house rules (take off shoes, no drinks, etc).
- Set up the camera.

### **During the Playtime Session**

- Always video playtime log with date, time, session number—write clearly and with a pen.
- State clearly when time starts and stops. Specifically say “Time is starting” and “Time is up”.
- Keep track of time!
- Do NOT speak to anyone during the 10 minute session!
- Carley and Nicky CANNOT react to the parent and child interaction in anyway!

- After the session is up, do NOT give feedback!

### **After the Playtime Session**

- Clean up the camera and datasheet.
- Ask the family if they have any questions prior to leaving.
- Thank the family for their time.
- Make sure to confirm the next session prior to leaving.

APPENDIX H  
PLAY TIME SESSION LOG

# Playtime Log

**Child/Parent:** \_\_\_\_\_

**Observer:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Session #** \_\_\_\_\_

**Time In:** \_\_\_\_\_

**Time Out:** \_\_\_\_\_

**Notes:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Next Scheduled Session:** \_\_\_\_\_

APPENDIX I  
POST PARTICIPATION QUESTIONNAIRE

## Post Participation Questionnaire

This questionnaire was designed to help us describe the families that have participated in our study. We hope that providing this information when we describe the procedures and outcomes of this study will help other families and family interventionists. Thanks for your support! **ALL INFORMATION WILL REMAIN CONFIDENTIAL.**

Child's Name \_\_\_\_\_ Date of Birth \_\_\_\_\_

How old was your child (in weeks) at the beginning of this study? \_\_\_\_\_

How old was your child (in weeks) at the end of this study? \_\_\_\_\_

Mother's age (at beginning of study): \_\_\_\_\_

Mother's occupation: \_\_\_\_\_

Circle and Complete:

High School Degree

Bachelor's Degree in: \_\_\_\_\_

Master's Degree in: \_\_\_\_\_

Doctoral Degree in: \_\_\_\_\_



How would you best describe your ethnicity? \_\_\_\_\_

Father's age (at beginning of study): \_\_\_\_\_

Father's occupation: \_\_\_\_\_

Circle and Complete:

High School Degree

Bachelor's Degree in: \_\_\_\_\_

Master's Degree in: \_\_\_\_\_

Doctoral Degree in: \_\_\_\_\_

How would you best describe your spouses' ethnicity? \_\_\_\_\_

What is your annual income (circle)?

under \$50,000   \$50,000-75,000   \$75,000-100,000   \$100,000-125,000   over \$125,000

**Please describe your experience with our study.**

What did you like best about participating in the study?

What did you like least about participating in the study?

What would you change and how would you like to see it changed?

Would you and your family consider participating in a study like this again?

Additional Comments:

APPENDIX J  
POST PARTICIPATION QUESTIONNAIRE RESULTS

	Dyad 1	Dyad 2	Dyad 3	Dyad 4	Dyad 5
<b>1. What did you like best about participating in this study?</b>	It was fun to have play sessions recorded of Lucy and me.		I liked being able to count on 10-min as week that all I had to focus on was "Infant 3" and play with him. I also liked the DVD.		Seeing the author on a weekly basis :-) Having the developmental screenings and the DVD at the end.
<b>2. What did you like least about participating in this study?</b>	That it didn't last longer. :-)		I guess I didn't like that a schedule wasn't given for the days promised. It would've helped remind me, but it wasn't a big deal.		Nothing - everything was very easy and flexible to our schedules. The authors were very sweet and professional.
<b>3. What would you change and how would you like to see it changed?</b>			Nothing.		I hate not writing anything because I want to be constructive for the authors, but I truly couldn't think of anything to say. Sorry!
<b>4. Would you and your family consider participating in a study like this again?</b>	Absolutely.		Yes.		Yes.
<b>5. Additional Comments</b>	The authors were both pleasant fantastic ladies to work with!!!				

APPENDIX K  
RAW DATA TABLES

JA	Inf1		Inf 2		Inf 3		Inf 4		Inf 5	
Age	Supp	Coor	Supp	Coor	Supp	Coor	Supp	Coor	Supp	Coo
1										
2										
3										
4										
5	0	0								
6			1	0	0	0				
7	9	0	0	0	0	0				
8	10	0	0	0						
9			2	2						
10	2	1	2	0						
11	0	0								
12	16	.5	1	5						
13	0	0	0	0						
14	0	0			3	0				
15	27	5			20	6				
16	32	4	0	0	11	16				
17	47	21			28	2				
18	12	0	0	.5	11	21	6	3		
19			4	2	14	13	7	16	15	0
20			2	.5	7	8	12	2	19	1
21					3	28	9	5	54	6
22			12	14	12	9	16	7	13	0
JA	Inf 1		Inf 2		Inf 3		Inf 4		Inf 5	

	Supp	Coor	Supp	Coor	Supp	Coor	Supp	Coor	Supp	Coor
23					5	9	13	5	11	
24										
25							21	0	10	2
26							28	0	23	1
27									29	0
28										
29							29	2		
30							21	1	37	5
31							24	2	28	2
32									12	16
33							53	2		

Focus of Attention	Infant 1			Infant 2			Infant 3			Infant 4			Infant 5		
Age	Obj	Face	Other	Obj	Face	Other	Obj	Face	Other	Obj	Face	Other	Obj	Face	Other
1															
2															
3															
4															
5	0	74	3												
6				0	27	10									
7	0	73	16	2	68	0									
8	0	73	11	0	12	3									
9				1	12	2	0	58	4						
10	0	63	8	0	53	6	0	89	0						
11	0	83	0												
12	1	33	23	0	75	5									
13	0	80	5	0	40	1									
14	0	47	7				0	13	10						
15	8	14	39				0	35	28						
16	22	31	28	0	57	7	2	39	25						
17	18	15	51				10	14	41						
18	13	41	18	0	34	3	6	31	46	15	14	12			



Focus of Attention	Infant 1			Infant 2			Infant 3			Infant 4			Infant 5		
	Obj	Face	Other	Obj	Face	Other	Obj	Face	Other	Obj	Face	Other	Obj	Face	Other
19							16	39	36	7	24	23	0	9	16
20				0	20	9	3	30	28	13	16	29	22	1	40
21							0	36	46	3	12	36	21	13	48
22							30	7	27	5	18	37	85	1	12
23				5	22	29	11	10	41	10	7	37	4	8	14
24															
25										1	13	57	13	15	29
26										16	1	56	52	4	27
27													77	0	10
28															
29										12	17	53			
30										21	11	39	2	25	24
31										22	4	42	42	4	38
32													38	4	26
33										16	6	68	33	12	20

Infant Resp	Infant 1	Infant 2	Infant 3	Infant 4	Infant 5
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onses										
Age in weeks	Vocalizations	Reaches and Grasps	Vocalizations	Reaches and Grasps	Vocalizations	Reaches and Grasps	Vocalizations	Reaches and Grasps	Vocalizations	Reaches and Grasps
1										
2										
3										
4										
5	3.1	8								
6			2	11						
7	7.5	4	9	26						
8	5.7	13	5	16						
9			6	19	25	14				
10	7	15	6	7	26	17				
11	9.1	10								
12	3.2	19	7	24						
13	8.2	17	5	14						
14	7.6	23			33	22				
15	8.5	31			6	48				
16	7.9	49	19	23	14	36				
17	2.9	26			7	37				
18	7.5	36	6	26	6	49	7	14		
19			10	19	6	32	7	18	5	35
20			10	25	5	27	3	24	2	11
21					1	43	17	31	3	31
22			5	22	4	46	6	39	6	48
23					4	26	8	42	6	22
24										
25							5	25	7	15
26							6	33	3	67
27									6	41
28										
29							3	6.7		
30							5	7.8	4	26
31							8	14.9	7	50
32									7	54
33							10	25.6	2	52
34										

Parent Responses	Infant 1		Infant 2		Infant 3		Infant 4		Infant 5	
	Vocalizations	Nonvocalizations	Vocalizations	Nonvocalizations	Vocalizations	Nonvocalizations	Vocalizations	Nonvocalizations	Vocalizations	Nonvocalizations
1										
2										
3										
4										
5	47	0								
6			30	2						
7	42	4	32	2						
8	42	1	33	1						
9			37	4	38	7				
10	37	2	26	1	29	2				
11	41	0								
12	29	2	31	3						
13	48	0	38	2						
14	49	0			38	2				
15	42	2			50	4				
16	36	2	39	0	39	4				
17	34	4			35	2				
18	31	4	35	2	42	3	36	1		
19			41	1	38	4	39	2	33	0
20			37	1	40	3	43	1	19	2
21					45	4	46	0	38	3
22			41	4	33	5	47	2	14	3
23					37	2	40	3	28	1
24										
25							35	3	26	3
26							41	3	25	4
27									19	3
28										
29							39	5		
30							39	2	36	1
31							37	5	28	4
32									30	2
33							37	7	21	2
34										

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