

THE EMERGENCE OF JOINT ATTENTION IN A NATURALISTIC
PARENT TRAINING PROGRAM

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Behaviors related to joint attention have been described by behavior analysts and developmental psychologists alike as having a distinctly social function. Children with autism often do not emit these behaviors. Research on the collateral effects of teaching joint attention suggests far reaching consequences. Given the reported benefits of using these behaviors, and the theoretical descriptions of their function, we assessed joint attention as a collateral effect of a naturalistic parent training program. Data suggest that although these behaviors were not directly targeted, they increased in all 3 children. Implications of parent training goals and child intervention targets are discussed in terms of a behavior analysis of joint attention and child development.

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INTRODUCTION

Joint attention (JA), a phenomenon described in depth in the cognitive developmental literature, has recently attracted the interest of behavior analysts. Developmentally speaking, behaviors related to joint attention, hereafter referred to as JA behaviors, typically begin to emerge between the 9th and 12th month of infancy (Bakeman & Adamson, 1984), first in the form of gaze switches between an object or event of interest and a social partner, for the sole purpose of sharing an experience. Later, gestures and vocalizations typically accompany the shifts in gaze as the infant becomes more sophisticated in communicating (Bates, Camaioni, & Volterra, 1975; Seibert, Hogan, & Mundy, 1984). Behavior analysts have used developmental literature because the typical development of children may suggest logical teaching sequences that may speed progress in intervention programs for children with delays (Dyer & Peck, 1987).

At least in part, behavior analysts' increasing interest in joint attention is related to the link between early indicators of joint attention deficits and diagnoses of autism (Mundy, Sigman, Ungerer, & Sherman, 1986; Osterling & Dawson, 1994), and the widespread and effective treatment of children with autism by applied behavior analysts.

Rosales-Ruiz and Baer (1997) discuss the typical developmental sequence as a progression of environmental contingencies that appear to vary in a systematic way based on the common outcomes, or behavioral products, typically discussed in the developmental literature. They challenge the behavior analyst to identify whether there are certain contingencies in the environment that do, in fact, vary systematically, and if so, to identify whether any of these contingency changes have more far reaching consequences that expose the learner to more contingencies that shape his or her behavior. Additionally, if lacking in the behavioral repertoire of a 9-12 month old, JA behaviors may represent a "marker variable" for autism, thus requiring a

contingency change to maximize the pool of consequences that affect learning for that individual.

Several studies describe a relationship between deficits in JA behaviors and deficits in both concurrent and predictive language performance in both children with autism and in typically developing children (Loveland & Landry, 1986; Mundy, Sigman, & Kasari, 1990, 1994). Other studies have compared children with autism to those with other developmental delays and have noted syndrome specific differences, namely, impairments in imitation and coordination of gaze in response to emotional displays by adults (Charman, Swettenham, Baron-Cohen, Cox, Baird, & Drew, 1997). These findings support the description of joint attention as a marker variable for the diagnosis of autism. Moreover, these unique differences might be used to improve our screening and diagnostic tools, thereby allowing for earlier detection, and earlier onset of treatment.

Assessment tools used to measure joint attention have ranged from structured lab assessments to naturalistic home video assessments. In the Early Social Communication Scales (ESCS) (Mundy et al., 2003; Seibert & Hogan, 1982), the clinician takes advantage of the lab environment and presents a set of tasks using scripted procedures to measure responses to behaviors such as pointing, showing, gaze shifts, and vocalizations to attend. Structured measurement systems like this provide the observer with ample opportunities to observe JA behaviors, and explicit definitions of correct and incorrect, higher and lower levels of behavior to score.

In more naturalistic settings, as in Osterling and Dawson's (1994) pre-diagnostic home video assessments of children in their natural environments on their first birthdays, an observer was able to correctly classify 10 of 11 children with autism and 10 of 11 typically developing

children based on differences in the frequencies of 4 behaviors, namely, pointing, showing objects, looking at the face of another, and responding to their name. Although useful for assessing snapshots of performance in natural environments, this tool was not designed to assess performance over time or across contexts, which could be important now that many early intervention programs target these behaviors.

Although only a few studies discuss teaching JA behaviors (Jones, Carr, & Feeley, 2006; Martins & Harris, 2006; Whalen & Schreibman, 2003) they do provide evidence that JA behaviors are amenable to change. For example, Jones et al. (2006) discuss the effectiveness of an intervention in which preschool teachers (Study 1) and parents (Study 2) successfully taught five 2- to 3- year-old children with autism to initiate and respond to JA behaviors using discrete trial instruction and pivotal response training. Martins and Harris (2006) taught three 3- to 4- year-old children with autism to respond to JA initiations (turning to look at an object referenced by the experimenter after the experimenter's attention- getting phrase and head turn toward an object) by presenting successively higher level attention bids (i.e. first experimenter point + touch + head turn + instruction, then point + head turn + instruction, then point + head turn, and finally head turn alone). These experimenters initially used a continuous schedule of reinforcement combining social praise and tangible items, and then leaned the schedule of tangible reinforcement. During intervention the experimenters used preferred and non-preferred items as objects of reference. However, during the follow-up phase they used only non-preferred items to ensure the behaviors were JA behaviors rather than requesting behaviors. Whalen and Schreibman (2003) used similar procedures and consequences to teach five 4 year-old children with autism to respond to JA behaviors and engage in protodeclarative pointing (i.e., pointing at an object of interest as in commenting rather than requesting) and coordinated gaze shifting.

Teaching JA behaviors requires the use of antecedents and consequences that are difficult to control, particularly because the way they evolve in typically developing infants has yet to be analyzed beyond descriptions and theories. Dube et al. (2004) contributed to these theories with their behavior analytic description of JA initiations. They suggested that over time in a context that includes a familiar adult and an interesting event, the interesting event functions as a motivating operation (MO) (Michael, 1982, 1983) by momentarily establishing the adult's attending behaviors (e.g., nodding, smiling, or otherwise indicating he/she is attending to the event) as reinforcers for the child's JA initiations (e.g. switching gaze between the event and the adult's face). As the adult's attending behavior comes to reliably predict that the adult will react to an interesting event, and the adult's reaction to that event increases its overall reinforcement value, the adult's attending stimuli take on two functions: conditioned reinforcers for the child's gaze shifting, and discriminative stimuli for a greater probability of reinforcement from the event [e.g. the adult assists in making a toy spin faster, thus adding to its value from the child's perspective] (Dube, MacDonald, Mansfield, Holcomb, & Ahearn,, 2004). In sum, despite the evidence that interventionists have taught JA behaviors, an analysis of the contingencies that establish them may suggest alternative approaches to teaching JA behaviors in early intervention programming.

The evidence that JA behaviors are amenable to change and that teaching these behaviors may have desirable collateral effects such as increases in social initiations, positive affect, imitation, play, and spontaneous speech (Whalen, Schreibman, & Ingersoll, 2006) suggests that joint attention may be more than a marker variable for autism. Once developed, it may strengthen skills in other areas as is true of pivotal skills (Koegel, Koegel, Shoshan, & McNerney, 1999). Or, using Rosales-Ruiz and Baer's (1997) behavioral analysis of

development, we might consider JA behaviors as “cusp-like changes” if the intervention produces exposure to more far reaching consequences.

At this point, we can establish topographies of JA behaviors in the behavioral repertoires of individuals who originally did not display them. We can measure them in both lab settings and natural environments. We can train others, including parents and teachers, to establish and monitor them. We have a proposed theory about the stimuli and consequences that produce and maintain these behaviors. However, some remaining questions regarding JA behaviors involve their development as collateral effects of other primary intervention targets. That is, are there certain components of early intervention programs that may produce JA behaviors without teaching the topographies? If Dube et al.’s (2004) analysis is correct, programs that target establishing adult attending stimuli as generalized conditioned reinforcers (and events in the environment as discriminative for these consequences) may end up producing JA behaviors.

Given the evidence of joint attention’s potential to impact multiple skill areas when taught to children who do not emit these behaviors, and the time frame in which these behaviors typically develop, we designed an observation protocol to measure frequencies and topographies of behaviors related to joint attention (facial orientation shifts, reaching/pointing, leading, showing, and vocalizing) in a parent training program for toddlers with autism.

Many intervention programs train intervention agents who work directly with children, rather than parents. At the University of North Texas, graduate students involved with the Family Connections Project (FCP), a naturalistic parent training program, train parents to teach their children basic play and communication skills using the principles of behavior analysis. Additionally, parents learn to follow their child’s lead to identify potential reinforcers, and

arrange the environment to achieve high levels of child responding and initiating both in the context of play, and everyday routines.

The purpose of this study was to determine how behaviors related to joint attention changed as potential collateral effects of this naturalistic parent training program for 3 children with autism.

METHOD

Participants

A fellow graduate student and I collected primary and reliability data from the videos of two families who participated in the Family Connections Project (FCP) parent training program in the department of Behavior Analysis at the University of North Texas. I was not directly involved with the FCP interventions, unlike my fellow graduate student who scored the videos for reliability measures. However, I have experience collecting data using event and interval recording methods from other practica and projects.

The two families whose data are presented herein are Daniel and his mother Katie, who are discussed first; thereafter, Will, Tyler, and their mother, Jennifer, are described.

The first of the two families included a 32 year-old mother, Katie, who was a full time homemaker of Caucasian-American descent and a father of Mexican and French descent. Their son, Daniel, at the age of 23 months, was diagnosed with pervasive developmental disorder-not otherwise specified (PDD-NOS) by an outside pediatrician, and then with autism spectrum disorder (ASD) at 24 months by a pediatric neurologist. He was 25 months old at the start of their participation in FCP.

The second family was of Caucasian-American descent. The mother, Jennifer, was age 33 at the onset of her participation in FCP. She was a full time homemaker. Her two twin sons who participated, Will and Tyler, were diagnosed with ASD by an outside agency at 30 months old. They lived at home with both of their parents and a 5 year- old brother.

Setting and Materials

I observed and coded the videos of the two families in the FCP lab and play room at the University of North Texas. This room contained a play area and office equipment. I used the Mac® laptops and PC's located in the office to view and score the videos using Apple Quicktime®. Data collection materials included pencils, Radioshack® talking timers, and Microsoft® Excel (2003) computer program. For a description of the setting and materials used in intervention, see the FCP publication (Ala'i-Rosales et al., in press).

Intervention

FCP begins by conducting assessments both in the home and in the FCP playroom. Then, each training session includes instructions, demonstrations and practice on how to teach the skills selected for intervention. Appendix C contains an outline of FCP's parent teaching strategies. Both families came to the FCP play room 2-3 times/week for 10 weeks for 1-hour training sessions. The mothers of each family received direct training from the supervising professor and the trained graduate students involved with FCP. A more detailed description of the sequence of service delivery is presented in the service delivery sequence diagram (Table 1).

Although the training package was the same for both families, each parent-child dyad focused on individualized goals. Following the baseline phase, the intervention sequence for Katie and Daniel was first teaching gestural requesting, then teaching communicative attending, and finally, teaching vocal requesting. For Jennifer, Will, and Tyler the intervention sequence was first teaching gestural and vocal requesting and then teaching reciprocal imitation. For a complete set of definitions of the parent and child's behavior goals from FCP's observation protocol see Appendix D.

Measurement

FCP graduate students collected and scored assessment video clips as part of an ongoing service learning project (Ala'i-Rosales, Laino, Broome, Besner, Ruiz-Rosales, et. al 2007, in preparation). Data collection included both primary and collateral measures. I scored these video clips to evaluate the degree to which joint attention was produced as a collateral effect of the primary intervention. Katie and Daniel's clips were 10 min each, while Jennifer, Will, and Tyler's clips ranged from 2-5 min in duration.

A fellow graduate student and I scored the videos for reliability and primary data, respectively, using event recording for 10 topographies of parent and child behavior. The selected behaviors and their definitions measure successful attending episodes, including coordinated joint attention in a naturalistic setting, and were adapted from the revised Early Social Communications Scales (ESCS) (Mundy, Delgado, Block, Venezia, Hogan, & Seibert, 2003).

In contrast to the ESCS, which is designed to test for joint attention behaviors in a contrived laboratory setting with scripted procedures for the test administrator to carry out, the opportunities to assess joint attention initiations and responses in a naturalistic environment are more sporadic and present observation challenges. Therefore, the observation code (Appendix E) includes several examples and nonexamples of JA behaviors. I developed general definitions of instances of joint attention initiations and responses by reviewing the literature both from cognitive psychology and behavior analysis, and viewing a variety of interactions between typically developing children and children on the autism spectrum with their parents and others.

Unlike in the ESCS, only child initiations followed by parent responses and parent initiations followed by child responses were scored. That is, this represents an analysis of the

rates and topographies of one person's behavior successfully evoking an attending response from another person.

Each instance that met the definition for a topography of parent or child behavior was counted and then converted to number per minute using the formula (total # of instances of the topography) / (total # of seconds/60) resulting in a final number per minute of each of the topographies of behavior for each observation session. The following definitions summarize the more detailed ones (Appendix E) used to count the behaviors of interest.

While only responses to initiations were scored, the observation code divides the initiations into different topographies to measure the type of initiations that evoked responding. Child initiations included leads, points, shows, and vocals. Parent initiations included taps/noises, shows, and implicit and explicit vocals to attend. Responses to initiations included attending responses, such as commenting, turning to look, and/or taking an offered object, beginning within 3 s of an initiation.

A third category of behavior scored was coordinated joint attention, in this case facial orientation shifts between parent, child, and activity. This behavior has been referred to in the literature as “coordinated joint engagement” (Bakeman & Adamson, 1984; Lewy & Dawson, 1992), “gaze switch[ing]” (Charman, Swettenham, Baron-Cohen, Cox, Baird, & Drew, 1997), “alternat[ing],” (Mundy, Sigman, Kasari, 1990), and “coordinated gaze shifting” (Whalen, Schreibman, & Ingersoll, 2006) all of which refer to joint attention.

Differences in observation session durations were accounted for by converting instances of successful initiation topographies and episodes of coordinated joint attention to a number/min by using the formula (total # of instances / (clip duration in seconds / 60)).

Interobserver Agreement

Data for each target were compared for the first and last sessions of baseline and then, beginning with the first session of the intervention phase, every third session. For Katie and Daniel, sessions with the untrained parent were originally included but those data are not presented here. Interobserver agreement (IOA) was calculated for each topography, in each observation session, using the formula $(\text{total \# agreements} / (\text{total \# agreements} + \text{disagreements})) \times 100$. The percent agreement scores, averaged across participants and presented by observation session, are presented in Table 2.

The sampling of session data to evaluate IOA resulted in reliability comparisons for 34% of sessions for Daniel; 40% of sessions for Will; and 39% of sessions for Tyler. Overall agreement for successful parent initiation topographies ranged from 84.5-90.3%, while agreement for successful child initiation topographies ranged from 91.3-96.4%. Agreement for the coordinated joint attention measure across sessions was 90.1% overall.

RESULTS

Figures 1, 2, and 3 present successful attending episodes by each of the 3 parent- child dyads, respectively. The first graph in each figure depicts one of the parent-child dyad's number/min of child responses to parent initiations (closed triangles) as the sum of successful parent taps/noises, shows, explicit vocals to attend, and implicit vocals to attend. The open triangles on the same graph depict the number/min of parent responses to child initiations as the sum of successful child leads, shows, reaches/points, and vocals. The second graph in each figure depicts coordinated joint attention measured by that parent-child dyad's number/min of child facial orientation shifts.

Following baseline and upon initiation of the parent training package, increases in child responses to parent initiations, parent responses to child initiations, and episodes of coordinated joint attention were observed.

Successful Parent and Child Initiation Topographies

Generally, Daniel, Will, and Tyler responded to higher rates of parent initiations, and Katie and Jennifer responded to higher rates of child initiations throughout intervention. When a new skill was introduced, each of the parent-child dyads responded to their partner's initiations at lower rates. However, within 2-3 sessions of more practice on the new skill, responses to initiations by parents and children increased.

For Daniel, parent responses to child initiations remained lower than child responses to parent initiations throughout intervention. When responses to child initiations decreased, responses to parent initiations decreased similarly. Parent and child responses to initiations occurred at the most equal rates after the onset of communicative attending, and then again towards the end of vocal request training when responding by both partners was lower..

Initially, Will's and Tyler's responses to parent initiations occurred at higher rates than parent responses to child initiations, however, this pattern began to reverse by the end of the intervention after reciprocal imitation training was introduced. At the onset of a new skill, greater differences between the rates of parent and child responding to initiations are seen, but these become more equal by the end of training on the new skill.

Coordinated Joint Attention

Daniel, Tyler, and Will showed increases in coordinated joint attention compared to their baseline assessments. For Daniel, the highest rates followed communicative attending training and preceded vocal request training. For Will and Tyler, rates rose, then fell upon the addition of a new skill. Will's coordinated joint attention varied more than it did for the other parent child dyads throughout intervention, regardless of the targeted skill, but nevertheless was generally higher than in baseline.

DISCUSSION

Development of the measurement system for this study was derived from both developmental literature (e.g., Bakeman & Adamson, 1984; Bates et al., 1975; Bruner & Sherwood, 1983) and behavior analytic research (e.g., Jones, Carr, & Feeley, 2006; Martins & Harris, 2006; Mundy et al., 2003; Seibert et al., 1984; Whalen & Schreibman, 2003). The recording system was reliable and reflected common definitions of coordinated joint attention. Findings indicate that behaviors related to joint attention increased for all 3 children although these behaviors were not directly targeted in the intervention. For this reason, it is useful to examine the primary intervention targets and the teaching methods that resulted in these systematic increases in JA behaviors.

The Family Connections Project (FCP) intervention package teaches parents to teach their children. Parents do this by arranging opportunities and physically leveling themselves with the child, waiting for child responses that approach a target behavior, and delivering desired events immediately following the behavior and pairing this with praise. After learning to embed teaching into play, the parents are equipped to practice the intervention targets across multiple settings, thus contributing to the child's generalization of skills. FCP also emphasizes reciprocal responding between parent and child. Parents and children take turns initiating and responding to one another. Finally, the child and parent enjoying interacting with each other, the "E" in the D.A.N.C.E acronym (Appendix C), is a critical feature of the intervention package and component of training feedback. This teaching interaction approach requires the parent to monitor the child's general rates and types of responding to promote positive and productive interactions.

FCP primarily trains parents to use a naturalistic teaching style, which includes sampling a variety of activities to identify the child's interests. It is important to expand the activities parents and children with autism do together for several reasons. By definition, children with autism have restricted interests (*American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, 2000*). Individuals who are interested in a variety of activities have more events that could potentially function as reinforcers within teaching interactions. The teaching procedures used to establish JA behaviors may be related to the collateral effects produced in the study by Whalen et al. (2006). Finally, when the parent delivers preferred events to the child, she pairs herself with reinforcing stimuli and can condition herself as a reinforcing stimulus (Dube et al., 2004; Michael, 1982, 1983).

In Daniel's intervention, coordinated joint attention measures were highest after training Katie to teach communicative attending. During this time she required ever closer approximations of eye contact before delivering a preferred event to Daniel. At the onset of teaching vocal requesting (the final intervention target), instances of coordinated joint attention decreased to levels seen before teaching communicative attending. At the same time, successful child vocal initiations increased. Similarly, when teaching gestural requesting, successful child reaches increased. This suggests that when Katie began teaching a new behavioral topography to access her responding, it displaced the topographies taught earlier in the intervention.

Coordinated joint attention measures varied more for Will and Tyler. The intervention targets that Jennifer taught Will and Tyler did not include communicative attending. Instead, Jennifer taught gestural and vocal requesting together and later taught imitation skills. Performance on each of these targets likely benefited from Will and Tyler's existing use of eye contact. These 2 participants, compared to Daniel, demonstrated increases in successful

attending episodes and coordinated joint attention despite differences in their intervention goals. Thus, although joint attention was not a direct target in any of the interventions, each of the specific skills addressed could contribute to the emergence of joint attention.

FCP selects intervention targets that are likely to be useful in the child's everyday life. This way, each child learns skills that his or her environment will maintain. For example, when training Katie to teach Daniel communicative attending, FCP emphasized the importance of requiring eye contact before accessing a variety of motivating events. Katie and others could then practice this skill across many environments, thereby making eye contact useful in all of these.

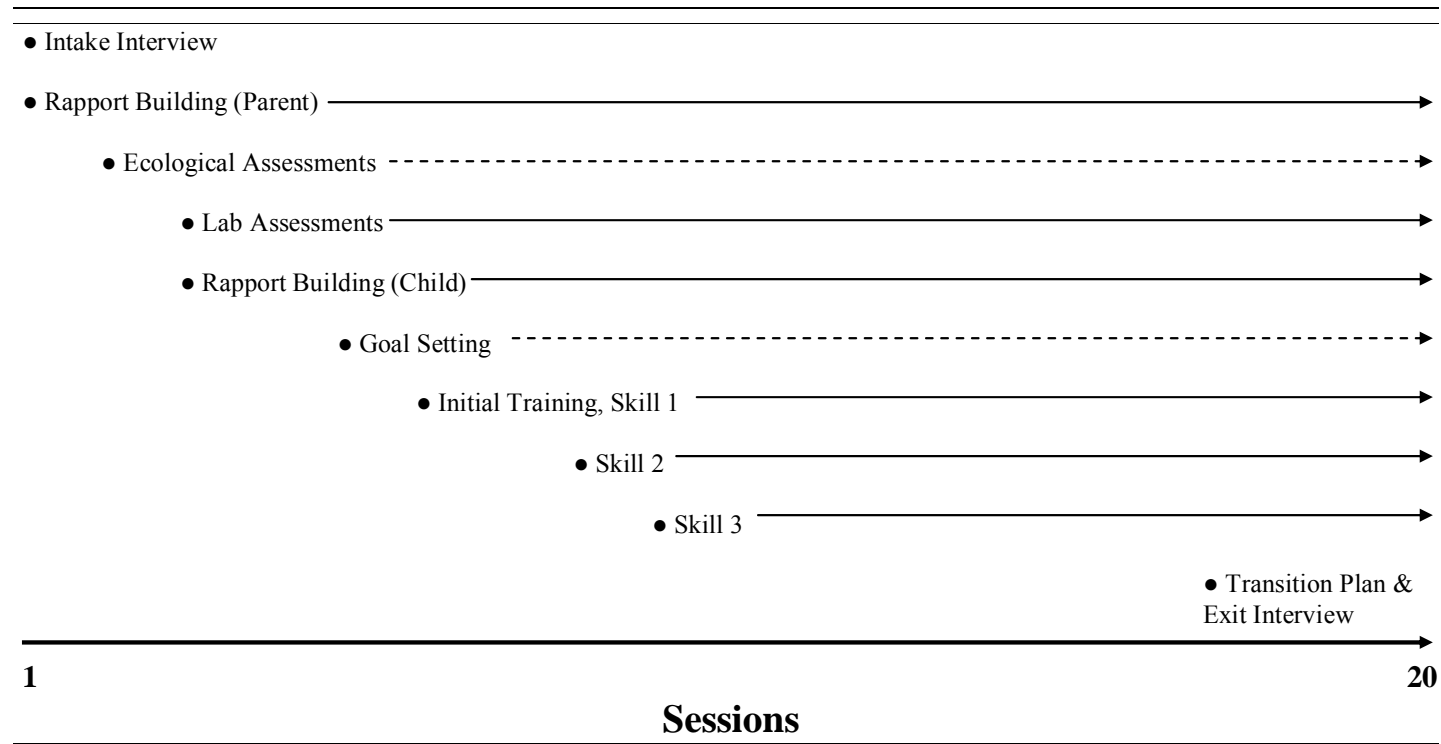
Finally, if the function of behaviors related to joint attention (JA behaviors) is to achieve a partner's attending response, (Dube et al., 2004) it would be critical to ensure that that partner's attention functions as a reinforcer. Training parents to teach these behaviors and pair their attention with reinforcement may have contributed to the emergence of JA behaviors in two ways: by conditioning parent attention as reinforcing, and by increasing the overall number of enjoyable interactions in which the parent-child dyads engaged, particularly in the context of play.

Future research on joint attention should include collateral data on the development of joint attention behaviors in early intervention programs that use different teaching styles (e.g., discrete trial and fluency-based instruction) and have different interaction targets (e.g., eye contact, requesting...). This will aid in understanding if particular features are more likely to produce changes. It is possible that the naturalistic teaching style and other components of FCP's intervention package may have contributed to the development of these behaviors.

While it is not clear *why* the joint attention increased with the introduction of the parent training program, it is clear that it did. It is important to note that JA behaviors were not specifically trained as in other research (Jones et al., 2007; Martins & Harris, 2006; Whalen & Shreibman, 2003), but were collateral effects. The parents of these 3 children implemented a teaching method that resulted in mastery of child goal responding, increases in successful attending episodes, and increases in coordinated joint attention. This suggests that the targeted child behaviors and the procedures the parents used to teach them resulted in cusp-like changes (Rosales-Ruiz & Baer, 1997) in these children's repertoires.

Table 1

Family Connections Service Delivery Sequence



*Created as a component of the Family Connections Project at the University of North Texas

Table 2

Summary of Interobserver Agreement Scores by Topography

IOA clip #	Successful Parent Initiations				Successful Child Initiations				Coordinated Joint Attention (CJA)
	Tap/Noise	Show	Explicit Vocal	Implicit Vocal	Lead	Show	Reach/Point	Vocal	CJA
1	93.33	91.53	100.00	100.00	100.00	100.00	93.33	100.00	100.00
2	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
3	96.67	95.24	100.00	87.78	100.00	100.00	100.00	100.00	100.00
4	100.00	88.64	100.00	97.62	100.00	100.00	97.62	100.00	77.78
5	91.67	70.01	93.33	94.44	66.67	94.44	98.72	85.19	79.80
6	100.00	86.56	100.00	82.58	100.00	100.00	97.62	100.00	100.00
7	100.00	78.89	100.00	81.20	93.33	33.33	94.44	85.19	100.00
8	90.00	79.17	100.00	83.34	100.00	100.00	88.20	100.00	100.00
9	60.00	75.00	50.00	75.00	100.00	100.00	81.82	33.33	33.33
10	66.67	100.00	50.00	83.33	100.00	100.00	83.33	100.00	100.00
11	80.00	64.71	100.00	86.67	100.00	100.00	75.00	100.00	100.00
Overall	88.94	84.52	90.30	88.36	96.36	93.43	91.83	91.25	90.08

Successful Initiation Topographies per Session

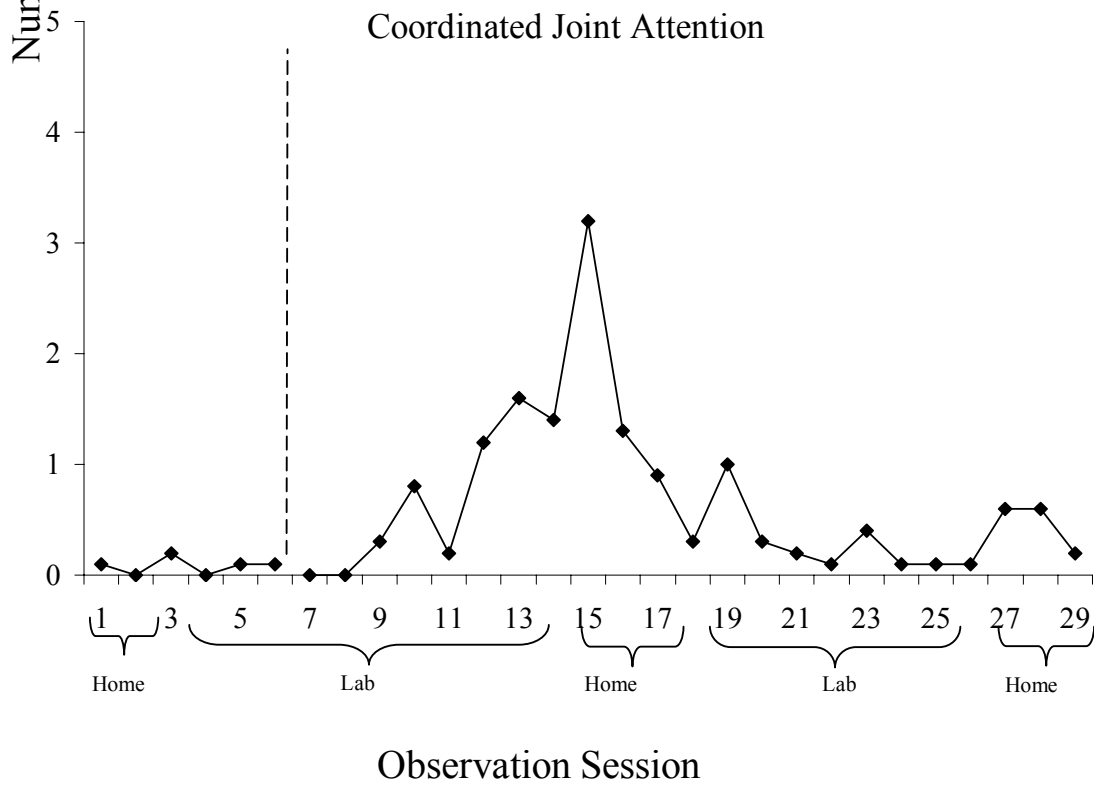
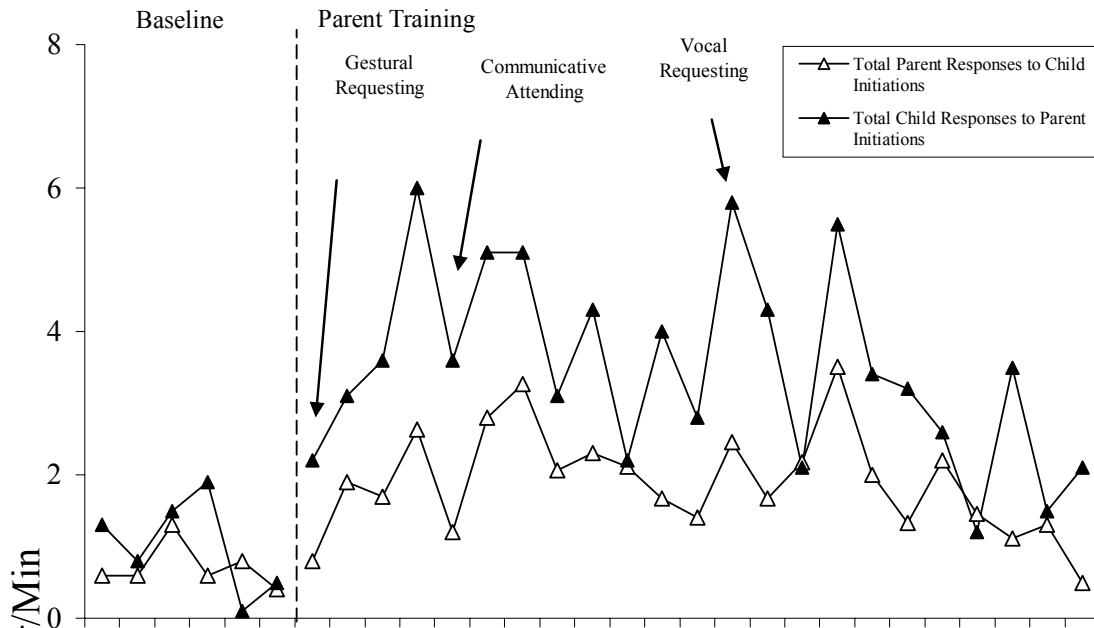


Figure 1. Successful attending episodes: Daniel and Katie.

Successful Initiation Topographies per Session

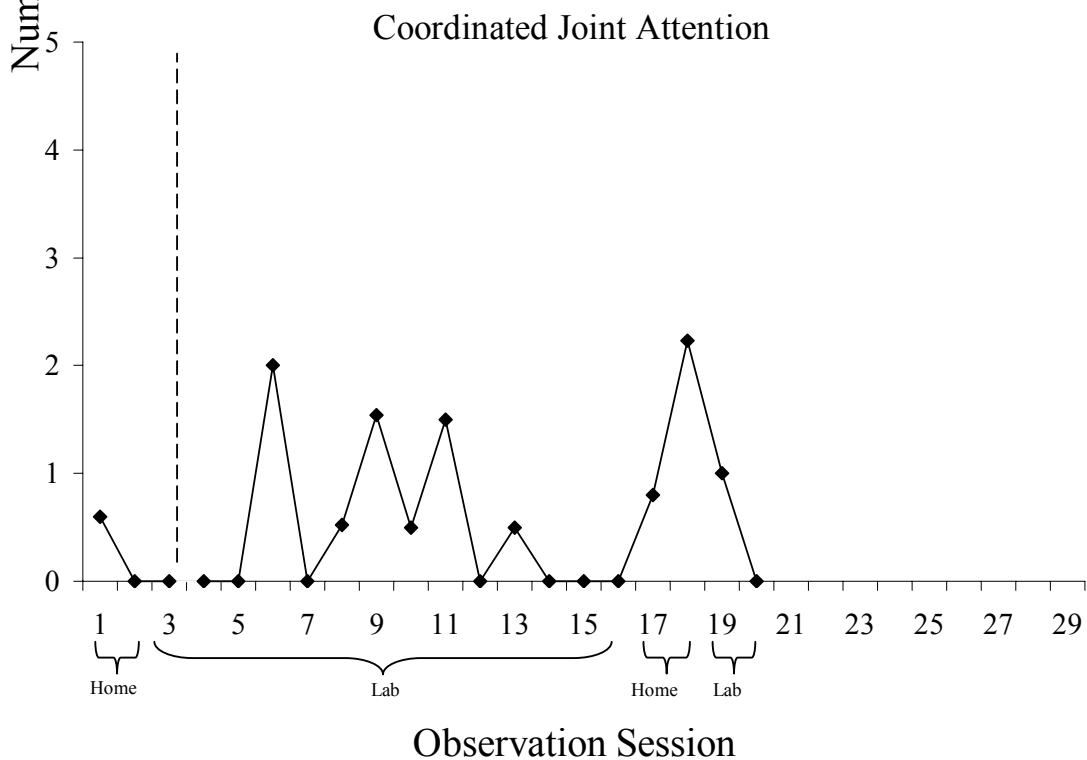
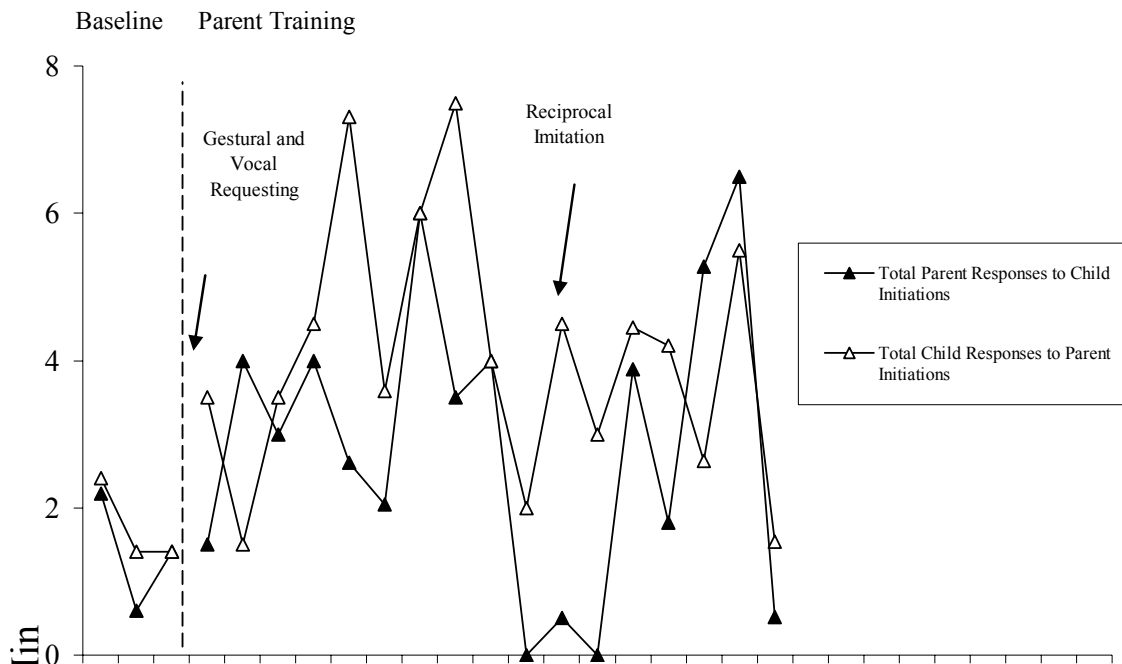


Figure 2. Successful attending episodes: Will and Jennifer.

Successful Initiation Topographies per Session

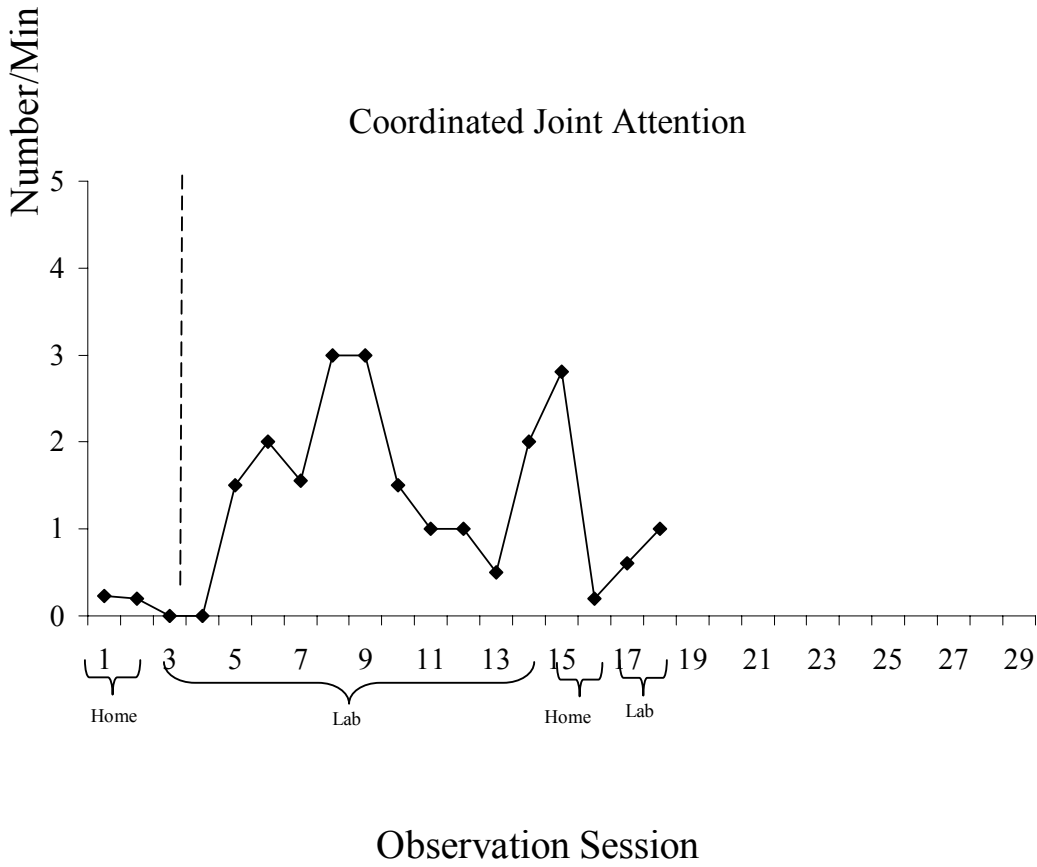
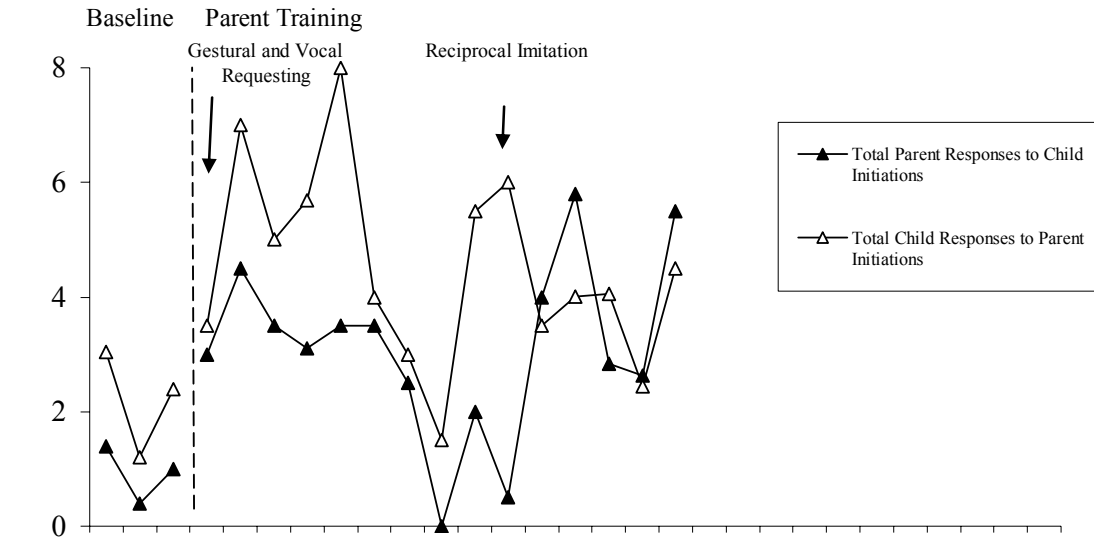


Figure 3. Successful attending episodes: Tyler and Jennifer.

APPENDIX A

JOINT ATTENTION MATRIX SUMMARIZING DEFINITIONS AND MEASUREMENT SYSTEMS IN THE LITERATURE

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
<p>Bakeman, R., & Adamson, L. (1984). Coordinating attention to people and objects in mother-infant and peer-infant interactions. <i>Child Development, 55</i>, 1278-1289.</p>	<p>Coordinated joint engagement- “In [‘passive joint engagement’ and ‘coordinated joint engagement’] infants attend to the same object as their partners do... In coordinated joint engagement...the baby might not only attempt to manipulate the [toy] but also to glance briefly at the partner, perhaps smiling at her and pointing to the [toy] as she moves [it] about.”</p>	<p>Six categories of engagement were scored, mean time per condition was 10.1 min per condition (mother, peer, and alone) <i>Unengaged</i>- “the infant appears uninvolved with any specific person, object, or activity, although he or she might be scanning the environment as though looking for something to do” <i>Onlooking</i>- “the infant is observing another’s activity, often quite intently, but is not taking part in that activity” <i>Persons</i>- infant is engaged only with the other person <i>Objects</i>- infant plays and attends to object only <i>Passive joint</i>-“The infant and the other person...are actively involved in the same object, but the baby evidences little awareness of the other’s involvement or even presence” <i>Coordinated joint</i>-“The infant is actively involved with and coordinates his or her attention to both another person and the object that person is involved with” <i>Off camera, adult intervention</i>,(coded but not included in analyses) and <i>adult interruption</i> were also coded</p>
<p>Bruner, J. & Sherwood, V. (1983). Ch. 5 Thought, language, and interactions in infancy. In J.D. Call, E. Galenson & R.L. Tyson (Eds.), <i>Frontiers of infant psychiatry</i>. New York: Basic Books.</p>	<p>JA- “achieving a common attentional focus and then achieving some elaboration upon the focus that begins increasingly toward the end of the second year to be in the form of joint topic-comment structuring”(p.44).</p>	<p>N/A-not an experimental study</p>

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
<p>Charman, T., Swettenham, J., Baron-Cohen, S., Cox, A., Baird, G., & Drew, A. (1997). Infants with autism: An investigation of empathy, pretend play, joint attention, and imitation. <i>Developmental Psychology, 33</i>, 781-789.</p>	<p>JA-Not defined</p>	<p>Joint attention tasks comprised of 3 Active Toy Tasks (based on Butterworth and Adamson-Macedo, 1987) and series of Goal Detection Tasks (Phillips, Baron-Cohen, and Rutter, 1992)</p> <p>Active Toy Tasks- scored presence/absence of infant <i>gaze switch</i> between active toy, adult, and back to toy and presence or absence of infant <i>look to [control] box</i> during each toy activation trial</p> <p>Goal Detection Tasks- scored presence/absence of child look to experimenter's eyes during the 5-s period immediately after the block or toy withdrawal in blocking and teasing task trials</p> <p>Blocking Task- E blocks toy with child's hands during active engagement with toy for 5-s</p> <p>Teasing Task- E offers toy to child , child reaches, E withdraws toy 5-s.</p>
<p>Drew, A., Baird, G., Baron-Cohen, S., Cox, A., Slonims, V., Wheelwright, S., Swettenham, J., Berry, B., & Charman, T. (2002). A pilot randomized control trial of a parent training intervention for pre-school children with autism: Preliminary findings and methodological challenges. <i>European Child & Adolescent Psychiatry, 11</i>, 266-272.</p>	<p>Target behaviors included commenting or declarative acts such as pointing, showing and holding objects out to adults (when combined with eye contact these are called "joint attention" acts).</p>	<p>Compared means across 2 groups - parent training group (social-pragmatic joint attention focused parent training program) and local services group - at initial and interim follow-up assessments:</p> <ol style="list-style-type: none"> 1. NVIQ (non-verbal IQ from D and E scales of Griffiths Scale of Mental Development) 2. MacArthur Communicative Development Inventory 3. Autism Diagnostic Interview-Revised domains: RSI Reciprocal Social Interaction; NVC Nonverbal Communication; RSB Repetitive and stereotyped behavior 4. Parental Stress Inventory <p>Parents completed activity checklists every 3 months to assess the type and amount of services their children had received</p>

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
<p>Dube, W.V., and MacDonald, R., Mansfield, R.C., Holcomb, W.L., & Ahearn, W.H. (2004). Toward a behavioral analysis of joint attention. <i>The Behavior Analyst</i>, 27, 197-207.</p>	<p>“From the behavior-analytic perspective, the cognitive-developmental definition of JA initiation might be interpreted as a mand for the adult’s behavior of attending to an object (or an observing response that verifies attending), as distinguished from a mand for the object itself”(p.198). “JA responding...is not part of the contingency analysis of JA initiation because it seems to be functionally distinct, with consequences related to compliance with the adult’s mand for attending behavior (i.e. the child is following directions)”(p.199).</p>	<p>N/A- Not an experimental study</p>
<p>Holth, Per. (2006). An operant analysis of joint attention skills. <i>European Journal of Behavior Analysis</i>, 7, 77-91.</p>	<p>“delineat[es] some of the cruder categories that are typically conceived of as involving ‘joint attention.’ These include ‘gaze following,’ ‘social referencing,’ ‘protoimperative gestures,’ ‘protodeclarative gestures,’ and ‘monitoring.’”(p.79).</p>	<p>N/A- not an experimental study</p>

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
Jones, E.A. & Carr, E.G. (2004). Joint attention in children with autism: Theory and intervention. <i>Focus on Autism and Other Developmental Disabilities, 19</i> , 13-26.	References others and says: It is defined by specific forms, namely, gaze alternation and conventional gestures. It also has a specific function, namely, social interaction concerning objects and events in the surrounding world. Both the initiation of joint attention and requesting entail gaze alternation and conventional gesture use to coordinate attention between self, object, and other (Adamson & Chance, 1998; Bates et al., 1975). Initiating joint attention serves a declarative, or indicating, function... Requesting, serves an imperative function... It is the function that makes joint attention more than just a repertoire of gestural and gazing skills.	N/A- not an experimental study
Jones, E.A., Carr, E.G., & Feeley, K.M. (2006). Multiple effects of joint attention intervention for children with autism. <i>Behavior Modification, 30</i> , 782-834.	JA-“occurs when two people...share attentional focus on interesting objects and events in their environment Bakeman & Adamson, 1984”.(p.782).	Taught 2 skills:respond and initiate RJA-alternating gaze between the object and adult within 2 s of adult’s attention directive IJA-independently directing adult’s attention by alternating his gaze and pointing at the object within 2 s of the presentation of the object or event

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
<p>Kasari, C., Freeman, S., & Paparella, T. (2006). Joint attention and symbolic play in young children with autism: a randomized controlled intervention study. <i>Journal of Child Psychology and Psychiatry</i>, 47, 611-620</p>	<p>JA skills-“involve sharing attention with others through pointing, showing, and coordinated looks between objects and people.”</p>	<p>Used ESCS (see Mundy, P. , Hogan, A., & Doehring, P.,1996). Caregiver-child interaction (see Bakeman & Adamson, 1984, for measures on the mother-child interaction coded for joint attention skills) Coded “amount of time (seconds) in which parent and child were jointly engaged and interactive around objects, who initiated joint engagement (parent or child), and the child’s frequency of joint attention skills (e.g., coordinated looks, pointing, and showing)”(p.613).</p>

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
<p>Leekam, S.R., & Ramsden, C.H. (2006). Dyadic orienting and joint attention in preschool children with autism. <i>Journal of Autism and Developmental Disorders</i>, 36, 185-197.</p>	<p>JA impairment shows itself in a striking absence of behaviors such as pointing and showing objects to other people (Curcio, 1978; Loveland & Landry, 1986; Mundy, Sigman, Ungerer, & Sherman, 1986; Sigman & Ruskin, 1999)"(p.185).</p>	<p>Adapted from ESCS</p> <p>IJA (Initiations of Joint Attention)</p> <p>(i) <i>pointing</i> acts not a repeat or echo of the experimenter's earlier pointing act,</p> <p>(ii) <i>showing</i> (toy was lifted upward towards the tester's face.</p> <p>Only acts that had a declarative rather than a requesting function were included.</p> <p>RJA (Responses to Joint Attention)</p> <p>Response to point</p> <p>(i) <i>head turn to verbal pointing</i> (i.e."Look!")</p> <p>(ii) <i>head turn to naming pointing</i> (i.e. "Look at the parrot!")</p> <p>(iii) <i>head turn to nonverbal pointing</i></p> <p>RR (Responses to Requests)</p> <p>(i) Gestural request to give</p> <p>(a) begging gesture only;</p> <p>(b) begging gesture plus verbal request ('Can you give me that?').</p> <p>(ii) Request to take</p> <p>(a) gestural offer (hand object to child),</p> <p>(b) gestural plus verbal offer (i.e. 'have the keys').</p> <p>(iii) Verbal request to give</p> <p>(a) 'can you give me that?' E alternates gaze between child and object on table without gesture</p> <p>(b) 'can you give me the car?' E names object as she alternates gaze.</p> <p>(iv) Request to show (Adult says 'Show me that' when child is playing with a toy).</p>

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
<p>Leekam, S.R., Lopez, B., & Moore, C. (2000). Attention and joint attention in preschool children with autism. <i>Developmental Psychology, 36</i>, 261-273.</p>	<p>N/A-cite many interpretations of JA “Joint attention is often referred to as a triadic relationship between self, other, and object” (Bakeman & Adamson, 1984; Hobson, 1993).</p>	<p>JA tasks tested responding to E’s attention bids and gaze direction with and without visual targets <i>Vocal attention bids</i>- name calls and other specific calls for attention (i.e.”look at me”) <i>Mutual gaze</i>- the co-occurrence of eye contact in which child and adult were looking at each other’s eyes <i>Gaze following match</i>- the child’s first head turn immediately following the experimenter’s head turn turned toward the correct target <i>Gaze following mismatch</i>- child turned toward the incorrect target Analyses were conducted for (a) number of attention bids and the proportion of bids to which the child responded and (b) number of mutual gaze episodes and proportion of time spent in mutual gaze</p>
<p>Lewy, A.L., & Dawson, G. (1992). Social stimulation and joint attention in young autistic children. <i>Journal of Abnormal Child Psychology, 20</i>, 555-566.</p>	<p>JA-“coordination of attention between object and person”</p>	<p>Used Engagement States Coding Scheme (Bakeman & Adamson, 1984)</p>

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
<p>Loveland, K.A., & Landry, S.H. (1986). Joint attention and language in autism and developmental language delay. <i>Journal of Autism and Developmental Disorders</i>, 16(3), 335-349.</p>	<p>Joint attention interactions- “interactions such as pointing and showing that focus a caretaker’s and child’s attention on the same object... which are important to the development of normal language use and perhaps also to acquiring terms such as personal pronouns (Bruner, 1975; Clark, 1978; Lock, 1978; Loveland, 1984)”(p.336).</p>	<p>(1)Percent correct responses to (a)language, (b)gesture, and (c) language with gesture tasks (2)number of different types of joint attention behaviors produced by a child (a) in response to task probes, (b) in response to the Requesting Situation, and (c) spontaneously (3) number of instances per session in which a child used joint attention behaviors spontaneously to initiate an interaction (4) the developmental level of a child’s spontaneous gestural joint attention behaviors (5) the frequency of different joint attention behaviors produced in the context of the Requesting Situation</p>
<p>Mars, A.E., Mauk, J.E., & Dowrick, P.W. (1998). Symptoms of pervasive developmental disorders as observed in prediagnostic home videos of infants and toddlers. <i>The Journal of Pediatrics</i>, 132, 500-504.</p>	<p>JA-i.e. sharing of attention with another</p>	<p>1 min intervals scored absence, presence, or n/a of 25 behaviors including those that significantly distinguished those with PDD from control group: <i>follows verbal directions, looks at faces, shows objects, alternates gaze, looks at people points with gaze, expresses words, and imitates verbalizations</i> 2 additional observers recorded the percent of time the subjects showed social and object engagement <i>Social engagement</i>-a motor or vocal response within 5 seconds of a motor or vocal response by another child or adult, included sharing, pushing another child, or talking to another person <i>Object engagement</i>-actively manipulating materials in an age-appropriate manner, included investigating objects, opening presents, or playing with pots and pans. Behaviors scored with computer program that allowed variables to be measured by duration.</p>

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
<p>MacDonald, R., Anderson, J., Dube, W.V., Geckeler, A., Green, G., Holcomb, W., & et al. (2006). Behavioral assessment of joint attention: A methodological report. <i>Research in Developmental Disabilities, 27</i>, 138-150.</p>	<p>JA “refer[s] to young children’s use of ‘gestures and eye contact to coordinate attention with another person in order to share the experience of an interesting object or event’ (Mundy, Sigman, & Kasari, 1994).” (p.138).</p>	<p>Tasks based on ESCS, (Mundy, Hogan, & Doehring, 1996)</p> <p>Counts were per activation or presentation period</p> <p>Frequency: <i>Gaze Shift</i>- child observes the object and then looks directly from the object to the examiner.</p> <p>Occurrence/Nonoccurrence: <i>Gesture</i>- child points toward an activated toy or picture in a book while looking at the toy/book or the examiner. <i>Verbalization</i>- child makes an intelligible comment or asks an intelligible question about the toy or book while looking at the toy/book or the examiner</p>
<p>Martins, M.P. & Harris, S.L. (2006). Teaching children with autism to respond to joint attention initiations. <i>Child and Family Behavior Therapy, 28</i>, 51-68.</p>	<p>JA-“the skill of using or responding to nonverbal behavior to regulate the experience of objects or events with others”</p>	<p><i>Responding to joint attention</i> –“at least a 90 degree head turn in the direction of an object for 2 seconds, in response to and within 5 seconds of a joint attention initiation of an attention getting phrase followed by a head turn by an experimenter”</p> <p>% Correct JA responses =total # correct responses to JA / Total # correctly implemented JA initiations</p>
<p>Mundy, P., Sigman, M., Ungerer, J., & Sherman, T. (1986). Defining the social deficits of autism: The contribution of non-verbal communication measures. <i>Journal of Child Psychology and Psychiatry, 27</i>, 657-669.</p>	<p>JA or <i>indicating</i> behaviors- “involve the use of procedures (e.g. showing a toy) to coordinate attention between interactive social partners with respect to objects or events in order to share an awareness of the objects or events”</p>	<p><i>Response to indicating</i>-“measured the child’s ability to respond appropriately when the adult pointed to and gazed to the left, right or behind the child and said ‘look’ three times”</p> <p><i>Initiate indicating</i>- “measured the child’s ability to share attention by making eye contact with the experimenter while manipulating objects or alternating eye contact between the experimenter and an active mechanical toy. Also measured was the child’s ability to use gestures to direct attention such as pointing to objects or showing objects.”</p>

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
<p>Mundy, P., Delgado, C., Block, J., Venezia, M., Hogan, A., & Seibert, J. (2003). A manual for the Abridged Early Social Communication Scales (ESCS). Available through the University of Miami Psychology Department, Coral Gables, Florida. Retrieved from http://www.psy.miami.edu/faculty/pmundy/main.phtml</p>	<p>JA-“the child’s skill in using nonverbal behaviors to share the experience of objects or events with others”</p> <p>Initiating JA-“the frequency with which the child uses eye contact, pointing, and showing to initiate shared attention to objects or events”</p> <p>Responding to JA-“refers to the child’s skill in following the tester’s line of regard and pointing gestures”</p>	<p>Subset of ESCS (see Seibert, Hogan, & Mundy, 1982)</p> <p>Coded using frequency data rather than the original, 4-stage, ordinal style originally used IJA Lower level behaviors:</p> <p><i>Eye Contact:</i> Child makes eye contact w/ tester while manipulating or touching inactive mechanical toy.</p> <p><i>Alternate:</i> the child alternates looking between an active object spectacle and the tester's eyes. Child must shift his/her gaze from object to the tester’s eyes.</p> <p>IJA Higher level behaviors:</p> <p><i>Point:</i> With clear articulation of index finger child points to active toy, pictures in book (before tester), wall posters (before tester), or other unobtainable object or event w/ or w/o eye contact</p> <p><i>Show:</i> Child raises toy upward toward tester's face while looking at tester. Typically brief bids w/ child quickly retracting proffered object.</p> <p>RJA Lower level behaviors:</p> <p>Following proximal point/touch-child orients head and eyes to tester’s point in book</p> <p>RJA Higher level behavior:</p> <p>Following line of regard- on left, right and behind trials child turns head sufficiently to indicate looking beyond end of E’s index finger and in direction of E’s head turn</p>

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
Mundy, P., Sigman, M., & Kasari, C. (1990). A longitudinal study of joint attention and language development in autistic children. <i>Journal of Autism and Developmental Disorders</i> , 20, 115-128.	Gestural JA or indicating skills-“refer to children’s use and comprehension of conventional gestures such as pointing to objects and showing objects to other people. These social skills also involve the use of eye contact in conjunction with gestures or alone as when children alternate their gaze between an interesting object and a care-giver.”	From abridged version of ESCS (Seibert et al.,1982) JA: <i>Alternate</i> -Child alternates looking at active mechanical toy or a toy in their hand and the tester’s face <i>Point</i> - Child extends index finger toward toy within reach or to part of the room (e.g., posters) <i>Show</i> - Child extends toy toward the tester’s face <i>Look</i> - % trials that the child turns head (45degrees) and eyes in the direction of the tester’s points to the left, right, and behind the child.
Osterling, J. & Dawson, G. (1994). Early Recognition of children with autism: A study of first birthday home videotapes. <i>Journal of Autism and Developmental Disorders</i> , 24, 247-257.	Not defined	JA behaviors-pointing, vague pointing (reaching for something in a communicative way), showing an object to another, and alternating gaze between an object and another’s face
Paparella, T. & Kasari, C. (2004). Joint attention skills and language development in special needs populations. <i>Infants and Young Children</i> , 17, 269-280.	JA-“describes a mutual mental focus between 2 or more individuals purely to share an experience”	N/A lit review

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
Seibert, J., Hogan, A., & Mundy, P. (1982). Assessing interactional competencies: The Early Social-Communication Scales. <i>Infant Mental Health Journal</i> , 3, 244-259.	JA- the primary goal is to establish both partners' shared focus on the same object, entity or event, that is, to look at something together."	8 scales comprise the ESCS score based on child's role as initiator/responder of social interaction, joint attention, and behavior regulation and skills maintaining social interaction and joint attention across 5 developmental levels (0-reflexive/responsive, 1-simple/undifferentiated, 2-complex/differentiated, 3-regulated by differentiated feedback, and 4-anticipatory & symbolic regulation or interactions)
Sigman, M., Mundy, P., Sherman, T., & Ungerer, J. (1986). Social interactions of autistic, mentally retarded, and normal children and their caregivers. <i>Journal of Child Psychology and Psychiatry</i> , 27, 647-656.	N/A- not defined, references Mundy et. al. (1986) for <i>indicating</i> and <i>requesting</i> behaviors	Scored 3 sets of behaviors: 1. Communication behaviors: <i>Social interaction</i> -frequency child touched caregiver or initiated a game <i>Indicating</i> - frequency child pointed to an object or showed or gave an object to the caregiver. <i>Requesting</i> - frequency child handed the object to the caregiver with clear aim for assistance 2. Social responsiveness measures-compliance, non-compliance E's commands/imperatives and suggestions 3. Social interaction measures- (frequency for looking and walking away, duration for all others) child looks at face of caregiver, caregiver and child look at each other, child smiles, child avoids eye contact during social game, child and caregiver in physical contact, child vocalizes, child frets(crying/whining), child walks away from caregiver, and child engages in the task

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
Vaughan, A., Mundy, P., Block, J., Burnette, C., Delgado, C., Gomez, Y. & et al. (2003). Child, caregiver, and temperament contributions to infant joint attention. <i>Infancy, 4</i> , 603-616.	JA-“the coordination of visual attention with a social partner.”	3 assessments: Caregiver-child joint engagement interaction(e.g., Bakeman & Adamson, 1984; Tomasello & Farrar, 1986). <i>Joint engagement episode-</i> caregiver and child visually focused on the same object or activity for at least 3 consecutive sec and at least a portion of both the caregiver and infant’s faces visible <i>End of JE episode-</i> child or caregiver looked away from interaction for more than 3 sec or by initiating a new activity with a novel toy that lasted longer than 3 sec <i>Active child state/bouts</i> within the episodes- percentage of episodes in which child alternated eye contact between the caregiver and the toy or activity at least once <i>Caregiver shows-</i> % episodes in which the caregiver moved an object to orient it towards the child’s face <i>Caregiver points-</i> % episodes in which the caregiver used an index finger to direct attention to an object. <i>Caregiver demonstrates-</i> caregiver used a toy in a conventional fashion or combined toys Calculated percentage of episodes(mutually exclusive categories) in which: <i>Caregiver directs-</i> caregiver began episode by actively directing the attention of their infant to a new common focus <i>Caregiver following in-</i> episode began with the caregiver recognizing and following the infant’s established line of attention Also used ESCS(see Mundy et al., 1996)

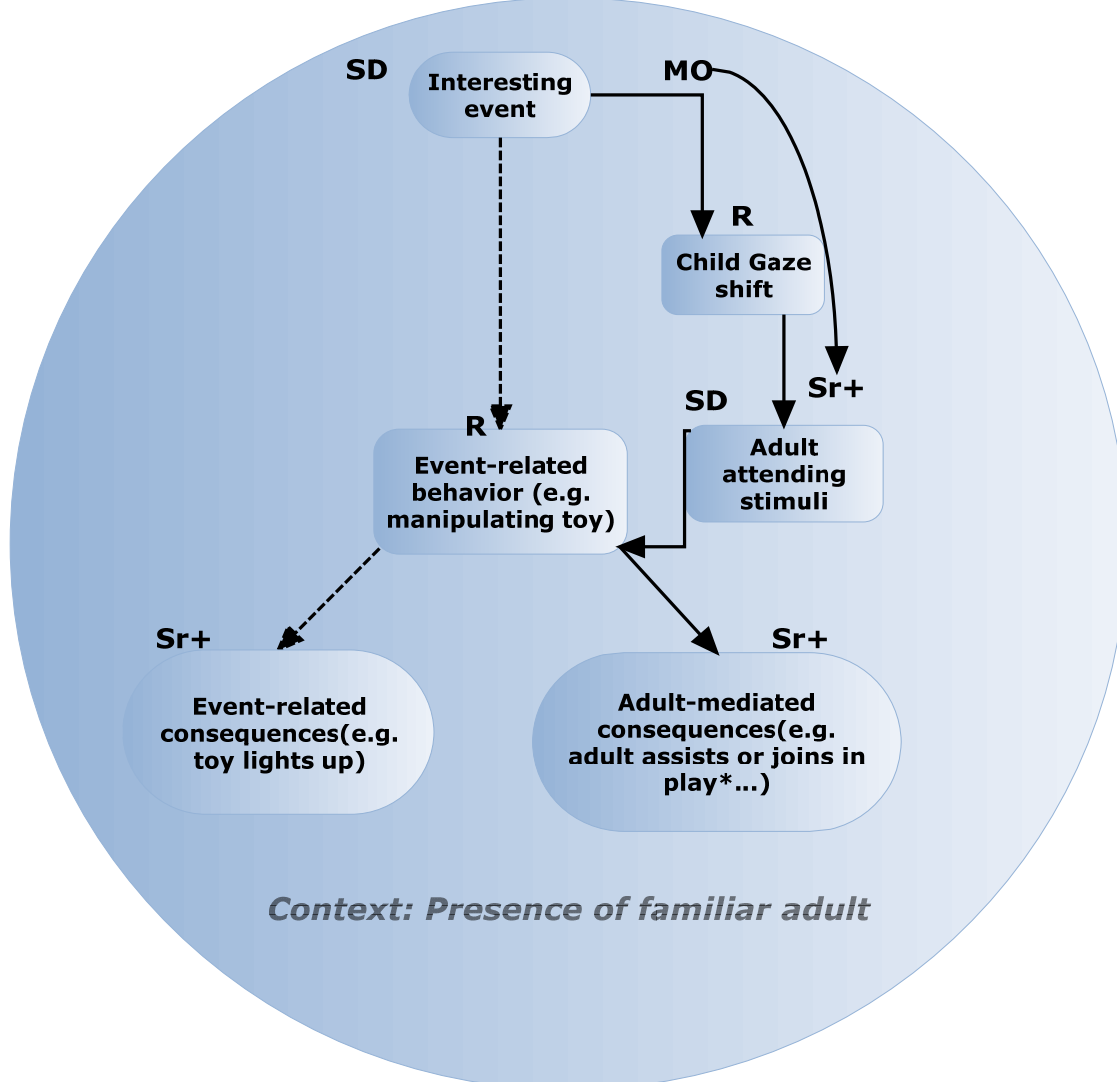
Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
<p>Whalen, C., Schreibman, L., & Ingersoll, B., (2006). The collateral effects of joint attention training on social initiations, positive affect, imitation, and spontaneous speech for young children with autism. <i>Journal of Autism and Developmental Disabilities</i>, 36, 655-664.</p>	<p>JA-“the ability to coordinate attention between an object and a person in a social context” from Adamson, L., & McArthur, D. (1995). Joint attention, affect, and culture. In C.Moore, & P. Dunham (Eds.) <i>Joint attention: Its origins and role in development</i> (pp. 205-221). Hillsdale, NJ:Erlbaum.</p>	<p>Joint Attention Response Training (5 levels):</p> <ol style="list-style-type: none"> 1. <i>(Correct) Response to hand on object</i>-“child engages with the newly presented toy [when E places child’s hand on it while playing with another toy] (i.e. manipulated or looked at the toy for at least five seconds)” 2. <i>(Correct)Response to object being tapped</i>-same as level 1 except E tapped new toy rather than placed child’s hand on it 3. <i>(Correct) Response to showing of object</i>:same as first 2 levels except E showed a toy to the child while the child was engaged in another activity. 4. <i>(Correct)Eye contact</i>-child makes eye contact w/ E.(to gain access to the reinforcer for the last 2 levels of phase 1) 5. <i>(Correct) Following a point</i>-while the child was engaged with an object, the experimenter established eye contact with the child. Once eye contact was established the experimenter turned their head and pointed to another object in the room, child turned head in same direction of point 6. <i>(Correct) Following a gaze</i>- same as level 5 except E shifted gaze only and child shifts in same direction <p>JA Initiation training (trained 2 behaviors):</p> <ol style="list-style-type: none"> 1. <i>(Correct) Coordinated gaze shifting</i>-child shifts their gaze from their toy to the experimenter with the purpose of sharing the object with the experimenter within ten seconds of obtaining the toy <i>Coordinated gaze shifting opportunity</i>-whenever a child was playing with a toy(every 10 sec=new opportunity) 2. <i>(Correct) Protodeclarative pointing</i>- child points to object in the room with the purpose of sharing with the E.w/ no prompt

Reference	Joint Attention (JA) Definitions	Coded Measures/Ways of Counting Joint Attention
<p>Yazbek, A. & D'Entremont, B. (2006) A longitudinal investigation of the still-face effect at 6 months and joint attention at 12 months. <i>British Journal of Developmental Psychology</i>, 24, 589-601.</p>	<p>Initiating joint attention (IJA) is defined by the early social communication scales as a frequency count of eye contact, alternates, points and shows.</p>	<p>Initiating JA measures: <i>Eye contact</i>- the child made eye contact with the experimenter while holding an inactive wind-up or mechanical toy. <i>Alternates</i>- the child alternated eye contact between an active wind-up or mechanical toy and the experimenter. <i>Pointing</i>- the child pointed at an active wind-up or mechanical toy or pointed at the wall posters before the experimenter pointed. <i>Showing</i>- was counted if the infant held a toy out towards the experimenter, unbidden.</p> <p>Responding to JA measures <i>Gaze/point following trials (left, right and behind the child)</i>- The experimenter attracted the child's attention, and then turned her head and eyes towards one of the posters while pointing and saying the child's name three times with increased emphasis. <i>Attention following measure</i>-a frequency count of the number of times the infant turned his or her visual regard in the direction of the experimenter's gaze/point gesture. The infant had to look beyond the pointing finger, towards the poster. Scores could range from 0 to 4.</p>

APPENDIX B

JOINT ATTENTION FLOWCHART

A Contingency Analysis of the Gaze Shift in Joint Attention Initiations



***When adult joins in play, providing supplemental reinforcement, both the solid-arrow path (adult-mediated contingencies), and the dotted-arrow path (event-related contingencies) co-occur.**

Adapted from Dube, W., MacDonald, R., Mansfield, R., Holcomb, W., & Ahearn, W., (2004). Toward a behavioral analysis of joint attention. *The Behavior Analyst*, 27, 197-207.

APPENDIX C
OUTLINE OF THE FAMILY CONNECTIONS PROJECT PARENT TEACHING
STRATEGIES

The Family Connections Project

The Teaching D.A.N.C.E.

This is a teaching strategy that incorporates the principles of operant conditioning in a developmentally suitable way for a toddler and her parents. The parent takes advantage of the toddler's interests to establish communication "dialogues" and build new skills. The keys are to start with the child's current interests and skills and to gently shape new and more complex ways of responding to the social and physical environment.

Decide

- Is this a good moment for a teaching interaction?
- Is your child alert? Interested in the presented activities?
- Do you have time? Are you free from other distractions?
- What skill will you teach?

Arrange

- Did you sample activities and events: offer choices until you see a "spark"?
- Did you arrange the desired events so you that you can control access?
- Did you level yourself to your child's position?
- Did you state the goal?
- Did you wait for small movements towards the larger goals?

Now!

- Did you responding *immediately* by presenting the desired activity or event?
- Did you pairing the event with delighted, brief and *specific praise*?
- Did you *adjusting your responding (models and event delivery)*:
 - Is what you are doing effective?
 - Is your child happy?
 - Is your child moving in the right direction?
 - Should you continue? Should you change?

Count

- Have you determined a time period to sample progress?
- Did you define the desired responses –what you want to teach?
- Did you count occurrences of each desired response?
- Did you chart the responses in real time in a standardized format?

Enjoy!

- Are you having fun?
- Are you keeping the DANCE short and sweet?
- Are you shifting to other activities while your child is still happy?
- Are you alternating teaching and play activities?

* Created as a component of the Family Connections Project at the University of North Texas *

APPENDIX D

PARENT AND CHILD BEHAVIOR DEFINITIONS FROM THE FAMILY CONNECTIONS

PROJECT OBSERVATION PROTOCOL

General Behavior Definitions

Parent Interaction Goals

Arranging Learning Opportunities (crea./capt.)

Teacher creates and/or capitalizing on a teaching opportunity by controlling or withholding access to events in the environment. The teacher creates or contrives a teaching opportunity by arranging the environment to promote the child's interest in events that the teacher can control access to.

Examples include but are not limited to: parent presenting events to the child while maintaining control; parent placing preferred materials out of reach; parent giving inadequate food/drink portions to the child; parent offering choices; parent setting up events that require assistance from the teacher; parent setting up a block or an aversive event; parent asking a question or making a comment.

Non-examples include but are not limited to: parent giving item to child non-contingently; parent giving entire container of desired food item to child (french fries, gold fish); all desired toys accessible to child; parent saying "hey honey do you want this?" and then giving it to him.

Responsive Model Delivery (M+/M-)

An appropriate adjustment of a model when compared with a previous model delivery.

Examples include but are not limited to; parent did not originally deliver a vocal model, but later delivers a vocal model, it would be considered a responsive model because it was adjusted compared to the first model (lack of vocal model); parent waits 2 seconds to delivery the next model when the previous model delivery occurred within 1 second of no response, it would be considered a responsive model because it was adjusted compared to the first model (shorter latency); parent slowly moves toy upward toward his face to model where the child should look when working on eye contact; parent adjusts placement of a toy (moves it closer or farther away) when child stops crawling towards it

Non-examples include but are not limited to: parent didn't originally deliver a vocal model and later still doesn't deliver a vocal model; parent waits 2 seconds originally and later waits 2 seconds again; giving the same model--parent says "ball" and then says "ball" again without breaking the word down.

Responsive Consequence Delivery (C+/C-)

Teacher adjusts reinforcer delivery based on closer approximation, previous responding, and apparent desirability of event being delivered.

Examples include but are not limited to: child delivers bubbles when child says, "buh" following a vocal model "buh;" parent gives child juice following an instance of communicative eye contact when juice was removed.

Non-examples include but are not limited to: parent gives item to child when child turns away; parent gives item to child when child begins to whine/tantrum; child reaches for item, gives eye contact, and parent does not give item to child.

Expansion of Child Initiations (E+/E-):

Parent accepts a child initiation and then parent immediately adds/participates in an additional sequence within the same pattern, activity, or vocalization while delivering access. Delivering access includes providing materials/activity related to a vocalization that was inaccessible prior to the initiation; or providing continued access to materials/activity that the child was engaged with at the time a non-vocal play sequence was initiated.

Examples include but are not limited to the child saying “vuv” in the presence of the tv, mom says “video,” and provides access to a video. Child is looking at a book and touches a flap, mom lifts flap up and the child continues to look at the book.

Non-examples include but are not limited to the child saying “mmm” in the presence of the tv, mom says “video” but does not deliver access. Child is looking at a book, says “du,” mom says “duck” and the child continues to look at the book.

Response (approx.):

The child engages or attempts to engage in the target behavior, specified in the opportunity arrangement. SEE CHILD SPECIFIC BEHAVIOR DEFINITIONS!

Examples include but are not limited to: the child moves his head in the directions of the parent’s head when an opportunity for eye contact is set up; the child says “buh” following the vocal model “ball;” the child touches his mouth and his nose with an open hand following an opportunity for motor imitation of touching nose.

Response (other):

The child engages in a behavior other than that specified by the opportunity arrangement.

Examples include but are not limited to: the child says “eat” when an opportunity for eye contact was set up; the child touches his head when an opportunity for object imitation with a drum was set up; the child sits still when an opportunity for functional communication was set up.

Child Goal Behavior Definitions

General Pool

Gestural Request:

Non-vocal gestures (pictures/gestures/signs) directed to another that ask for an item, specify an action to be completed by other, request information, permission, or attention.

Examples include but are not limited to: child moves pointer finger to gesture to come over here; child points with pointer finger toward the door; child puts both hands up with palms facing outward indication to stop; child reaches toward parent for an item with one hand.

Nonexamples include but are not limited to: child says, “stop!” child grabs an item; child stomps feet on the ground while listening to music; when a parent withholds access to an item and child looks at the item (If child looks in the direction of the adult’s face, an instance of communicative eye contact is scored.)

Communicative Attending

The child’s head movement in the direction of an adult, following removal of a preferred item or to gain access to an inaccessible item or event. An inaccessible item or event may be the attention of the adult (i.e. the parent delivers attention in the form of vocalizations or item/event delivery following the child’s head movement in the direction of the parent, delivers a food item, activates a toy, grabs a toy off of a shelf, opens a cabinet that was locked, etc.)

Examples include but are not limited to child looks at mom when she takes a toy away to fix it; child raises head towards mom while she is holding a piece of something he is playing with; child looks or turns head towards parent when a toy is stuck or will not work properly; child looks up towards a shelf and then looks at mom while he points to a toy on the shelf; child looks up towards mom and raises both arms and says “up;” child looks up towards mom and reaches to her when she has juice in her hand; child head and eyes are in the direction of the toy when the parent holds it up right next to their face

Non-examples and non-observables include but are not limited to: child turns toward parent after removal of a preferred item but does not move head in the direction of the adult’s face; child turns body in the direction of an adult and walks past them; child head turns upwards but their back is turned and the direction of the head is turned away from the parent; child’s back is turned toward the parent while the parent holds a chip in their hand

Note: this is a generous definition because it is technologically difficult to observe glances and/or eye contact with video recording procedures

Vocal Request:

Spoken sounds, words, phrases, or complete sentences directed to another that ask for an item, directs another to engage in a specified activity, specifies an action to be completed by other, request information, permission, or attention. Onset begins with 1st sound and offset happens

after 1 second has passed. Access to item/activity does not have to be delivered to be counted as a vocal request.

Examples include but are not limited to: saying "give" while hand extended towards toy; "more" while looking at candy in presence of teacher; "truck please" while reaching towards a truck peer is holding; "Look at me!" to parent; "Can you help?" while handing closed container to sibling; "Do this!" while demonstrating an action; "Now you say 'ready set go' " while in chase stance; child says "go over there;" child says "come here;" child says "give me that;" child makes a noise while demonstrating a non-vocal request such as communicative eye contact or reaching; child says "ba" while looking at the parent's face who has just removed access to an item; child says "ba" while reaching towards the parent or an item the parent is controlling access to; child says "ba" while pulling parent's arm toward an activity/item; child says "ba ba ba" while reaching for his bottle (1 occurrence); child says "ba ba ba" while reaching for his bottle (1 occurrence), 2 seconds pass and child says "ba ba ba" again while still reaching for his bottle (2nd occurrence).

Non-examples include but are not limited to child saying "NO!" when mom says it's time to go (scored as vocal protest); child pounding fists on table after getting frustrated; child opening mouth wide while reaching for the juice in mom's hand; child grabs an item in parent's hand; child is spinning in circles while saying "ahhhh baaaaahhh" repeatedly; child says "duck" while pointing to a picture of a duck in a book;

Child-Specific Behavior Definitions

TYLER and WILL

Gestural Request:

Non-vocal gestures (pictures/gestures/signs) directed to another that ask for an item, specify an action to be completed by other, request information, permission, or attention.

Examples include but are not limited to: Child laying on the floor with one arm up while mom is withholding access to a bean bag; Mom has food and child reaches for her hand; Mom turns off video and child reaches at the remote; Mom says "stop" and stops tickling and child reaches both hands at mom;

Nonexamples include but are not limited to: Mom stops tickling child and child looks at mom; Child grabs item and gives it to mom; child grabs moms hand and holds it; child grabs item out of moms hand which she was not withholding

Approximations include but are not limited to Will or Tyler extending 1 or both hands and/or arms toward mom or toward an item that is out of reach

Communicative Attending

The child's head movement in the direction of an adult, following removal of a preferred item or to gain access to an inaccessible item or event. An inaccessible item or event may be the attention of the adult (i.e. the parent delivers attention in the form of vocalizations or item/event delivery following the child's head movement in the direction of the parent, delivers a food item, activates a toy, grabs a toy off of a shelf, opens a cabinet that was locked, etc.)

Examples include but are not limited to child looks at mom when she is withholding access to food; child raises head towards mom while she is holding a bean bag; child looks or turns head towards mom after she says "stop" and stops tickling him; child looks up at mom when she has removed a toy; child moves head in the direction of mom's face when she has food; child head and eyes are in the direction of the toy when the parent holds it up right next to their face

Non-examples and non-observables include but are not limited to: child turns toward parent after removal of a toy but does not move head in the direction of the adult's face; child turns body in the direction of an adult and walks past them; child head turns upwards but their back is turned and the direction of the head is turned away from the parent; child's back is turned toward the parent while the parent holds food in their hand

Approximations include but are not limited to Tyler or Will facing mom while saying "eeee" when an item is withheld, Tyler or Will grabbing mom's hand while facing her, Tyler or Will moving their head in the direction of Mom's head while she stands with a cracker in her hand; Tyler or Will moving their eyes in the direction of mom's face but head is not facing her

Note: this is a generous definition because it is technologically difficult to observe glances and/or eye contact with video recording procedures

Vocal Request:

Spoken sounds, words, phrases, or complete sentences directed to another that ask for an item, directs another to engage in a specified activity, specifies an action to be completed by other, request information, permission, or attention. Onset begins with 1st sound and offset happens after 1 second has passed. Access to item/activity does not have to be delivered to be counted as a vocal request.

Examples include but are not limited to: saying "eat" while hand extended towards mom's hand while she has food; "Ba" while mom is withholding a bean bag; "Video" when mom stops the movie; Handing container of food to mom and saying "EEE"; child makes a noise while demonstrating a non-vocal request such as communicative eye contact or reaching;

Non-examples include but are not limited to child turning circles and babbling; child pulling mom's hand, which has food in it, and placing mouth on her hand; child grabs an item in parent's hand;

Approximations include but are not limited to any vocalization while engaging in a gestural request or communicative attending, such as “eeeeeee,” or “baba” for bop; child produces same number of syllables as mom modeled; child produces any sound or syllable that is within the word for the item

Reciprocal Imitation- (adapted from Brulfert & Baudonniere, 1982)

Is defined as the child reciprocating a play action by imitating the play action of the teacher or peer within 5 seconds of the play action being presented and engaging in the play action for at least 2 “turns”. A turn is defined as the teacher or peer performing the action and the child imitating the action.

Examples include but are not limited to a play action presented by the teacher or peer (e.g., tickles, jumping, etc) where teacher tickles child, after a second the child tickles the adult, then after 3 seconds the adult tickles the child, lastly the child tickles the adult again following 4 seconds.

Non-examples include but are not limited to the imitation of any other behavior not related to the play action or that when the duration of the play action is longer than 5 seconds.

DANIEL

Gestural Request:

Non-vocal gestures (pictures/gestures/signs) directed to another that ask for an item, specify an action to be completed by other, request information, permission, or attention.

Examples include but are not limited to: child grabs moms hand to pull her to come here; Child reaches for a car while mom has it next to her face; Child grabs moms hand and pushes it towards an inaccessible item; child reaches for a duck that mom has in her hand; Child places moms hand on an item after trying to open it and was unsuccessful.

Nonexamples include but are not limited to: Child picks item up off floor that is next to mom; child gives an item to mom; Child grabs moms hand and holds it;

Approximations include but are not limited to extending 1 or both hands and/or arms toward mom or toward an item that is out of reach or in mom’s hands; pushing moms hand toward an item

Communicative Attending

The child moves his or her head in the direction of an adult, following removal of a preferred item or to gain access to an inaccessible item or event. An inaccessible item or event may be the attention of the adult (i.e. the parent delivers attention in the form of vocalizations or item/event delivery following the child’s head movement in the direction of the parent, delivers a food item, activates a toy, grabs a toy off of a shelf, opens a cabinet that was locked, etc.)

Examples include but are not limited to child looks at mom when she is holding a toy next to her face; child raises head towards mom while she is tossing magnets across the

floor; child turns head towards parent when mom is withholding access to a shape; child looks up towards a shelf and then looks at mom while grabbing her hand and pushing it towards an item; child head and eyes are in the direction of the toy when the parent holds it up right next to their face; Child is looking at mom out of the corner of his eyes but head is not turned toward mom.

Non-examples and non-observables include but are not limited to: child turns toward parent after removal of a preferred item but does not move head in the direction of the adults face; child turns body in the direction of an adult and walks past them; child head turns upwards but their back is turned and the direction of the head is turned away from the parent; child's back is turned toward the parent while the parent holds a car in their hand

Approximations include but are not limited to Daniel facing mom while saying "cu" when a toy car is withheld, Daniel grabbing mom's hand while facing her, Daniel moving his head in the direction of Mom's head while she stands with a ball in her hand.

Note: this is a generous definition because it is technologically difficult to observe glances and/or eye contact with video recording procedures

Vocal Request:

Spoken sounds, words, phrases, or complete sentences directed to another that ask for an item, directs another to engage in a specified activity, specifies an action to be completed by other, request information, permission, or attention. Onset begins with 1st sound and offset happens after 1 second has passed. Access to item/activity does not have to be delivered to be counted as a vocal request.

Examples include but are not limited to: saying "ca" while hand extended towards a car; child makes a noise while demonstrating a non-vocal request such as communicative attending or reaching; child says "ba" while looking at the parent's face who has the ball; child says "g" while pulling parent's arm toward the door;

Non-examples include but are not limited to child saying "car" as he is dropping it into a can; when mom says it's time to go (scored as vocal protest); child opening mouth wide while reaching for the juice in mom's hand; child grabs an item in parent's hand; child is spinning in circles while saying "ahhhh baaaaahhh" repeatedly; child says "duck" while pointing to a picture of a duck in a book;

Approximations include but are not limited to any vocalization while engaging in a gestural request or communicative attending, such as "chee," "cuh," "duh," "buh," and "go."; child produces same number of syllables as mom modeled; child produces any sound or syllable that is within the word for the item

APPENDIX E
JOINT ATTENTION MEASUREMENT (OBSERVATION PROTOCOL)

The Emergence of Joint Attention in a Naturalistic Parent Training Program

Observation Protocol *Scoring Instructions*

We have asked participate in scoring a collection of videos you to score video clips from a parent training program at the University of North Texas (Ala'i-Rosales et al., 2008 in press) Family Connections Project). These clips range in duration from 2-10 min. The DVD's are kept on the laptop that is locked in a filing cabinet in the office of Dr. Shahla Ala'i-Rosales. The primary investigator will ensure that you have access to the video clips and datasheets that you need.

1. Fill in the blanks at the top of the page indicating clip number, date, child name, scorer name, and circle either "Baseline" or "Intervention" and "Lab" or "Home." Make any other notes that may be necessary to identify the clip that you score (such as "play with mom" or "play with mom and dad").
2. In the appropriate labeled box on the datasheet, tally each instance of child or parent initiation that achieves a partner's response.
3. If 2 initiation topographies occur at the same time, preceding a single response, record both.
4. A response to an initiation by one person may also be scored as a response to an initiation by the other person as long as it precedes the other partner's response within 3 seconds.
5. Sum the tallies in each box to calculate the IOA score ($\frac{\# \text{ agreements}}{\# \text{ agreements} + \text{ disagreements}} \times 100$) for each topography.

Definitions

(Adapted from Mundy, P., Delgado, C., Block, J., Venezia, M., Hogan, A., & Seibert, J. (2003). A manual for the Abridged Early Social Communication Scales (ESCS). Available through the University of Miami Psychology Department, Coral Gables, Florida. Retrieved from <http://www.psy.miami.edu/faculty/pmundy/main.phtml>)

Initiations and Responses to Initiations

Responses to Initiations

Child or parent orients toward the referenced (group of) object(s)/activity/person/event within 3 seconds of the initiation topograph(ies)y, or if already attending, responds with some other topography that was not occurring at the time of the initiation. If more than 1 initiation is scored as “responded to,” the initiation topographies must occur simultaneously preceding the response.

Examples

- Vocalizing/Commenting on the referenced object
- Turning to look (from a different object or area) to the referenced object or class of objects
- Taking the object that is offered
- Reaching for an object that is shown or offered
- Providing assistance with a referenced object or event
- Delivering an object or event that the other person references

Nonexamples

- Fully prompted responses to initiations, such as hand over hand guidance or turning the other’s person’s face to look at a referenced object, that are not followed by some other independent response
- Responses that occur more than 3 seconds after the initiation has ended

Initiations

Initiations are defined by their consequences, that is, the initiator stops initiating (leading, showing, pointing...) if the partner responds to that topography within 3 seconds.

A second initiation (and response to initiation) of the same topography may then re-occur 3 seconds after the response to the initiation has ended.

For instance, mom responds to a “*child reach*” by pulling her hand back and the child stops reaching for 3 seconds (score 1 response to “*child point/reach*”). Then, the child may reach and vocalize to which the mom responds by providing a cracker and praise (score a second response to “*child point/reach*” and a response to “*child vocal*”).

Also, an initiation of a different topography may begin after another topography but do not score it twice unless it is responded to twice (i.e. the child stops initiating with the original topography for 3 seconds after a response and then initiates again with that same topography before another response.)

Child Initiation Topographies

Tally each occurrence of the following topographies that are followed by a partner response to the referenced object or class of objects, area, event, or activity within 3 seconds.

Child Lead- Child physically guides parent by pulling or pushing hand or some other body part towards some object or area

Example:

- Mom is singing with a puppet on her hand and the child nudges mom's hand to which she responds by looking at the child and moving her hand.

Nonexample:

- Mom is singing with a puppet on her hand and the child nudges mom's hand towards the ground and mom looks at the TV (did not respond).

Child Show- Child brings a toy or other object upward toward the other's face and holds it there while looking at the item or the other person.

Example:

- Child picks up a grape and while bringing it toward mom he looks at her, then looks away. Mom says "grape!"

Nonexample:

- Child picks up a grape and mom says "grape" but child does not look at the grape or mom while holding it out or bringing it toward her.

Child Point or Reach- with some approximation of an articulation of the index finger or with outstretched arm or arms, the child points to or reaches for an object, person, or event.

Example:

- Child reaches for letter and mom moves hand back.

Nonexample:

- Child reaches for letter without turning and stops reaching without using some alternative means to obtain or call attention to the letter

Child Vocal- Child emits some word or word approximation such as “look” “ooh” or a label or part of a song that the partner subsequently attends to by either repeating or expanding upon the vocalization or turning to look at the referenced object.

Examples:

- Child holds up duck and says “duh” and mom says “yes, duck!”
- Child drops block off of side of table while imitating the words of a song mom just sang as mom watches and joins in singing or repeats the sounds that the child makes.

Nonexample:

- Child drops block off of side of table while imitating the words of a song mom just sang as mom watches and mom presents another toy without commenting on the vocalization.
- Child says “book” and mom says “book” then child says “book” again within 3 seconds of mom’s response (not a second initiation).

Parent Initiation Topographies

Tally each occurrence of a child response to the following parent topographies.

Parent Tapping/ Making Noise with Object- Parent makes an audible sound with an object or hands and child looks at object or person making the noise

Examples:

- Parent shuffles toys around while preparing them to bring to the table and the child turns around to look at the noisy toys
- Mom presses piano key while child is looking at the piano and child starts pressing the keys.
- While playing with the puzzle mom taps the place where the next piece goes and the child moves the piece towards her finger
- Child has his back to mom and mom claps. Child looks at mom.
- Child has back to mom and mom says “look at these bears, Chiquito,” and child turns around and looks at mom (not a response to tap/noise or vocal- looks at mom not object). Mom then shakes the cup of bears while holding them out and he looks at the cup.(score 1 response to parent tap/noise and 1 response to show)

Nonexamples:

- While child is already looking at the piano, mom presses the piano key and child does not comment, change facial orientation, or imitate mom’s playing.
- Mom drops block in bucket when the child is already attending to the block and child looks in the bucket.
- Mom is singing “C is for cookie” and pauses. The child turns to look at mom’s face when she pauses.(response to implicit vocal and facial orientation shift)

Parent Showing Object- Parent brings object upward to child’s face and holds it there or places an object in front of the child or models an action with a toy or activity to which the child responds by looking at it (must not already be looking at it for this to count as a response to show), taking/rejecting it, or imitating the action.

Examples:

- While playing cards mom moves the next card from the pile and holds it outward toward the child’s face. The child reaches for it, vocalizes, or turns to look at it. (You would also score as a child vocal initiation and/or reach if the mom subsequently responds to this)
- Mom puts a checker into the base of a toy while holding it out towards the child. The child puts the next one in.

Nonexamples:

- Child is oriented toward the stack of cards in mom's hands and watches the next one move from the pile to directly in front of his face and does not change facial orientation, reach, or comment within 3 seconds of her setting the object down.

Parent Point- Parent extends index finger towards object, event, or area (not touching the referenced object).

Examples:

- Parent extends index finger in direction of outside and child turns to look in the direction of the point.

Nonexamples:

- Parent uses index finger to tap place in puzzle where the piece goes

Parent Explicit Vocal to Attend- Child shifts facial orientation or moves toward object, person, or activity parent references (that is in the visual field of the initiator if referencing an object) following a clearly stated vocal instruction to attend to a (group of) object(s), person, or event, such as "look," "watch," "do what I do," "listen," "feel," "play__," "give me __," or other instructions to respond to an object or event. These vocalizations may or may not include a label or referent to the object or event. The end of an explicit vocal to attend is marked by a pause of 3 seconds following the child's response.

Examples:

- While playing with cards, the mom hands them, one by one, to the child. When the child looks away, mom says "look" to which he responds by turning to mom or the object being shown.
- "Look at these bears, Chiquito" (child orients toward bears)
- While taking turns putting blocks in a bucket, mom and dad each take turns and when it's the child's turn, dad says "put it in" (child puts block in)
- Dad says "give me five" and child looks at hand and gives five (also response to *parent show*)
- "Come here"

Nonexamples:

- Parent says "You're not looking" (*implicit vocal to attend*)
- Parent says "Do you see the "duck?"
- While playing with a ball, the child loses interest. Mom says "let's play cards." (cards are in other room so mom would not be calling attention to an object)
- "Look at these bears, Chiquito" (child turns head to look at mom and then the bears) UNLESS mom repeats before child looks at bears.

Parent Implicit Vocal to Attend- Child shifts facial orientation or moves toward object, person, or activity (that is in the visual field of the initiator if referencing an object) referenced by a parent's vocal label or referent (i.e. "it," "that," "there," "mommy," "her...", or exclamation about an object or event, without instructing the child to look or attend. Responses to a person singing (in the form of turning to look at the singer's face or doing the next action or sound of a familiar song) are also included in responses to parent *implicit vocals to attend*. The end of an instance of an *implicit vocal to attend* is marked by a 3 second pause between responses to phrases. A child can respond to an implicit vocal to attend before the end of the parent's vocalization/phrase.

Examples:

- describing/labeling the object/activity (child turns to look at the object/activity),
- making exclamations about the object/activity ("ooh, these are cool..."(child turns to look at the object/activity)
- calling the child's name or saying "hey,"(child looks at initiator),
- "over here" (child looks where pointing or showing-also mark response to point or show)"
- "your turn (child takes turn)"
- "mommy's turn"(child looks to mom)
- "you're not looking" (child turns to look)
- "ooh, blocks, these are fun."(child turns to look)
- Mom sings "the itsy bitsy spider" with hand motions. She pauses and the child moves her hands OR looks up at her face or says the next sound in the song.
- While playing ball with mom and dad, dad says, "I'm gonna throw it to mommy," (child looks at mom-mark 1 response)...3seconds... "ooh, here goes the ball,"...2 seconds... "I'm throwing it now" (child looks at the ball- mark a second response).
- "Want one?" (child looks at object being offered) (also a response to show)

Nonexamples:

- Mom says "weeble?" and child does not look up
- Mom hums while manipulating a toy (child looks at toy)(response to "parent tap/noise")
- "Look at these bears, Chiquito"(explicit vocal because instructed to look)
- "put it in"(instruction to attend not explicit or implicit)

Coordinated Joint Attention

Tally each occurrence of the following: (you may need to score coordinated joint attention measures at a separate time from the other measures as they are difficult to count)

Child Facial Orientation Shift – Child alternates facial orientation from

Activity/(group of) object(s)/person/event →

Parent's face→

Activity/(group of) object(s)/person/event

[and the shift from the parent's face → activity occurs within 3 seconds]

-or-

Parent's face→

Activity/(group of) object(s)/person/event →

Parent's face

[and the shift from the activity→ to the parent's face occurs within 3 seconds]

-or-

In the case of peekaboo, song singing, tickling, or other social games, when the event ceases, the child turns his or her facial orientation to the parent within 3 seconds

*Objects related to the activity such as those in the parents hand in a task where the parent is handing objects one by one to the child count as the same “group of objects”

Examples:

- Child and parent are playing with cards and mom holds one up and says “bird.” The child orients toward the card then to mom’s face then back to one of the cards(tally1)...then back to the mom’s face then to a card(tally 2)...
- Child looks from puppet on mom’s hand to mom’s face then back to the puppet within 3 seconds
- Child shifts orientation from bucket to the parent’s face to the next object in the parent’s hand (for the bucket)
- After a tickle stops the child shifts orientation from some other area of the room to the parent’s face
- Dad says “peekaboo” and child turns toward dad’s face and giggles (“*implicit vocal to attend*”) then dad disappears. Within 3 seconds child moves around the obstructing objects and when he finds dad, he orients toward dad’s face and giggles when dad says “peekaboo” (1 FOS)

Nonexamples:

- Child looks at the card then to the TV then to the parent
- Child looks from puppet on mom’s hand, to mom’s face, then to tv

Datasheet

Clip Date _____ / Int. or BL / Lab or Home/ Clip# _____

Notes: _____

Child Name _____

Scorer Name _____

Tally all parent responses to child initiations and child responses to parent initiations

Response to Child Initiation					
	Child Lead	Child Show	Child Point/Reach	Child Vocal	FOS
Total Responses to Child Initiations	Child Leads _____	Child Shows _____	Child points/reaches _____	Child Vocal to attend _____	Child facial or. shift _____
	IOA Score _____, % _____	IOA Score _____, % _____	IOA Score _____, % _____	IOA Score _____, % _____	IOA Score _____, % _____
Response to Parent Initiation					
	Parent Tap/Noise	Parent Show	Parent Point	Parent Explicit Vocal	Parent Implicit Vocal
Total Responses to Parent Initiations	Response to Parent Tap _____	Response to Parent Show _____	Response to Parent Point _____	Response to Explicit Vocal _____	Response to Implicit Vocal _____
	IOA Score _____, % _____	IOA Score _____, % _____	IOA Score _____, % _____	IOA Score _____, % _____	IOA Score _____, % _____

APPENDIX F

PARTICIPANT INFORMED CONSENT FORM



OFFICE OF THE VICE PRESIDENT FOR RESEARCH
Office of Research Services

November 14, 2007

Shahla Alai-Rosales
Department of Behavior Analysis
University of North Texas

Re: Human Subjects Application No. 07-428

Dear Dr. Alai-Rosales:

As permitted by federal law and regulations governing the use of human subjects in research projects (45 CFR 46), the UNT Institutional Review Board has reviewed your proposed project titled "A Parent Training Program for Toddlers with ASD: Program Description, Outcomes and Participant Satisfaction." The risks inherent in this research are minimal, and the potential benefits to the subject outweigh those risks. The submitted protocol is hereby approved for the use of human subjects in this study. **Federal Policy 45 CFR 46.109(e) stipulates that IRB approval is for one year only, November 14, 2007 to November 13, 2008.**

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

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 and how it will be conducted.

Title of Study:

A Parent Training Program for Toddlers with ASD:
Program Description, Outcomes and Participant Satisfaction

Principal Investigator:

Shahla Alai-Rosales, Ph.D., BCBA
University of North Texas, Department of Behavior Analysis

Purpose of the Study:

Professionals are able to detect and diagnosis autism spectrum disorders (ASD) at earlier and earlier ages. There are very few descriptions of interventions, however, that specifically address the needs of toddlers. Furthermore, waiting lists and costs of EIBI (Early and Intensive Behavioral Interventions) present many barriers to families. The Family Connections Project (FCP), a service-learning project in the Department of Behavior Analysis at the University of North Texas, was created to meet the needs of toddlers and their families in the region.

The purpose of this study is to provide a description of FCP procedures, outcomes and participant satisfaction so that other interventionists can benefit and extend our efforts.

We will describe the intake, training and evaluation procedures that all families experience as participants in FCP. We will do this so that other interventionists working with toddlers can replicate these procedures in their programs.

The outcomes we would like to report include the teaching skills you learned, your child's progress that resulted from your teaching, and any additional benefits that were observed. Additional beneficial outcomes might include: your child's increased attention to objects and people; overall increases in the amount that you and your child were able to play together; and increases in positive affect (smiling, laughing). We will report outcomes so that other interventionists understand the types of changes that FCP produces.

We would also like you to provide us with your evaluation of FCP. We would like your opinion of the experience (benefits, difficulties, suggestions) and how you view your participation several months after participation. We will report this information to help us and others benefit from your perspectives on this type of intervention.

Study Procedures:

1) We are asking you to fill out a questionnaire that describes your education, age, ethnicity, income level, and your child's specific diagnostic labels (e.g., PDD, PDD-NOS, Autism,

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Aspergers, Tourette's, etc.). You will also be asked to evaluate your experience with FCP (benefits, difficulties, suggestions). If you consent to participate, we will provide you with the two page questionnaire. The questionnaire should take about 20 minutes to complete. You will be provided with a self addressed, stamped envelope at your convenience. Your names will in no way be linked to this information. You and your child will be referred to by pseudonyms.

2) We are asking you to give consent for the data from you and your child's training assessments to be reanalyzed and summarized in order to assess the degree to which additional changes occurred (in addition to your teaching skills and your child's goal skills). Your name and your child's name will never be associated with any of the data. We will use pseudonyms to describe you and your child in any publications.

Voluntary Participation:

Participation in this research study is voluntary. You have completed your participation in FCP and refusal to participate or a decision to discontinue participation will not involve a penalty or loss of benefits or jeopardize access to any services that you may qualify for through the Family Connections Project.

Foreseeable Risks:

No foreseeable risks are involved in this study. Pervious clinical and research reports have identified no harm and substantial benefit from participation in the training that was associated with this study and there is no foreseeable harm in completing the questionnaire.

Benefits to the Subjects or Others:

This study is not expected to be of any direct benefit to you; however, the results of the study the study may add directly to the knowledge of other service providers delivering parent training services to families with toddlers with autism and other populations. This, in turn, may benefit future children and parents receiving services similar to FCP.

Procedures for Maintaining Confidentiality of Research Records:

As part of standard FCP procedure, all intervention records (signed consent forms records, reports, home helpers, and assessment video tapes) are kept for three years in a locked filing cabinet in the FCP office in Chilton Hall Rm. 361E. No documents will be posted on the internet and any electronic copies are kept for three years following FCP training and then destroyed. Parents may request additional copies of FCP files or video assessments at anytime.

For families consenting to participate in this study, pseudonyms will be assigned to each parent/child and those pseudonyms will be used when referring to that participant data. These pseudonyms will be maintained throughout the course of research. A separate set of files will be set up for data related to the research and the files will be kept in a locked filing cabinet in the FCP office in Chilton Hall Rm. 361E. Following the completion of the research study, the files will remain in The Family Connections Project records for up to 3 calendar years. Because of the extensive data collection involved in the study, a team of graduate student may at any time during study view the participants' records. All of these graduate students are staff of The

Family Connections Project. Personally identifiable data will not be disclosed to anyone outside of The Family Connections Project Research Team. The confidentiality of the participants' personal information will be maintained 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 Dr. Shahla Ala'i Rosales at 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.

Research Participants' Rights: Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- Shahla Alai-Rosales has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as a research participant and you voluntarily consent to participate in this study.
- You have been told you will receive a copy of this form.

Printed Name of Participant

APPROVED BY THE UNT IRB
FROM 11/14/07 TO 11/13/08
RB

Signature of Participant

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

Date

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