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Generalization of joint attention:
Using Parent Child Interaction Therapy to program social skills
in children with developmental disorders

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A thesis submitted to the Graduate Faculty of

JAMES MADISON UNIVERSITY

In

Partial Fulfillment of the Requirements

for the degree of

Master of Arts

Psychological Sciences

May 2016

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Abstract

Generalization of social behaviors is a vital component of human behavior. Children with Autism Spectrum Disorder often show symptomology that includes impairment in social behavior and failure to generalize behavior on the whole. Initiation of joint attention is a social behavior that can be understood as a behavior cusp and worthy of intervention to promote development. Parent-Child Interaction Therapy has been studied in recent years for its efficacy in treating some dimensions of Autism Spectrum Disorder in children and adolescence. The current study sought to explore the efficacy of Parent-Child Interaction Therapy in promoting the generalization of initiation of joint attention in children with Autism Spectrum Disorder across adult/child dyads. Data showed that PCIT was both effective in producing initiation of joint attention and in producing generalization of joint attention.

Generalization of joint attention:

Using Parent Child Interaction Therapy to program social skills
in children with developmental disorders

Generalization

Generalization is a vital process for the proliferation of behaviors that promote the survival and welfare of an organism. This process allows humans to write with a pen or pencil, eat with chopsticks, and throw a dart. All of these unique behaviors require the ability to grip an object between one's thumb and forefinger. Without generalization, each of these skills would need to be taught as if there were no similarities between them. Fortunately, through generalization, that grip can generalize from the first time it is learned across these different contexts and make learning more efficient.

Catania (2013) defined generalization as “the spread of the effect of reinforcement from one stimulus correlated with reinforcement to nearby stimuli” (p. 138). In this definition, Catania spoke to the key aspect of the process: stimuli. For stimulus generalization to have occurred, an organism must engage in a behavior across stimuli. Thus, two requirements must be met. First, the stimuli must change. Second, the behavior must occur with the same functional identity before and after stimulus change. The process includes a broad set of variables in any given context. From organism to organism and from environment to environment, generalization is fundamentally different in each setting.

Stokes and Baer (1977) cited two requirements in order to claim that generalization has occurred. First, a relevant behavior must occur across various conditions (i.e. differing stimuli/stimulus packages). Second, the occurrences of the

relevant behavior must have occurred without training across the various conditions. This suggests that the process by which a given response occurs across conditions is dependent upon stimulus generalization in which some salient dimension of a stimulus that has evoked the behavior in previous presentation becomes salient in other stimuli. Therefore, stimulus generalization occurs when a dimension of the stimulus that has previously occasioned a behavior becomes the discriminative stimulus for a novel or previously non-paired condition that subsequently occasioned a functionally equivalent behavior without training.

Generalization and Social Skills. In the human experience, generalization is one of the hallmarks of typical functionality. Through it, a behavior is occasioned by a greater number of stimuli, thus resulting higher occurrences of the behavior, resulting in more efficient responses to stimuli. Responses become more efficient because the salience of a stimulus dimension across stimuli occasions a given behavior in generally novel situations without training.

This is no truer than in social skills. According to Catania (2013) we owe a great deal to the large body of knowledge that is passed on to us via social interaction. Social behaviors, or, more accurately, socially mediated behaviors, are defined as any behavior of which the outcome is mediated by the behavior of at least one other person (Cipani & Schock, 2011). Catania (2013) also stated that behaviors transmitted by social interactions persist because they have consequences. These consequences are often social as well. Social skills as a behavior class, represent the foundational behaviors required to initiate, maintain, and derive positive outcomes from interaction with other organisms.

Another key to understanding social behaviors is in the ecological context in which they exist. Sheridan, Hunglemann, and Maughan (1999) wrote that “social behaviors must be considered as they interrelate with meaningful social environments” (p. 87). The authors asserted that social skills do not exist in isolation, but rather *interrelate* with different contexts. In this light, it is reasonable to regard social behavior as predicated on the ability to generalize because the behaviors must remain recognizable across contexts if one is to consider their relation to the different settings.

Causes of Generalization. But what causes generalization? Prior to the work of researchers like Guttman and Kalish (1956), mentalistic explanations for all behaviors relied upon a non-physical free agents such as a “mind” or “soul”. This free agent was used to explain all manner of phenomenon that could not be accessed through contemporary psychological measures. With the advent of behavior analysis, research into the observable aspects of generalization proliferated. Through this proliferation, researchers found that a process that may seem simple at first was, in fact, quite complex. For example, generalization also involves discrimination. Dinsmoor (1995) noted that the capacity to discriminate between antecedent stimuli is vital to identifying the behavior it occasions. From a researcher perspective, this is important for analyzing and predicting behavior. From an organismal perspective, this is important because an organism must discriminate the likenesses and differences in stimuli in order to respond with previously learned behaviors.

Similarly, Davison and Baum (2010) found that stimulus salience was a key correlate with how an organism responded to operant contingencies. This means that observing, a behavior class that allows an organism to take in important information from

a stimulus, is vital to generalization. It also illustrates the part of Catania's (2013) definition of generalization which states that the stimuli must change. In order for an occurrence of a previously learned behavior in a novel setting, an organism must have observed differences in stimuli between the settings, but also observe similarities that indicate the potential efficacy of a behavior.

Generalization in Applied Settings. Stokes and Baer (1977) defined generalization as, "the occurrence of relevant behavior under different, non-training conditions" (p. 350). Although it is easy to recognize this as an analog for the Catania definition, it also contains an important applied term, "relevant."

Baer, Wolf, and Risley (1968) outlined several dimensions of applied behavior analysis that would ultimately become the guiding principles of the field. Effectiveness, the extent to which a behavior or intervention produces meaningful outcomes, is one of these principles and relevance can be seen as a parallel to this. Both promote a viewpoint in which the value of a concept resides in its meaningfulness to real world events. This is further echoed in Wolf's (1978) writings on social validity. Wolf argued that the only measure of whether or not the pursuits of applied behavior analysis are successful is the extent to which it makes meaningful difference to the person or persons who it is meant to affect. In this light, generalization is also a major component of social validity.

Behavioral Cusps. A great deal of research has gone into understanding the relevant, effective, and socially valid concepts and applications of generalization (see Hixson, 2004, Stokes, 1992, Stokes and Baer, 1976, & 1977, & Tillman 2000). Rosales-Ruiz and Baer (1997) discussed behavioral cusps, an area in which the field of applied behavior analysis had begun to understand some of the more global effects of

generalization. As the authors wrote, cusps are “behavior change that has consequences for the organism beyond the change itself” (p. 534). They went on to explain that the defining quality of a cusp is how it brings the organism into contact with “new environments, especially new reinforcers and punishers, new contingencies, new responses, new stimulus controls, and new communities of maintaining or destructive contingencies” (p.534). Returning to Stokes and Baer’s (1977) definition of generalization, it is apparent that behavioral cusps meet the standard of being relevant to untrained situations.

The behavioral cusp is a concept that is informative to understanding the importance of basic social skills and their generalization. Bosch and Fuqua (2001) proposed a series of criteria for identifying behavioral cusps. The five criteria they suggested in order to accurately categorize an event as a behavioral cusp were that it brought the person into contact with new contingencies, environments, and reinforcers; it was a socially valid change in behavior, it promoted generativity; it competed with less affective or inappropriate responses; and that the change had effect beyond the person engaging in the behavior.

These criteria lend themselves to understanding the function of social behavioral cusps. The behavior of verbally responding to indicate understanding of another person’s preceding statement can be used as an example. When a person learns to verbally respond to indicate understanding, it necessarily brings them into contact with new contingencies and environments as it increases the likelihood that a person will speak to them, expect them to respond, and understand the meaning of their words. All three of these things are contingencies that would likely not be in effect, at least to the same extent, prior to a

person's ability to convey their understanding of another's speech. It goes without saying that verbally indicating one's understanding of another person's speech is socially valid; it is foundational to having conversations. This skill promotes generativity in that it provides access to opportunities for new behaviors to occur that are predicated on indicating one has understood another's speech. Verbally indicating understanding competes with developmentally lower behaviors such as gestural communication and is in direct competition with behaviors that often develop from the frustration of a lack of verbal communication such as destructive or injurious behaviors. Finally, any social behavior necessarily impacts the environment around the person engaging in the behavior, which can shift the contingencies in place for other people in that environment. Thus the ability to verbally express understanding another's statements impacts the environment in which the speaker and the listener exist, and therefore could affect how the listener will respond to the speaker in the future.

Joint Attention

Joint attention is a core social skill that can also be seen as a behavioral cusp. It is critical to early language development (Tomasello & Farrar, 1986) and an early indicator of typical communication development (Toth, Munson, Meltzoff, & Dawson, 2006). Charlop-Christy, Carpenter, Le, LeBlanc, and Kellet (2002) operationally defined joint attention as when a child observes the same object as another person for five or more seconds, when the child engages in a referential look between another person and an object, and/or when the child establishes a shared focus of attention on an object, activity, or event.

When Bosch and Fuqua's (2001) criteria to be considered as a behavioral cusp are applied, Charlop-Christy, Carpenter, Le, LeBlanc, and Kellet's (2002) definition of joint attention fits nicely. Joint attention brings one into contact with new contingencies and environments because it dynamically changes the relation between environmental factors, namely two people who now have shared experience of an object, environment, or event. This shared experience can then provide new contingencies that can only be accessed if multiple people are sharing attention such as cooperative play. It is also a socially valid behavior because jointly attending to an environment is prerequisite for essential skills such as working in teams and sharing.

Generativity arises from joint attention in that it provides an access point to new contingencies that require new skills that work in sequence or in chorus with joint attention such as participating in a band or choir which requires a person to jointly attend to the sheet music, but also requires the ability to modulate one's behavior in response to the behaviors of others (matching voice tone and volume, playing notes at the correct speed, etc.). These behaviors could not occur if one was not jointly attending.

Joint attention is incompatible with other attending behaviors in that no other behavior can achieve the same results as it. So, although one may be able to play with toys without jointly attending to others, one cannot play a game with others without joint attention. Joint attention directly competes with lower order behaviors that provide access to a smaller array of reinforcers.

And finally, joint attention impacts others as it is a behavior that necessarily requires at least two people. Although joint attention requires the behaviors of two or more separate individuals, those behaviors must occur in concert for any one person to

successfully engage in the behavior. So, a person who learns to jointly attend positively impacts others because those other people can now access reinforcers that they would otherwise not be able to experience.

Autism Spectrum Disorder

In their 1989 article, “A Comprehensive Behavioral Theory of Autistic Children: Paradigm for Research and Treatment” Lovass and Smith outlined a behavioral perspective on children with autism. Their works can be applied more broadly to the general class of developmental delays and disorders. In the article they outlined four tenets of their paradigm that create a behavioral account of autism. First they suggested that the behavior of children with autism is bound by the laws of learning and this provides the foundation for intervention. Second, persons with autism have discrete deficits rather than a central deficit. These discrete deficits can be seen as developmental delays. Third, with placement in appropriately specialized environment, persons with autism can learn as effectively as others do. And fourth, the success of these persons in specialized environments and failure in typical environments is indicative of a mismatching between the biological abilities of the person (nervous system, sensation and perception, etc.) and the environment rather than a disease that may be cured.

The Diagnostic and Statistical Manual of Mental Disorders, DSM-5 (5th ed., American Psychiatric Association, 2013) outlines the criteria for Autism Spectrum Disorder, or ASD, as (1) social communication and interaction deficits that are persistent across contexts, (2) circumscribed and stereotyped behavior patterns and interests, (3) early onset of symptoms, (4) symptomology that causes significant disruption to current, important functioning, and (5) symptoms that cannot be explained more accurately by

another diagnosis. These are the criteria by which many professional clinicians diagnose and treat autism.

Lovaas and Smith's (1989) and the DSM-5 (APA, 2013) definitions are not in conflict with each other and both present useful perspectives on autism. Both of them indicate that the symptoms of ASD are not borne out of a central deficit, but involve some core deficits in several areas that may or may not be related. Also, both definitions identify the relation between ASD and the environment. Both of them note that there is significant impairment or failure in typical environments such as social settings.

The major difference between these two definitions is in their applicability. The DSM-5 definition is more explicit and thus allows for only narrower interpretation. This, in turn, limits the ability to functionally understand ASD across settings. However, Lovass and Smith (1989) presented a much more broad conception of ASD that focuses less on the content of the disorder and, instead, place emphasis on the functional differences that can apply to all contexts for persons with ASD.

For the purposes of this study, both definitions are used. The DSM-5 definition is used for inclusion criteria for participants. But, more importantly, the Lovaas and Smith definition is used for a functional understanding of the application of therapy to treat ASD. Therefore, both definitions maintain important roles, but the Lovaas and Smith definition is ultimately more informative to the questions the present study seeks to explore.

ASD and Social Skills. As stated by the DSM-5 (APA, 2013) children with ASD have difficulty in social communication and interaction. In the context of the Lovaas and Smith (1989) definition, these difficulties are understood as behavioral deficits that

revolve around a developmental delay that affects behaviors in social settings. As such, it can be said that a common identifier among person's with ASD is that they often have deficits, due to weak, inappropriate, or missing behaviors, that negatively impact social contexts. Thus, the exact behaviors and contexts are not necessarily the same, but whatever the combination, it prevents successful interaction with the social realm of one's environment.

This has been illustrated many times by research. Matson and Nebel-Schwalm (2007) discussed challenging behaviors, such as noncompliance, in children with ASD and reviewed means to assess such socially significant behaviors. Howlin, Goode, Hutton and Rutter (2004) found significant deficits in adults with ASD in arenas of academic and job achievement, and friendships. All of these areas are socially mitigated and therefore can be understood as involving deficits in social behaviors. And finally, in their overview of intensive early interventions for children with ASD, Pelios and Lund (2001) identified a significant impact on speech, which is innately a social skill, among those with a diagnosis of ASD. This and other research has clearly verified that social deficits are a core commonality in persons who have ASD.

The DSM-5 (APA, 2013) also identifies limited and repetitive behavioral repertoires as a major trait of ASD. This can be conceptualized as a problem with the generalization of behaviors as a behavior that is stereotypic in nature is inherently not generalized appropriately. Wong, Kasari, Freeman, and Paparella (2007) studied problems with generalization of two social behaviors, joint attention and symbolic play. They suggested that training for such skills needs to specifically program generalization as part of the intervention. Chandler, Lubeck, and Fowler (1992) speak more generally to

the difficulty of programming generalization for young children, but conclude that it is imperative to the success of social skills training.

A great deal of research has established that social skills and generalization of skills are both areas in which persons with ASD commonly have significant deficits. This research has informed the application of various treatments (Matson, Benavidez, Compton, Paclawskyj, & Baglio, 1996). And a great deal of research has, in turn, been done on the efficacy of these treatment models (Butter, Wynn, & Mulick 2003, McLeod, Wood, & Klebanoff 2014, Matson & Smith 2007, & Matson & Rieske 2014). In addition, treatment models not initially intended for use with populations having ASD or developmental delay have been adapted and applied to these populations effectively (Agazzi, Tan & Tan, 2013). Parent Child Interaction Therapy, or PCIT, is one such treatment model that was not initially intended for persons with ASD, but has found success in application (Eyberg, 2005).

Returning to joint attention specifically, Dawson, Meltzoff, Osterling, Rinaldi, and Brown (1998) found that children with autism often fail to orient themselves towards objects, events, and other persons. This means that a precursor to joint attention, simply orienting oneself to the proper part of one's environment required to attend, is impaired in children with ASD. Also, patterns of joint attention observed in children with autism significantly differ from those observed in typically developing children (Kasari, Sigman, Mundy, & Yirmiya, 1990). This is displayed in consistently lower levels of positive affect towards adults as compared to a typically developed child (Kasari, Sigman, Mundy, & Yirmiya, 1990). Finally, joint attention has been found to be the most

significantly impaired social dimension in children with Autism as compared to typically developing children (Dawson et al, 2004).

Parent Child Interaction Therapy

Parent Child Interaction Therapy, or PCIT, is a manualized treatment model designed by Sheila Eyberg that was initially conceived for use with children diagnosed with disorders that included noncompliance as a significant symptom, such as Oppositional-Defiant Disorder, Conduct Disorder, and Attention Deficit Hyperactive Disorder (Eyberg, 1982). PCIT is founded in the principles of play, family, and relational therapy. The model focuses on intervention in parent behaviors as a means to address concerns about the parent-child dyad. The ultimate goal is to provide the parent with effective tools to improve their interactions with their child and build consistency in their response to child misbehavior.

As presented by Eyberg and Funderburk (2011) in the PCIT protocol manual, treatment is divided into two major components: Child Directed Interaction and Parent Directed Interaction. Child Directed Interaction, or CDI, establishes a positive pattern of interactions between parent and child by training the parent in skills that reflect, describe, and praise the child and his or her products as the child leads the dyad in free play. Parent Directed Interaction, or PDI, uses the foundation of positive interactions to build a consistent sequence for directing the child and scheduling consequences for compliance or noncompliance.

In recent years, research has shown PCIT to be an effective treatment for children with ASD (Agazzi, Tan, & Tan, 2013, and Solomon, Ono, Timmer, & Goodlin-Jones, 2008). It has also shown to be effective in encouraging ancillary outcomes in child

behaviors such as cooperative play and joint attention (Cannady, Stokes, Rigg, & Brittan, 2015). However, to date, only one study has been completed that explored generalization of child outcomes (McNeil, Eyberg, Eisenstadt, Newcomb, & Funderburk, 1991).

Because of the model's focus on parent behaviors, generalization studies have focused primarily on these and on maintenance of behaviors in the home setting (Eyberg, 2005).

Current Study

Although McNeil, Eyberg, Eisenstadt, Newcomb, and Funderburk's (1991) study on the generalization of child outcomes from treatment via PCIT showed that compliance did generalize to the school setting, this study was completed with children diagnosed with disorders where the core symptom upon which treatment focused was non-compliance. The population of interest for McNeil et al.'s study did not have poor behavior generalization as a core symptom. Alternately, limitations or absence of generalization of behaviors is a prevalent dimension of developmental delays, including ASD.

Also, as stated previously, the treatment goals of PCIT involve the development of new skills and scripts on the part of the parent, and improvement in the parent's perception of the child's behavior in terms of compliance. Although compliance is also an important factor in the interactions between parents and children who have ASD, it is only one of a broad constellation of symptoms that are worthy of intervention. Thus, any intensive treatment of ASD should seek to affect change across multiple symptoms in order to maximize its social validity.

The current study seeks to understand the effects of PCIT on the generalization of initiation of joint attention across settings. Specifically, this study looks to answer the question: Does Parent-Child Interaction Therapy promote generalization of the initiation of joint attention from a child with Autism Spectrum Disorder or another developmental delay across different adults?

Joint attention necessarily requires interaction with another person, as the other person is the specific component of the environment with which the child interacts to engage in joint attention. Thus, in reference to this study, its methodology and design, the term “multiple baselines across settings” will mean that a single child is engaging in multiple baselines across different people, where the people are the settings.

Methods

Participants

Child Participant. This study had one child participant, Todd, a pseudonym. Todd was a male aged 10 years (Todd turned 11 during the study) that was diagnosed with Autism Spectrum Disorder, prior to his fifth birthday, by a child psychologist. In order to be considered for the study, the child participant was required to be within the age range of 5-12 years old. This age range was chosen based on the previous research of Solomon, Ono, Timmer, and Goodlin-Jones (2008). Todd’s vision was corrected with glasses. There were no other physical abnormalities or limitations that would have excluded him from the study (i.e. other sensory/motor limitations). He also had no diagnosis of intellectual disability or co-occurring mental health disorder, criteria used to exclude subjects from participating. Finally, Todd had no previous experience with

Parent Child Interaction Therapy nor was he currently in any type of program that is similar to PCIT.

Parents. Parent/Guardian participants for this study were be required to have a legal right to participate in therapy with the child participant or have written consent to participate from the child's legal guardian. Also, the parent participant were required to be free of visual or auditory impairments unless corrected to typical unimpaired range, or physical disabilities that would significantly limit the participants' ability to speak, see, hear or participate in a range of physical movements needed for physical play. Finally, the parent participants could not have previously experienced Parent Child Interaction Therapy or currently be in any type of program that is similar to PCIT.

Todd's parents, Donna and Monty, both pseudonyms, met inclusion criteria for the study. Todd was their only child of a somewhat complicated birth that had no reported lasting effect on Todd. Todd, Donna, and Monty were recruited from a local city school system via in person contact by the lead researcher.

Due to circumstances beyond the control of the researchers, Monty was unable to continue participation in the study. Although he was unable to complete the therapy, his initial participation was beneficial to the overall efficacy of therapy outside of research. Also, because he was able to participate after he was transitioned from baseline to treatment, his data were reported for posterity.

Student Clinicians. The final group of participants was two student clinicians who acted as analogs to adults in other settings typical of the Todd's life. These participants were required to have the same physical and sensory abilities that the parents

had. They were also required to have had no prior experience with PCIT. Sheila, a pseudonym, was a female undergraduate student at James Madison University. And Steve, also a pseudonym, was a graduate student studying applied behavior analysis at James Madison University.

Setting

Clinical sessions were completed at the Alvin V. Baird Attention and Learning Disabilities Center's Applied Behavior Analysis / Parent Child Interaction Therapy Clinic at James Madison University in Harrisonburg, VA.

Research Suite. Formal treatment, including observation and bug-in-the-ear coaching occurred in the research suite's treatment room. The research suite was comprised of two rooms, a treatment room and an observation room, with a one-way mirror in the wall between the two rooms. There was also a vestibule with a bathroom between the two rooms. The treatment and observation rooms had separate entrances from a main hallway, as well as entrances to the shared vestibule. The suite could only be accessed via the entrances into the hallway. The entrance from the hallway into the observation room was secured by a keyed lock and a numerical keypad lock. The entrance from the hallway to the treatment room was secured by only a keyed lock. Both entrances to the treatment room had child proof doorknobs inside the treatment room. (*See Appendix , Figure 3 for a diagram of the research suite.*)

Treatment room. The treatment room contained a round table with two chairs, a white board mounted to the wall opposite of the one-way mirror, and two windows with blinds. The table and chairs were centered in front of the two way mirror and rested

directly against the wall with the one-way mirror. The treatment room also contains a small, empty closet that is a remnant of the room's previous purpose.

Observation room. The observation room contains two tables, a computer, several chairs, and the audio visual equipment required to record treatment sessions (see the technology section below for further description of this equipment). One of the tables was placed against the wall between the two rooms, below the one-way mirror. This table was used for coding parent-child interactions to measure treatment fidelity.

Technology

Treatment Protocol. This study used Parent Child Interaction Therapy, PCIT, a manualized therapy created by Sheila Eyberg that focuses on scripting, response sequences, and live parent coaching (Eyberg & Funderburk, 2011). PCIT has two major components: Child Directed Interaction and Parent Directed Interaction. For the purpose of this study, only Child Directed Interaction, or CDI, was employed.

PCIT also utilizes the live coaching via a bug in the ear. A wireless earpiece and microphone that used radio frequency were used in this study (Anchor UHF 16 Channel Transmitter and UHF 16 channel receiver, and Anchor condenser collar microphone). All sessions were recorded via audiovisual equipment (Flip Ultra Video Camera, 1st generation – 1GB, Sony HDRCX405 Handycam, Sandisk microSD card – 32GB) that will then be digitally transferred onto an external hard. Video recordings of sessions will be used for later coding.

Treatment Toys. PCIT employs the use of non-rule based toys during treatment (Eyberg, Funderburk, 2011). During each session, dyads engaged with toys that allow for

free play. No more than four different types of toys were present in the treatment room. Toys were not rotated systematically as the client showed preference for particular items. If the child did not engage in play with a specific item during a session, that item was removed from future use. The parent participants were also encouraged to bring in non-rule based, non-screen based toys from home. Examples of the toys that were used include: Mr. Potato Head, building blocks, toy cars and trains, plastic animals, paper and crayons, and magnet boards with magnetic shapes, and Legos.

Measures. The Eyberg Child Behavior Inventory, ECBI, (Eyberg & Pincus, 2012), Parent Stress Index 4th edition, PSI, (Abidin, 2012), and Child Behavior Checklist, CBCL, (Achenbach & Rescorla, 2001) were used as initial assessments and interim measures for ratings of treatment outcomes and social validity of treatment. All three of these are parent report instruments that have been shown to have validity and reliability (Achenbach & Rescorla, 2001, Abidin, 1983, & Eyberg & Robinson, 1983).

The Dyadic Parent-Child Interaction Coding System (fourth edition), or DPICS, is a manualized coding system specifically created to code the verbal behaviors of PCIT participants (Eyberg, Nelson, Ginn, Bhuiyan, & Boggs, 2013). While this coding is not the measurement of interest for the present study, it was used to ensure fidelity to the manualized treatment of PCIT and to monitor parent progress in the program. The DPICS is a reliable and valid coding system for PCIT (Robinson & Eyberg, 1981). DPICS data were coded for frequency during a 5-minute recording period (*see Appendix B*), per the treatment protocol outlined in the PCIT manual (Eyberg & Funderburk, 2011). DPICS was also measured using a 5-minute, 10-second partial interval coding system to explore the relationship between initiation of joint attention and parent behaviors.

Finally, a coding system for initiation of joint attention was created based on the previous published literature (Charlop-Christy, Carpenter, Le, LeBlanc, & Kellet, 2003). For this study, initiation of joint attention was defined as any time the child participant (A) looked from the other member of the dyad to an object and back to the other person, a three point referential gaze, (B) looked at the other person in the dyad while pointing at an object, (C) presented an object to the other person in the dyad while looking at them, (D) initiated and maintained eye gaze on the face of the other person in the dyad for at least 3 seconds or (E) initiated an eye gaze with the other person in the dyad and then immediately looked at the same object as the person for at least 3 seconds. Coding of initiation of joint attention was completed via recorded therapy sessions.

Coding of initiation of joint attention was completed using a 5-minute partial interval recording with 10-second intervals. During a 5-minute recording period, the first instance of initiation of joint attention that occurs within each 10-second interval was recorded, whereas subsequent instances within the interval were not (Cooper, Heron, & Heward, 2007).

Personnel

Clinician Coaches. Therapy sessions were performed by clinician coaches. The lead clinician was a licensed clinical therapist and a board certified behavior analyst who had been performing parent-child interaction therapy for over 5 years. A second clinician ran most therapy sessions under the supervision of the lead clinician. The second clinician was a graduate research assistant with 3 years of experience participating in PCIT administration.

Observers. Observation and coding were performed by trained undergraduate research assistants. All research assistants were trained in DPICS. Training included required reading of the DPICS manual (Eyberg, Nelson, Ginn, Bhuiyan, & Boggs, 2013), and practice coding sessions. In order to code data for the study, research assistants were required to have an Interobserver Agreement, IOA, of at least 80% with the lead researcher on two consecutive practice coding sessions. IOA for initiation of joint attention, IJA, was calculated as per occurrence IOA, the larger number of intervals in which IJA occurred divided by the smaller number of intervals in which IJA was observed. IOA for each category of DPICS data were calculated as interval by interval agreement IOA, the total count of intervals of agreement of a given category divided by the total number of intervals of a given category (intervals of agreement /total number of intervals). The percentages for each category was then averaged for an overall IOA (Cooper, Heron, & Heward, 2007).

During formal observation and coding of the study, IOA was calculated for at least 30% of the observations. Again, the criterion for IOA was 80% agreement in each calculation. Both the minimum frequency of IOA calculation and the criterion for minimum acceptable IOA are conventions in the applied behavior analysis field (Cooper, Heron, & Heward, 2007).

Procedure

After recruitment, participants were scheduled for an intake appointment at the Alvin V. Baird Center for Attention and Learning Disabilities in the Institute for Innovation in Health and Human Services at James Madison University. During the intake the child and parent dyad was observed, and the child was observed interacting

with clinic staff without the parent present. The parent completed the ECBI, CBCL, and PSI, which were scored by a graduate student under the supervision of a licensed clinical psychologist. The parents were asked to provide documentation of their child's diagnosis of Autism Spectrum Disorder and the child's most current assessment information, if available. Finally, the parents participated in an informal interview about the histories of the child, parents, and family unit. All of this information was used to set treatment goals and confirm eligibility for research participation.

At subsequent appointments, the parents participated in an informal interview concerning the past week's events in terms of the child's behavior and the family unit in general. Then the child entered the treatment room. A rotation was used to counter-balance the settings to mitigate potential confounds from sequencing effects. In week one of the rotation the parents participated in treatment/observation sessions first, with the mother always going first and the student clinicians, always in the same order, participating second. During the second week of the rotation, the student clinicians, in the same order, participated first, followed by the parents, in the same order again. The rotation then returned to the same sequence as week one. During treatment/observation time, two 5-minute baseline observations were recorded for parent-child dyad and also for the two clinician participants. This totaled six measures at each session. As needed, between each dyad the child was supervised by a research assistant who offered a bathroom or water break and allowed the child to otherwise play freely.

Once all three baselines were stabilized, the parent participated in CDI Teach. Stability was identified by a neutral trend in baseline data for three to four data points as visually analyzed on a graph (Parsonson, 2003). CDI teach, as written in the PCIT

manual, involves giving the parent/clinician participant an overview of PCIT, explaining the structure of therapy sessions, offering a description and rationale for CDI, explaining the basic “do” and “don’t” skills of CDI, confirming understanding of the skills, explaining the sequencing of how to respond to misbehavior, roleplaying CDI skills, and providing a description and rationale for prescribed 5-minute daily homework sessions (Eyberg & Funderburk, 2011, p.20-32).

CDI “do” skills were explained using the PRIDE acronym: Praise, Reflect, Imitate, Describe, and Enjoy (Eyberg & Funderburk 2011). Praises were either designated as labeled or unlabeled. A labeled praise was defined as a positive evaluation of a child or his/her product that explicitly names the action, trait, quality, or product that is being evaluated. Unlabeled praise was defined as a positive evaluation of a child or his/her product without explicit indication of what is being valued. Reflect, or reflection, was defined as restating the verbalization of a child verbatim, with only minimal changes to improve clarity. Imitate was defined as acting in ways that copy a child’s play. Describe, or behavior description, was defined as making neutral to positive statements that describe a child’s current behavior. And finally, enjoy was defined as presenting a warm and welcoming affect to a child throughout interactions (Eyberg & Funderburk, 2003, p.27).

CDI “don’t” skills were defined as, commands, questions, criticism/sarcasm, also called negative talk, and negative touch. A direct command was defined as any statement that explicitly directs a child to engage in a specific task. An indirect command was defined as any statement that implies a direction for a child to engage in a task that is not explicitly stated. Questions were defined as statements that have an interrogative

grammatical structure, and/or have a rising inflection at the end of the statement. And Negative talk was defined as any statement that demeans, devalues, or otherwise expresses a negative evaluation of a child or his/her product. And finally, negative touch was defined as any non-incident physical contact initiated by the adult that acts as a punishment for the child (i.e. hitting, pushing, restraining, shoving, smacking, etc.) (Eyberg & Funderburk, 2003, p.28).

Once the parent had displayed competency in CDI skills through discussion and role plays with clinicians, the parent could begin experimental condition sessions with their child. These sessions involved alternating 5-minute coaching and 5-minute coding periods. During the coaching periods, the parent received live coaching from an observing clinician via a bug in the adult's ear. This coaching included feedback and suggestions for performance of CDI skills. During coding periods, the parent received no communication from clinicians and their interaction with their child were coded using the DPICS. A total of two cycles of coaching and coding were completed for the parent at each session in the experimental condition.

Once stable baseline recordings were observed in the two student clinician participant baselines, the first clinician participant participated in CDI teach as outlined previously. The clinician then participated in CDI with the child and was coached and observed as described above. Then, the process of CDI teach occurred for the second student clinician.

Finally, the parent was again asked to complete an ECBI, CBCL, and a PSI for treatment purposes. The ECBI was completed four times during the study to monitor parent perceptions of child problem behaviors. Also, the parent participated in an

informal interview regarding their perceptions of treatment efficacy and changes in their relationship with their child.

After research was completed, participants were offered follow up sessions. These sessions were offered to ensure the achievement of treatment goals. Beyond this, parent-child participants were be invited to continue treatment at the clinic as paying clients.

All data collected from all participants were deidentified and each participant was assigned a random number to maintain confidentiality. All consent forms and other documents that contained participant identifiers were placed in the locked records room of the clinic inside a locked file cabinet. Deidentified documents, such as data sheets and parent inventories were kept in a locked filing cabinet in the clinic.

Parent participants receive two forms of compensation for participation. First, the clinic fees for treatment were waived during the period of active research. Second, as the parents were traveling from outside of Rockingham County they be offered \$10.00 per visit to offset the cost of travel to the clinic up to \$100.00 total per child participant. The first compensation was vital to ensuring that parent and clinician bias due to financial obligations were not a confounding variable in parent or clinician behavior. The second compensation was offered to remove barriers to participation and mitigate a potential factor in participant attrition. Neither of these compensations were contingent on performance in therapy, but solely on attendance to therapy.

Research Design

This study used a multiple baseline across settings design in which the different settings were different adult participants (Kazdin& Kopel, 1975).

Results

Figure 1, a graph of percentage of intervals in which the child participant, Todd, exhibited initiation of joint attention, IJA at any time during the interval, shows that IJA, was not occurring in any of the baselines prior to intervention, as all of them had zero trends and remained at zero while all settings were on baseline. For simplicity, graphs will be referred to by the pseudonym of the adult participant; all graph's included Todd as well. Immediately after implementation of the treatment condition in the first setting, with the mother, Donna, instances of IJA were observed across all baselines. On Donna's and Sheila's graphs, IJA maintained a low level with low variability and no trend after the initial increase. Interestingly, Steve's graph shows a more dramatic and variable change in IJA after Donna's change into the treatment condition. As seen in Steve's graph, IJA has an increasing trend with moderate variability that is at a low to moderate level. This indicates that IJA generalized across all baselines without implementation of treatment conditions across all baselines.

Figure 2, a graph of percentage of intervals in which any DPICS "do" and "don't" skills occurred, shows an increase in "do skills" after implementation of treatment conditions on each baseline, and a decrease in "don't skills" after implementation of treatment conditions on each baseline. As the effects of treatment only occurred in each baseline after that baseline entered the treatment conditions, it can be concluded that experimental control was achieved in terms of the adult participants' behaviors of interest.

In measuring social validity, the child participant's mother completed the ECBI three times and the PSI and CBCL twice each. The ECBI showed decreases on each

subsequent survey after the initial one, with the first assessment T-score of 69, within the clinically meaningful range and finishing with a final assessment T score of 52, below the clinically meaningful range. The PSI and CBCL pre-treatment T-scores were 56 and 73 respectively. Post-assessment PSI and CBCL T-scores were 55 and 71 respectively. Neither of the PSI nor the CBCL T-scores reduced to a clinically meaningful extent.

IOA for percentage of intervals in agreement was collected for DPICS coding for 66% of coding sessions. The overall IOA for DPICS coding was 97%. IOA for agreement by occurrence was collected for 46% of IJA coding sessions. The overall IOA for IJA was 86%. IOA for IJA is lower than that of DPICS because the form of IOA used for IJA was more stringent and the behavior was low frequency.

Discussion

When taken in the context of the research question, the results of this study indicate that not only was PCIT effective in positively influencing adult behavior, but also that PCIT was effective in improving the child participant's initiation of joint attention *and* promoting the generalization of it to untrained conditions.

In terms of the experimental control exhibited on adult participant behavior, it has been well documented that PCIT is effective at affecting parent behavior (*see* Eyberg & Robinson, 1982, and Eisenstadt, Eyberg, McNeil, Newcomb & Funderburk, 1993). It goes without saying that a large portion of experimental control in parent behavior is due to the absence and subsequent presence of training. Adult participants may have incidentally performed the various behaviors of interest prior to training, but the

introduction of training in “do” and “don’t” skills had a clear effect on the rates of these behaviors.

However, it is not necessarily the case that the introduction of training was responsible for the maintenance of these behaviors at their post intervention levels. Donna, the child participant’s mother, reported that the live coaching was helpful and that using the skills outside of the clinic made her more confident in their use. Both of these comments may explain, in part, the control seen in the maintenance of the behaviors of interest. Donna also reported high investment in the therapy, which could also have played an important part in her maintenance of the therapy behaviors. Similarly, both student clinicians reported high investment in the therapy. In addition, the student clinicians both reported positive perceptions of the child client.

Ultimately, it can be said that the measured behaviors of the adult participants were initially under the control of the introduction of the training prescribed by PCIT. However, the maintenance of these behaviors may be due to any number of other factors, or a combination of them. These factors could include, but are not necessarily limited to, adult participant perception of the child participant, perception of/investment in PCIT and treatment goals, use of therapy in non-clinical settings, and/or exposure to continued coaching. Future research into what maintains these behaviors may prove valuable to increasing the efficacy and economy of PCIT.

Initiation of Joint Attention was absent during the initial baseline measures of all conditions. This supports previous research that has shown that poor social skills, including joint attention, are a common symptom of autism spectrum disorder. Anecdotally, from reviewing the video recordings of the sessions, it was apparent that

Todd often attended to objects. Often, when an adult participant was holding an object of interest, Todd would track the object with his eyes, but would not attend to the face of the person holding the object. Also, Todd would engage in conversation with each adult participant throughout the sessions, however he would not make eye contact while speaking. This was noted across all adult participants.

As a referent for the meaningfulness of the change in Todd's IJA, Whalen and Schreibman (2003) found that the average percentage of intervals in which IJA occurred among 6 typically developing children was 23%.

Once treatment conditions were begun with Donna, Todd immediately began to show IJA. Although it was not the purpose of this study to explore how this occurs, there are several possible answers. First, it is possible that the nature of the CDI mastery criteria, high rates of praise, reflection, and behavior description simply increased the rate of adult interaction with the child, thus creating more opportunities for IJA. Second, and similarly, the goals of CDI encourage adult participants to engage in behaviors that are in response to and in chorus with the child's behavior which could lead to interactions that are more salient to the child as they are more closely related to the child's own behavior. This, in turn, could set the scene for the interaction to become a more salient discriminative stimulus for jointly attending. A third possible process could be that the reinforcing qualities of the "do skills" are such that response generalization occurs and new topographies of social behavior, i.e. joint attention, arise that all functionally work to gain positive interaction from the adult. Finally, a fourth possibility is that IJA was an already occurring behavior, but that it had not been paired to the contingencies that are

made salient via PCIT, namely that positive, pro-social behavior increases access to positive attention from adults.

The major research question of this study was whether or not PCIT promotes the generalization of IJA in children with ASD. Based on the current data, it appears that PCIT does, in fact, lead to not only to an increase in IJA, but also the generalization of IJA across settings. This is especially interesting considering the goals of PCIT are directly focused on issues of compliance. PCIT does not specifically program for IJA or its generalization, so one is left to wonder, what aspect(s) of the therapy collude to support the development and generalization of IJA.

While the potential aspects of therapy that support an increase in IJA are easier to identify, as stated above, it is more difficult to tease out what portion(s) of PCIT support generalization. It is possible that PCIT in and of itself is not the direct catalyst for generalization, but rather the product(s) of PCIT has a functional relationship with generalization of IJA. That is, PCIT encourages increases in positive interactions between an adult and child in a dyad. These positive interactions may act as a reinforcer for IJA. Then, when the child interacts with another adult, the similarities between each interaction are such that they evoke IJA as a means to elicit those positive interactions. Thus, IJA becomes instrumental for the child in accessing positive interactions.

Another possibility is that some other aspect of the adult-child dyad interaction took on reinforcing qualities that can only be accessed using IJA. For example, if a child begins engaging in IJA, and this results in access to a different type of play, such as turn taking or shared humor, this type of play may act as a reinforcer for IJA that is separate from the adult in the dyad, yet bound to the need for interaction. This then would create a

situation in which the way the child accesses that type of play is through IJA. This would support the conceptualization of IJA as a behavior cusp as it brings the child into contact with new contingencies and new reinforcers.

Another interesting aspect of the data was the difference in how IJA occurred during the condition in which Todd interacted with Steve, one of the student clinicians. Whereas the level and trend of IJA in both Donna and Sheila were relatively uniform and minor, the trend and level for Steve was more dramatic and variable. Although all three conditions saw immediate increases in IJA after the implementation of treatment conditions in Donna's setting, only Steve's saw a major increase.

One possible explanation for this could be that gender was a salient dimension of difference between the conditions and therefore Todd already had patterns of responses that were differentiated by gender. Unfortunately, the loss of Monty's participation limits the insight into this potential explanation. Another possible explanation is that Steve's interactions with Todd systematically varied in some way other than gender. For example, it could be that Steve's humor, voice tone, or some other dimension was different enough to evoke significantly different responses from Todd. No matter what the aspect of Steve's interactions that differed from those of Donna and Sheila, it is also interesting to note that this difference did not affect Todd's IJA prior to intervention.

The definition of IJA used in this study was adapted from the work of Charlop-Christy, Carpenter, Le, Leblanc, and Kellet (2002). The adapted definition focused on non-verbal behavior, with emphasis on eye gaze. This definition is versatile in that it can be used with both verbal and non-verbal children. However, it may have limited the present study from fully capturing Todd's IJA. The lead researcher made anecdotal

observations that in concert with the increase in Todd's IJA according to the research definition, Todd's use of the term "look", as a command, also increased. No data was taken on how often Todd said "look", but the change was significant enough that it was not noted prior to intervention and was noted after. After noting this, a review of the video recordings of the sessions found that there was a noticeable increase in his use of the command.

This anecdotal observation presents a limitation to the current study and also an avenue for future research. Because the current study had only one participant, it is unclear what effect, if any, client level of functioning had on the transpiration of IJA. It is within reason to assume that level of functioning plays a prominent role in how and to what extent IJA is achieved through PCIT. From a purely physiological perspective, functioning must play a role in that functioning sensory organs play an important role. However, the more difficult impact to understand is that of the symptoms of ASD. As discussed previously, verbalizations were noted as a potential factor in how IJA was expressed. A common symptom of ASD is delayed and/or impaired verbal communication (Howlin, Goode, Hutton, & Rutter, 2004). Also, as stated in the DSM-5 (5th Ed., APA, 2013), ASD symptomology also includes impaired social functioning. The intensity of this impaired social function in any given child could potentially significantly impact the prerequisite behaviors for IJA, such as orientation towards people. Future research should focus on understanding the relationship between ASD symptomology and the efficacy of PCIT in promoting IJA and its generalization to untrained settings.

Another limitation to the current study was that all conditions happened successively during the same therapy session. As such, it is impossible to fully rule out

carryover effects from one condition to the next. While counterbalancing the sequence of settings worked to mitigate such effects, it is possible that IJA came under, at least partial, control of the clinic setting. Future research should also explore the effects of location on the generalization of IJA. While the members of the dyad are the only required aspects of the environment for IJA to occur, the physical surroundings of the dyad may play a part in way in which IJA is expressed.

A final limitation of this study is that time constraints did not allow for assessment of IJA between changes in baseline. Although IJA generalized across all settings, it is possible that the implementation of treatment conditions in fairly rapid succession may have affected the maintenance of IJA. As such, future research should also take into consideration the maintenance of IJA in untrained settings for longer periods of time without implementation of treatment conditions.

In summary, the data from the current study showed an immediate increase in IJA across all settings after implementation of treatment conditions in one setting. These changes in IJA were at least maintained after implementation, but it is unclear what dimension(s) of PCIT affected these changes. Future research should pursue a better understanding of the ways in which different dimensions of PCIT, the physical environment, adult attributes, and ASD symptomology affect IJA. The social validity of PCIT was reflected in a significant decrease in ECBI scores and verbal report from the child's mother about the benefits of the therapy. Although limitations of the current study prevented deeper analysis of how IJA is promoted by PCIT, the data still reflects efficacy in both increase and maintenance of IJA.

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Appendix A

Figures

Percentage of intervals in which any “do” or “don’t” skill occurred

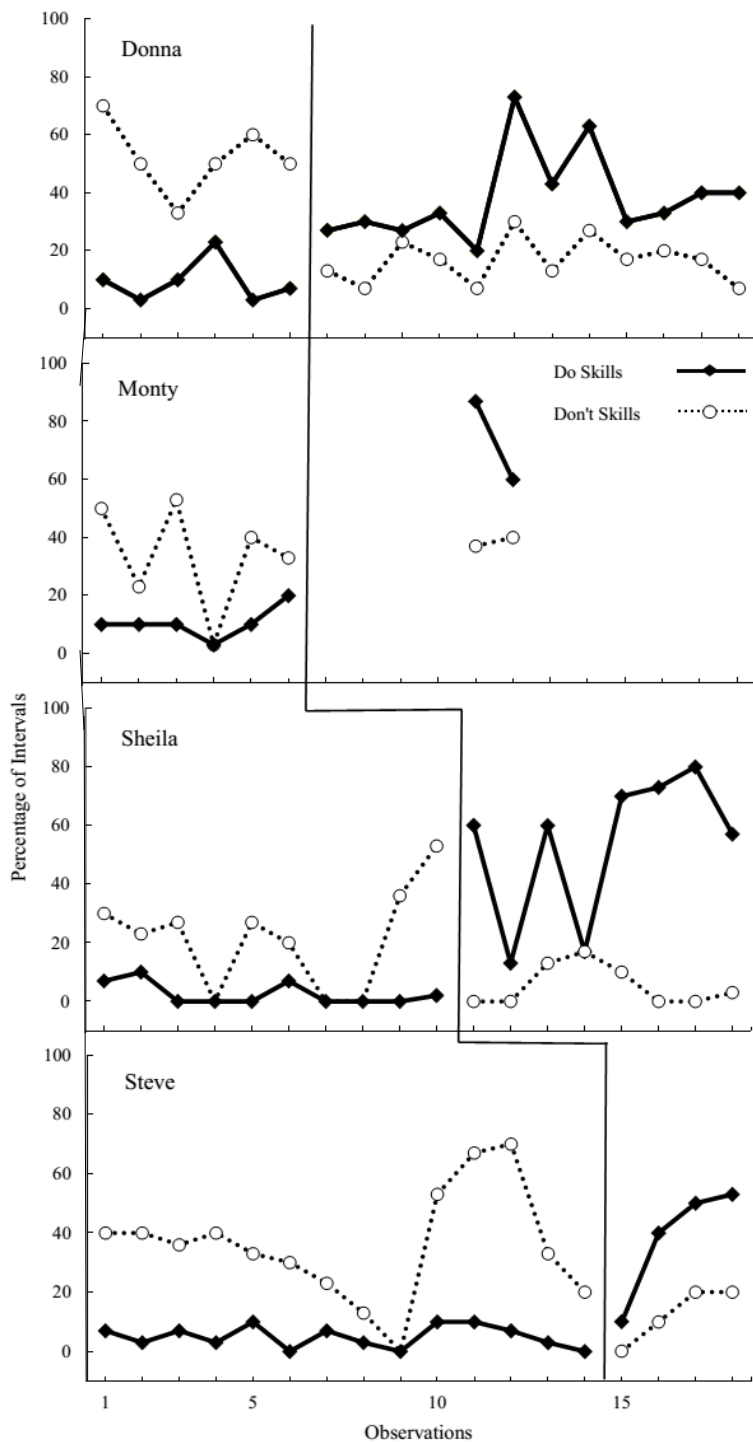


Figure 1: Multiple baselines graph of DPICS data for percentage of intervals in which “do” and “don’t” skills that occurred at any time during an interval.

Percentage of intervals in which Initiation of Joint Attention occurred

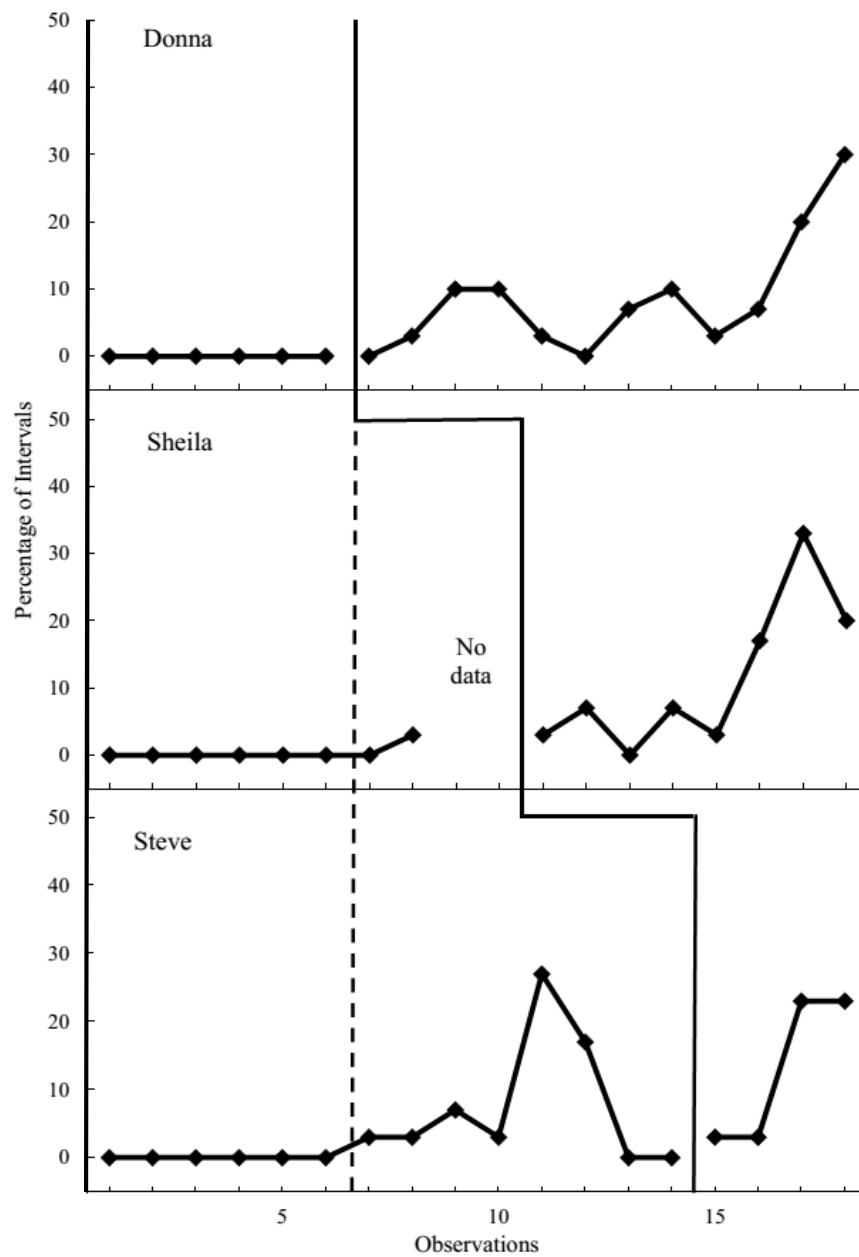


Figure 1: Multiple baselines graph of IJA data for percentage of intervals in which IJA occurred at any time during an interval.

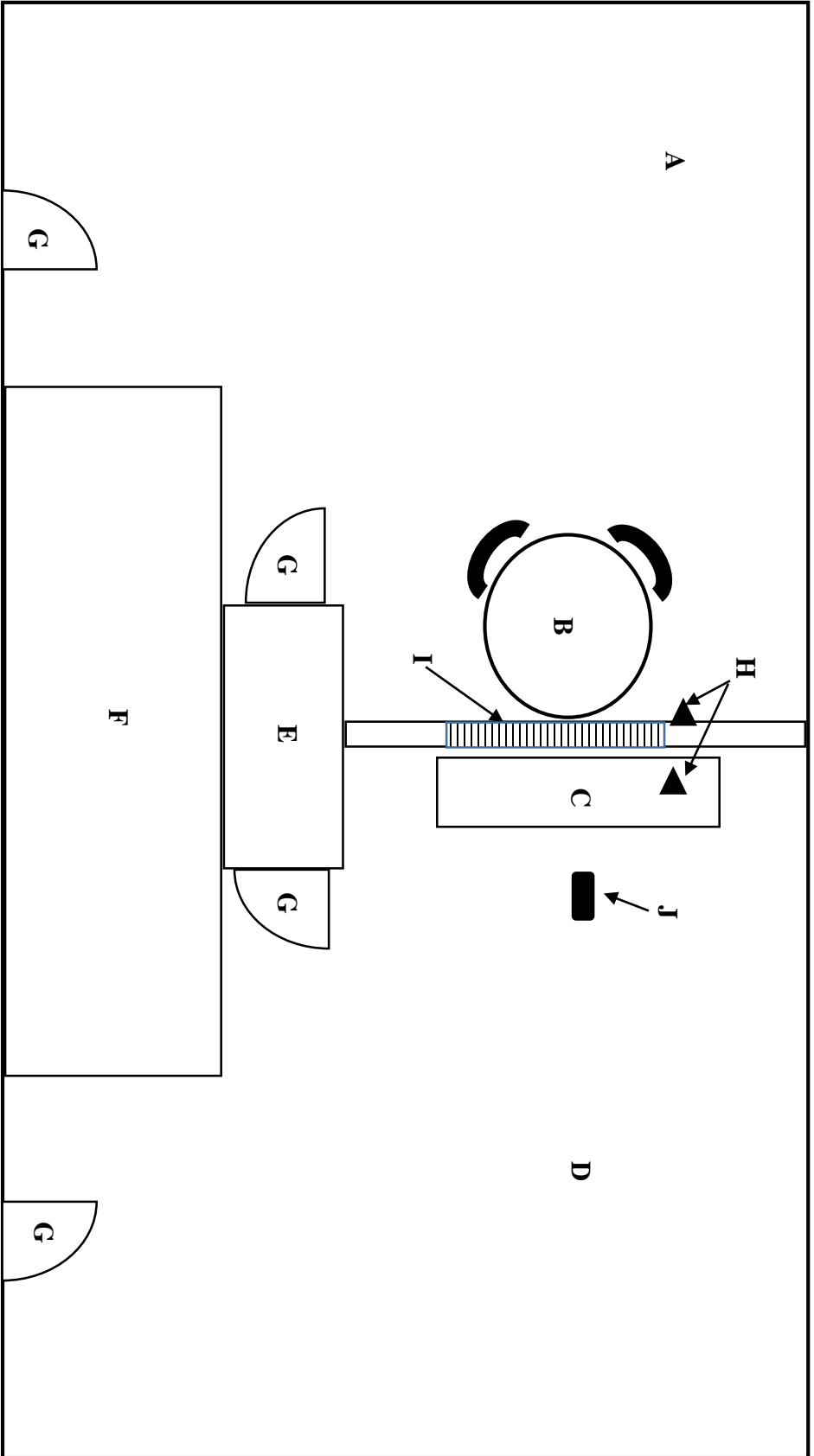


Figure 3: Diagram of Research Suite – A. Treatment Room, B. Play Table, C. Observation Table, D. Observation Room, E. Vestibule, F. Bathroom, G. Door, H. Baby Monitor Transmitter & Receiver, I. One-way Mirror, J. Camcorder

Appendix B

Forms

Initiation of Joint Attention Data Sheet

Observer # _____
 Child Participant # _____
 Adult Participant # _____

Primary/ Secondary Observer
 Baseline/CDI/PDI

Date of Session _____
 Video Name _____

Observation Begin Time _____
 Observation End Time _____

| | | | | | | |
|----------|----|----|----|----|----|----|
| | 10 | 20 | 30 | 40 | 50 | 60 |
| MINUTE 1 | | | | | | |
| MINUTE 2 | | | | | | |
| MINUTE 3 | | | | | | |
| MINUTE 4 | | | | | | |
| MINUTE 5 | | | | | | |

IOA: Total intervals in agreement/48(total intervals)

IOA: _____ / 48 = _____ %

Observation Begin Time _____
 Observation End Time _____

| | | | | | | |
|----------|----|----|----|----|----|----|
| | 10 | 20 | 30 | 40 | 50 | 60 |
| MINUTE 1 | | | | | | |
| MINUTE 2 | | | | | | |
| MINUTE 3 | | | | | | |
| MINUTE 4 | | | | | | |
| MINUTE 5 | | | | | | |

IOA: Total intervals in agreement/48(total intervals)

IOA: _____ / 48 = _____ %

