SOCIAL INTERVENTION AND PLAY FOR CHILDREN WITH AUTISM SPECTRUM DISORDERS

A dissertation presented

by

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Abstract

This intervention study arose from the need for social intervention for children with autism spectrum disorders, given the high incidence and prevalence of these diagnoses and their associated social deficit. Information from the cognitive developmental and behavioral perspectives was integrated in order to provide social intervention that would support participating children's engagement in socially coordinated interactions.

In order to link intervention to assessment to target social coordination in the context of specific play activities, this intervention study represents a single subject across multiple baseline design. The participants were 4 students between the ages of 5 years, 7 months and 7 years with Autism or PDD-NOS. Their cognitive, language, and social development was assessed to be delayed as compared to same-aged peers.

Intervention was linked to assessment by selecting intervention targets based on individualized assessment of naturally occurring social behavior. Participant's social behavior was assessed systematically to determine the behaviors at the leading edge of social development. Social behaviors selected for intervention were those that represented socially coordinated activities. Individually determined play activities provided the context for intervention in phase 2, whereas play activities in phase 1 were not specified.

The children's responses to intervention varied. Each child's independent occurrence of the target behavior and prompting required to demonstrate the target behavior were assessed across all phases of intervention. Changes in the children's response to intervention between phase 1 and phase 2 were assessed. Although limited

conclusions can be made about differences in response to intervention between phases 1 and 2 because of the sequential treatments design, the results indicate that the participants acquired social behaviors not demonstrated during baseline.

The results of this study contribute to the literature base by describing the methods and outcomes of a social intervention that was linked to individualized assessment, targeted socially coordinated behaviors that were identified based on the children's developmental level and not arbitrary social skills, and integrated individually specific play activities as the context of intervention. Directions for future research include refining intervention procedures and developing long-term partnerships between researchers and schools.

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CHAPTER 1

Introduction

Social Intervention and Play for Children with Autism Spectrum Disorders

Statistics show that Autism and Autism Spectrum Disorders are impacting ever-increasing numbers of children. Autism Spectrum Disorders (ASDs), Pervasive Developmental Disorder- Not Otherwise Specified (PDD-NOS), Autism, and Asperger's Syndrome, effect 1 in 166 to 1 in 500 children (www.cdc.gov). These disorders are more prevalent in boys than girls (www.cdc.gov). According to the *Twenty Fifth Annual Report to Congress on the Implementation of the Individuals with Disabilities in Education Act* (Office of Special Education Programs, 2005), 17,032 students between three and five years of age and 97, 847 students between six and 21 years of age were on Individualized Education Plans under the disability category of "Autism" in the 50 states, Washington, DC, and Puerto Rico as of 2005. These numbers indicate that there is great need within the fields of mental health and education to understand and develop empirically-supported social interventions for children with ASD.

Each of the diagnoses along the spectrum of autistic disorders— Autism, Asperger's Syndrome, and PDD-NOS—are marked by social functioning that is characterized by impairment in the use of multiple nonverbal behaviors, failures to develop appropriate peer relationships, lack of spontaneous sharing with others, and lack of reciprocity in social or emotional exchanges (American Psychiatric Association, 2000).

Autism and its most closely-related counterpart, Asperger's Syndrome, are defined by the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text*

Revision (DSM-IV-TR; American Psychiatric Association, 2000) as impacting social interaction and patterns of behavior, interests, and activity. Specifically, for both Autism and Asperger's Syndrome, there must be evidence of a "qualitative impairment in social interaction" and presentation of "restricted repetitive and stereotyped patterns of behavior, interests and activities" (American Psychiatric Association, 2000, p. 75). Autism is differentiated from Asperger's Syndrome by the evidence of communication impairment and delays in social interaction, language, and play (American Psychiatric Association, 2000). Further differentiating these two disorders is presence of clinically significant impairment in functioning and, in Asperger's Syndrome, the absence of clinically significant delays in language, cognitive development, adaptive behavior and curiosity about the environment (American Psychiatric Association, 2000).

The boundaries between the diagnostic criteria for Autism and Asperger's Syndrome are loosely defined, which has prompted some contention surrounding the diagnosis of Asperger's Syndrome. For example, research has revealed that children with Asperger's Syndrome often demonstrate marked impairment in communication present before age three, qualifying them for a diagnosis of Autism (Dickerson, Calhoun & Crites, 2001). Walker and colleagues (2004) found similar diagnostic complications. These researchers examined the diagnosis of PDD-NOS and found it to have similar communication impairments to Autism. Additionally, they found that children diagnosed with PDD-NOS demonstrated less stereotypic, repetitive behavior than children with Autism or Asperger's Syndrome (Walker et al., 2004). Despite this contention regarding the most appropriate label(s), the functional impact of ASD remains an issue worthy of focus and attention, especially regarding impairment in social interaction.

Deficits in social behaviors are a major concern for children with ASD. In addition to characterizing ASDs, deficits in social behavior impact children's ability to function spontaneously and independently. Unlike typically developing peers who independently attempt, practice, and master social interactions, children with ASD have difficulty with awareness of the social world and as such do not independently develop capabilities with social interactions. Consequently, targeted social intervention is required in order to help children with ASD develop social capabilities.

For purposes of this study, a definition of "social" was derived from the cognitive developmental perspective. "Social" is defined as coordinated social interactions with others. A child exhibits coordinated social behavior when the child observes, understands, and responds to the actions of others in the environment. For example, the child who announces "look at my tower," and waits for another to look at the tower before knocking it down, has demonstrated a coordinated social interaction. This definition was used because it captures the fundamental requirement for engagement with the social world. Moreover, preliminary research has demonstrated that preschoolers with autism engage in social behaviors to a markedly lesser extent than children with autism (Pierce-Jordan & Lifter, 2005).

Social interventions for children with ASD often focus on observable behavior, which may describe the surface skills associated with social behaviors, but not socially coordinated behavior. Social interventions use structured and planned curricula to teach social behaviors to children with ASD. The strategies of these interventions often are derived from behavioral perspective and employ empirically-proven strategies and practices (Thomas & Grimes, 2002). However, social interventions to date are limited in

the extent to which they address socially coordinated interaction. Previous social interventions are either unclear when describing the origin of the social behaviors targeted for intervention or determine intervention targets from prescribed manuals of social skills (i.e., Barry, Klinger, Lee, Palardy, Gilmore & Bodin, 2003; Bauminger, 2002).

This chapter will discuss the strategies and targets of social interventions for children with ASD. Additionally, the importance of play for young children will be discussed given that many social interventions are implemented in play contexts. This chapter will conclude with a statement of the problem and description of the research questions.

Social Interventions

Because of the nature of impairment for children with ASD, there is a plethora of information regarding social interventions with this population. Current social interventions for children with ASD vary in theoretical orientation, intervention strategies, intervention targets, and applied outcomes. Types of social interventions for this population include: collateral skills interventions (i.e., play or language interventions that improve social functioning); child-specific intervention procedures (i.e., Applied Behavior Analysis and interventions using ABA strategies); peer-mediated interventions; and participation in social skills groups (McConnell, 2002; Konstantareas, 2006; Barry, Klinger, Lee, Palardy, Gilmore & Bodin, 2003). Each of these intervention approaches attempts to impart social knowledge and skills to children who are not independently developing these skills on their own.

Intervention Strategies. Many of the intervention strategies used with children with ASD have derived from the tradition of Applied Behavior Analysis (ABA; Lovaas, 1981; Zager, 2005). ABA has traditionally included discrete trial training (DTT), incidental teaching (McGee, Almedia, Sulzer-Azaroff, & Feldman, 1992), and has more recently evolved to include the use of Positive Behavior Supports (PBS; Thomas & Grimes, 2002; Zager, 2005). Incidental teaching often occurs in a naturally occurring context for children: play (McGee, Almedia, Sulzer-Azaroff, & Feldman, 1992). DTT involves (a) providing cues for a desired behavior, (b) prompting during which the child is assisted to respond to the discriminative stimulus, (c) the child's response, (d) consequences and immediate reinforcement, and (e) a pause before beginning the next trial (Smith, 2001 as cited in Zager, 2005). PBS strives to strengthen personal integrity by using positive and proactive methods and has been shown to bring about effective long-term changes (Carr et al., 1999).

Adopting and evaluating a commonly used format, Barry and colleagues (2003) studied the progression of four children with High Functioning Autism (HFA) through a clinic-based social skills group intervention. Intervention strategies included didactic teaching of social scripts and structured and unstructured skill implementation to target initiating and responding to greetings, conversations and play invitations (Barry et al., 2003). Barry and colleagues (2003) found that participants exhibited significant improvements in greeting and play and demonstrated a trend toward improvement in conversation. Among this research group's limitations were improvements that did not generalize to non-clinic settings (Barry et al., 2003).

Intervention strategies such as these demonstrate behavioral interventions that employed previously determined curricula to address targeted skills. The interventions relied on individual and group instruction and included the use of peers and caregivers to help participants model and rehearse skills. The strengths of these studies include: operationalized definitions of social behavior, use of peers and caregivers to foster and assess generalization, and structured instruction involving didactic teaching and rehearsal.

Intervention targets. ABA and interventions using ABA techniques are frequently employed in intervention with children with ASD because they focus on observable and teachable behaviors (Lovaas, 1981; Lovaas, 1987; Zager, 2005). As such, interventions that focus on behavior have been used to facilitate social-emotional skills and social interaction, and to teach specific social skills (Barry, Klinger, Lee, Palardy, Gilmore & Bodin, 2003; Bauminger, 2002).

For example, in a seven-month cognitive behavioral intervention, Bauminger (2002) sought to teach interpersonal problem solving, affective knowledge and social interaction to 15 children with high-functioning Autism (HFA), defined by verbal IQs of 69 or above. The intervention curriculum was derived from Spivack and Shure's (1974) Interpersonal Problem Solving Model and Margalit and Weisel's (1990) *I Found a Solution* social skills curriculum (as cited in Bauminger, 2002). Bauminger (2002) found generally significant results; participants demonstrated improvement in social problem solving, understanding of emotions, and social interactions.

Bauminger's (2002) study did not include assessment to determine skills to target for each child based on his/her individual capacities. Consequently, the extent to which

this study addressed the essential nature of social interaction— coordination with another— is unknown. Because the skills chosen for social intervention are often based on either unknown or published curricula, it is difficult for researchers and interventionists to address socially coordinated behavior based on the child's knowledge level for learning the presented skills presented.

Importance of Play

The close relationship of social and play behavior as purported by theorists (i.e., Parten, 1932; Piaget, 1962) is supported by the cognitive-developmental perspective, which states that play is a prosocial activity that fosters one's learning about and interpretation of the world (Lifter & Bloom, 1998). Many social interventions, including Barry et al. (2003) and Bauminger (2003) either rely on delivery of social interventions in a play-based context or incorporate play into their social interventions. Researchers and interventionists often conduct interventions in the play context because play is a pervasive activity of childhood and is a natural activity for young children.

The practice of conducting social interventions in the context of play activities has many challenges, including the potential to disregard the complexity of play behaviors that occur simultaneously with social demands. Play is a cognitive activity that requires children to have and employ play knowledge. Social interaction is also a cognitive activity that requires children to have and employ social knowledge. Consequently, during interventions that combine social and play activity, a child must exert cognitive effort to combine their social and play behaviors, which may negatively impact the child's ability to develop new social (or play) knowledge (Pierce-Jordan & Lifter, 2005).

Pierce-Jordan and Lifter's (2005) study supports the hypothesis that cognitive effort is required to combine social and play activities. These researchers found that there is an inverse relationship between social and play complexity; when a child, with or without a developmental disability, is engaged in a complex social interaction the child's play is less complex and, conversely, when a child, with or without a developmentally disability, is engaged in a complex play interaction, the child's play is less complex. This relationship can be explained by competition for cognitive resources. Engagement in social and play behaviors both require use of cognitive skills; concurrent engagement in these behaviors requires an allocation of a limited set of cognitive resources to one activity or the other (Kahneman, 1973; Pierce-Jordan & Lifter, 2005).

Overview of Study

This study arises from the substantial prevalence of ASD, the nature and extent of social impairment within this population, paucity of available research on interventions to address socially coordinated interaction, and the need for systematic incorporation of play behaviors with social interventions. The purpose of this study is to implement social interventions targeting the development of behavior that is socially coordinated and at the leading edge of each child's learning in the context of mastered play activities.

Social knowledge was assessed via the Social Behavior Scale (SocBS; Pierce-Jordan & Lifter, 2005). The SocBS was developed from Parten's *Scale of Social Participation* (1932) but distinguished from Parten's scale because it separates social behaviors from play behavior. It employs a continuum from least to most complex social behaviors. The social behaviors described by the SocBS (Pierce-Jordan & Lifter, 2005) include solitary, onlooking, uncoordinated social, and coordinated social; the only non-

social category is solitary. Coding of social behavior was based on analysis of 20-minute recorded observations of children in naturalistic social and play environments. Coding was based on one-second intervals. From the coding, evaluators were able to assess the social behavior and knowledge that the child has mastered, is in the process of learning, and has yet to approach.

Research Questions

Use of videotaped observations allowed for the assessment of an individual child's capacities within the social and play domains, respectively. Baseline measures and progress monitoring occurred at the onset and for the duration of the socially focused intervention. Using the data from systematically coded video taped observations, two research questions were addressed:

Research Question One. Will the frequency of social behaviors that are socially coordinated be *increased* through intervention per se and further increased in the context of individually determined play activities?

Research Question Two. Will the frequency of teaching (i.e., prompting) for social behaviors that are socially coordinated be *decreased* through intervention per se and decreased more markedly in the context of individually determined play activities?

Summary and Overview

Children with ASD represent a large population of individuals whose disability is characterized by impairment in social interaction, marked by impairment in the use of social knowledge to guide interactions with others (American Psychiatric Association, 2000; www.cdc.org). Based on the nature of these disabilities, there are voluminous social interventions that target the notable social delay. This study sought to combine the

frequently used behavioral techniques of social interventions with a cognitive developmental perspective on social capabilities in order to provide intervention that occurs in the context of specified play activities, allowing the child to learn social behaviors that are increasingly coordinated with others during social interaction.

The nature of social development is intricately related to play development, in that the development of social behaviors is frequently described in terms of co-occurring play behaviors (i.e., Parten, 1932). Due to this close relationship, socially focused interventions are frequently delivered in the context of naturally occurring play behaviors. During social interventions conducted in a play setting, minimal attention may be devoted to the complexity of the play environment (Pierce-Jordan & Lifter, 2005). This lack of attention to the play environment can be problematic in that social interactions and play interactions are likely to both tax an individual's cognitive resources; the result is that a child's cognitive resources may be allocated to engagement in *either* complex social interaction *or* complex play engagement. When a child's cognitive resources are taxed in this way, engagement in co-occurring complex social interaction and complex play activity is not seen (Pierce-Jordan & Lifter, 2005).

This study sought to further explore this finding by implementing socially focused interventions in play contexts, and also in play contexts comprised of specific activities that were individually determined. By implementing social interventions simultaneously with play activities that were believed, based on assessment, to place less demand on cognitive resources), it was expected that the child's cognitive resources were available to access socially-focused intervention.

CHAPTER 2

Review of the Literature

To define the word "social" is no easy task. Definitions of the word social and of social behavior vary among psychologists and are often rooted in specific theoretical orientations (Parrot, 1983). The psychosocial psychologist may define "social" as the product of interactions between the self and objects (i.e., others) and would develop this understanding of "social" based on the desire of the child to connect with others and the characteristics of the relationship between primary caregiver and child. A behavioral psychologist may define social behavior in terms of discrete, observable actions that represent social behaviors and understand these behaviors as being mediated by environmental contingencies. A cognitive-behavioral psychologist may define social in terms of underlying thoughts and the behaviors that arise from those thoughts. A psychologist operating from the cognitive developmental perspective may define social as engagement with others in the world that is the product of underlying cognitive development. Additionally, the cognitive developmental psychologist would note that social interactions extend from the way(s) in which children take in, represent, construct a response, and behaviorally respond to others in the environment. For the purpose of this study, "social" was understood from the cognitive developmental perspective and was defined as coordinated interactions with others. That is, a child exhibits coordinated social behavior when he or she observes, understands, and responds to the actions of others in the environment. Social behavior is seen to be the result of underlying cognitive capabilities.

In order to address the complicated nature of social behavior and provide justification for the definition of social as coordinated interactions with others, this chapter will discuss the definitions of social behavior by perspective (psychosocial, behavioral, and cognitive). The strengths and limitations of each perspective's approach to conceptualizing social interactions will be discussed to guide understanding of their effectiveness for children with ASD. After a review social definitions by perspective, theoretical applications of these theories will be discussed as they are applied to social interventions for children with ASD. Theoretical applications will be divided into interventions derived from single or multiple theoretical perspectives. Within these discussions, the strategies, targets, and outcomes of each intervention approach will be described. This chapter will conclude with a description of the context for the intervention study.

The Psychosocial Perspective

Theoretical Background

The psychoanalytic perspective gave rise to the psychosocial perspective and the interest in human socialization; it continues to influence current conceptualizations of social behavior (Van Hasselt & Hersen, 1992). This perspective evolved from Freud's initial explanations of development as stemming from progression through a series of prescribed psychosexual stages. Additionally, Freud posited that biological forces were the impetus for social development. That is, psychoanalytic theorists believed that individuals were biologically driven to seek out and make connections with other individuals in the world. In contrast, the later developing neopsychoanalytic, or psychosocial, tradition promoted by Erik Erikson and Harry Stack Sullivan emphasizes

the role of the social environment in the social development of the child (Grusec & Lytton, 1988).

Psychoanalytic Theory. From psychoanalytic tradition, the self and other relations that develop over a period of stages define social behavior (Grusec & Lytton, 1988; Van Hasselt & Hersen, 1992). The psychoanalytic perspective posits that for a child to understand social behavior and, ultimately, engage in coordinated social behaviors, he or she must first understand the difference between the self and others in the environment. The child's comprehension of the difference between the self and others in the environment develops over time as the product of a responsive and reliable caregiving environment (Mahler, Pine & Bergman, 1975).

The understanding of the self as separate from others is supported by the infant's attachment to another person (Bowlby, 1969; Grusec & Lytton, 1988; Van Hasslet & Hersen, 1992; Mahler, Pine, & Bergman, 1975). Through the experience of a responsive and reliable caregiving environment, the infant develops an attachment to another person (namely, the primary caregiver), which enables the infant to develop cognitive and affective representations of the self and objects, or others (Bowlby, 1969; Grusec & Lytton, 1988; Van Hasslet & Hersen, 1992). Thus, based on underlying cognitive, perceptual, memory and locomotor abilities, the child is able to "individuate," or develop and achieve an understanding of his/her own personality characteristics. From the understanding of the self that arises through individuation, the child is able to understand that he or she is distinguishable from other people in the environment (Mahler, Pine, & Bergman, 1975). It is through attachment and individuation that the child develops the

capacities required to engage in coordinated social behaviors and ultimately becomes a social being.

Psychosocial Theory. Similar to psychoanalytic theory, psychosocial theorists posit that relationships between the self and others, which develop over a period of stages, define social behavior (Grusec & Lytton, 1988; Van Hasselt & Hersen, 1992). Psychosocial theory has arisen from the child's understanding of the self as separate from others. It purports that there are eight stages of *psychosocial* development delineated by crises resulting from social conflict (Erikson, 1968; Grusec & Lytton, 1988; Van Hasselt & Hersen, 1992). The stages span infancy, when it is imperative that the infant experiences a responsive and consistent caregiving environment (marked by a conflict between trust and mistrust), through mature age, when the older adult is concerned with setting standards for future generations (marked by a conflict between integrity and despair; Van Hasselt & Hersen, 1992).

During the first six years of life, Erikson (1968) proposed that children will experience three conflicts: the conflict during infancy of trust versus mistrust; the conflict during early childhood of autonomy versus shame and doubt; and the conflict during the preschool age of initiative versus guilt (Corey, 2001; Erikson, 1968). The first conflict— trust versus mistrust— is mediated by the child's environment and caregivers. When the infant's basic needs are met, (s)he develops a sense of trust. The sense of trust in the caregiver allows the child to be active in the world, viewing the world as reliable, and develop a sense of trust toward the world, especially toward interpersonal relationships (Corey, 2001; Grusec & Lytton, 1988; Van Hasselt & Hersen, 1992). The second conflict— autonomy versus shame and doubt— describes the conflict between self-

reliance and self-doubt. At this time the caregiving environment should allow the child to experiment and explore so that (s)he can develop a sense of self-reliance, or autonomy. The development of self-reliance occurs through the parents' socialization of the child toward obedience and self control. The child's growing sense of autonomy allows the child to develop a sense of self-control, which supports the capacity to interact with the world successfully (Corey, 2001; Grusec & Lytton, 1988). At the time of the third conflict— initiative versus guilt— the caregiving environment should support the child's decision-making, and the child should be allowed to decide on personally meaningful activities to develops a sense of initiative. The sense of initiative allows the child to develop an active stance toward the world and a positive sense of him- or herself (Corey, 2001; Grusec & Lytton, 1998).

Ultimately, the psychoanalytic and psychosocial perspectives address social development by focusing on thoughts and feelings, rather than behavior (Grusec & Lytton, 1988). Whereas traditional psychoanalytic theorists, such as Freud, focused on biological drives as the impetus for social development, neopsychoanalytic theorists, such as Erikson, placed greater emphasis on the social environment as promoting psychosocial development (Van Hasselt & Hersen, 1992). Both traditions can be characterized by their emphasis on responsive relations with others, such as mothers and primary caregivers, as critical to the social development of the child (Greenspan & Wieder, 2006; Van Hasselt & Hersen, 1992). As such, interventions deriving from this perspective may target parental relationships with and responsiveness to children with various delays and disabilities (Greenspan & Wieder, 2006).

Strengths of Psychosocial Perspective

The psychosocial perspective addresses a crucial component of coordinated social behaviors: the importance of differentiating between the self and another. Without this differentiation, a child cannot coordinate his/her actions with another, as he/she would not have a concept of the other. Therefore, the psychosocial perspective, by addressing psychosocial development through attachment and relationships, provides a theoretically based understanding of a foundational component of coordinated social behavior. The understanding of the self versus other develops through relationships and affective experiences to become knowledge that guides the child's interactions with others. That is, the child comes to understand that the self is different from another and then is able to engage others in social interactions.

Limitations of Psychosocial Perspective

The psychosocial perspective is limited by the paucity of available empirical research. It is very difficult to conduct randomized clinical trials or experimental research on interventions deriving from the psychosocial perspective. Due to the psychosocial perspective's emphasis on thoughts and feelings, which are difficult to measure, research and interventions based solely in this theoretical orientation are difficult to conduct. Ultimately, the psychosocial perspective does not provide an operational definition of the meaning of "social" and social behavior, which could guide assessments, research studies, and interventions.

The Behavioral Perspective

Theoretical Background

The behavioral perspective emphasizes the role of environmental contingencies on the development and maintenance of observable behaviors. The behavioral perspective emphasizes the events that precede (antecedents) the behavior and those that follow the behavior (consequences). As such, behaviors are seen to be the results of events that either evoke a behavior or events that reinforce a behavior. For example, a social behavior may be evoked by initiation from another as when teacher says "good morning" and the child's behavioral response is to say "good morning." A social behavior may be reinforced through attention; for example, the child who is speaking out of turn in class may get eye contact and a verbal response (i.e., attention) from the teacher. Therefore, when examining social interactions behavioral theorists would explore the environment in which a behavior occurs and events that precede, or evoke, a behavior and/or the events that reinforce a behavior (Odom, McConnell, McEvoy, 1992; Skinner, 1953; Strain & Schwartz, 2001). From this perspective, definitions of social processes include overt, observable, and measurable behaviors that allow one to engage his/her social environment (Grusec & Lytton, 1988; Van Hasselt & Hersen, 1992).

Strengths of Behavioral Perspective

The behavioral perspective provides clear descriptions of social behavior. Because the behavioral perspective derives its definition of "social" from overt, observable, and measurable behaviors, it lends itself to empirical research and applied practice. When understanding the behavioral definition of social behavior as that which can be seen, observed, measured and mediated environmentally, it is possible to clearly

delineate theoretical, research, and intervention points. The behavioral perspective provides specific definitions of social behaviors and skills that can be clearly assessed, directly targeted, and monitored over time. As such, the behavioral perspective lends itself to effective practices and interventions and is the foundation for multiple and varied approaches to intervention, such as those to be described later in this review (i.e., ABA, interventions that target social behavior, CBT, and Social Stories™).

Limitations of Behavioral Perspective

The behavioral perspective is limited in the extent to which it addresses the nature of the social being and of social development. Additionally, the behavioral perspective's explanation of social behavior is limited to the topography of behavior, rather than an in-depth understanding of the motivations for and the thoughts and feelings that underlie behavior. That is, although overt and measurable social behaviors are used to describe behavior, the extent to which the observable behaviors that are chosen to denote social engagement actually describe social engagement is unknown. By observing and intervening with overt behaviors through contingency management, theorists from the behavioral perspective may not develop a comprehensive understanding of children's inherent social capacities. Additionally, reliance on overt and measurable behaviors that "should be" social may result in understandings of social that are culturally biased or developmentally inappropriate for a given child.

The Cognitive Perspective

Theoretical Background

The cognitive developmental and social information processing perspectives provide descriptions of the development and nature of socialization. The cognitive

developmental perspective arises largely from the work of Piaget, who provided the theoretical foundation for how individuals (namely children) come to acquire knowledge about, and an understanding of, the physical and social worlds (Flavell, 1963; Grusec & Lytton, 1988; Piaget, 1962; VanHasselt & Hersen, 1992). The contemporary construct of theory of mind and descriptions of social cognitive behavior also have arisen from Piagetian cognitive developmental theory. Additionally, the social information processing perspective provides information about social cognition, derives from the information processing perspective, and describes the beliefs one has about him- or herself that guide social interaction (McDevitt & Ormrod, 2004).

Cognitive developmental theory. Piaget's cognitive developmental theory represents an influential perspective that described the way(s) in which children develop into logical and social beings. Pigetian theory postulates that children are active learners who engage with objects, people, and events in their environment in order to understand their physical and social world (Piaget, 1963). Piaget conceptualized development as evolving across series of four stages: the sensori-motor stage, the pre-operational stage, the stage of concrete operations, and the stage of formal operations (Piaget, 1962). Piaget's cognitive developmental theory further addresses children's developing knowledge about the physical and social world through discussion of equilibration, schemata, and the organization of information, which operate in each developmental stage (Van Hasselt & Hersen, 1992).

Piaget described equilibration as the impetus for cognitive development (Piaget, 1963). Equilibration describes the child's desire to have a balance between internal thoughts and experiences in the external world. In order to interpret the physical and

social world, children are constantly investigating their environments so they can come to better organize and understand the world. Piaget coined the term "schemata" to describe the foundational components by which information about the world is cognitively organized and understood (Piaget, 1963).

Piaget's theory (1962) addressed social behavior by describing the underlying cognitive capability that allows for engagement in social behaviors. Piaget (1962) described how cognitive structures, such as schemata, develop over time to support social interactions ranging from solitary and uncoordinated with others, to those that are coordinated with others.

The first two stages, the *sensorimotor* and *pre-operational* stages, describe children's development from birth through approximately seven years of age. The *sensorimotor* stage constitutes the period before the child has acquired language and extends from reflexive actions (i.e, sucking) to the coordination of actions to achieve a goal (i.e., reach for a bottle; Piaget, 1962). During this stage, behavioral schemata are based on the coordination of sensory inputs and motor capabilities (Shaffer, 2002). During the sensorimotor stage, the child develops "object permanence" and "person permanence" as well (Van Hasselt & Hersen, 1992). The understanding that objects, and/or people, continue to exist even when removed from view is representative of emerging symbolic thought, which has implications for a child's social development. Behaviors that demonstrate person permanence, such as deferred imitation in which a child recalls and reproduces a person's behavior after a considerable time delay, denote children's interest in their social environment(s) and establish the foundation for their social interaction.

Following the sensorimotor stage, the *preoperational* stage is marked by the appearance of symbolic functions, which is the development of the ability to represent an object that is not immediately present. The child's ability to use symbols allows him or her to engage in social interactions with others through the use of a shared symbolic system (i.e., a common language; Bloom & Tinker, 2001). Additionally, the child's thought continues to depend on primary perceptions during this stage. During the earlier sensorimotor stage, infants' perceptions (i.e., seeing, hearing) are limited to what is immediately available to them. For children in the preoperational stage, perceptual thought is limited to an "egocentric" worldview in which the child is unable to view situations from another person's perspective (McDevitt & Ormrod, 2004). That is, the child's conceptual thought during early childhood consists of only the child's point of view. Consequently, children's social interactions at this time are characterized by difficulties in viewing situations from another person's perspective, which is reflected in their language (i.e., assuming others have the same prior knowledge as themselves when recalling daily events) and behavior (i.e., assuming all other playmates are using the same rules for a game they are playing, without discussing rules).

Beyond early childhood, during the stage of *concrete operations,* the child demonstrates the ability to manipulate objects based on concepts such as physical size or number. The final stage, *formal operations*, emerges around the 11th or 12th year and is marked by the capability of the child to reason based on more than the physical world; that is, the child can hypothesize and mentally manipulate situations (Piaget, 1962).

As children develop cognitively, their increasingly sophisticated social schemata allow them to understand social information so that they can appropriately interpret it and

act accordingly (Piaget, 1962). Schemata have two main components: a behavioral sequence that can be applied repeatedly in different situations *and* the cognitive structure that organizes and re-organizes the behavior set for each schema (Flavell, 1963). In addition, schemata develop over time to assimilate (incorporate into the schema) new and different objects or experiences and to accommodate schemata to allow for new and increased application. That is, during each stage of cognitive development, the child strives to achieve equilibration between his or her internal mental schemata and the environment in order to interpret and understand the external social world (Bloom & Tinker, 2001; Piaget, 1962; Van Hasslet & Hersen, 1992).

Theory of mind. A contemporary extension from Piaget's cognitive theory is the concept of "theory of mind." Theory of mind describes a cognitive understanding of the mental state (i.e., thoughts or feelings) of another person (Baron-Cohen, Tager-Flusberg, & Cohen, 1993). In order to take the perspective of another, a child must first *understand* the self and other relationships; cognitive structures are then required to allow the child to understand that the other's thoughts and feelings may differ from their own (Baron-Cohen, Tager-Flusberg, & Cohen, 1993). Theory of mind demonstrates a child's awareness of self and other relationships, and it allows the child to coordinate his or her actions with others by using the other's perspective to guide social coordination. Ultimately, theory of mind allows individuals to understand and predict the behavior of others (Baron-Cohen, Tager-Flusberg, & Cohen, 1993).

Theory of mind is purported to develop throughout childhood as children's capacity for complex cognitive thought and processing increases (Baron-Cohen, Tager-Flusberg, & Cohen, 1993; Flavell, 2000). Many theorists believe that children are

endowed from birth with important capacities (e.g., perceptual abilities, interest in others, ability to attend) that are the foundational components for the development of theory of mind (Flavell, 2000). Furthermore, many theorists believe that theory of mind has its beginnings in infancy and early childhood when the development of visual perception, attention, desires, emotions, beliefs and mental representations, knowledge and thinking support children's developing ability to understand their own and other's minds. Although theory of mind begins to develop during the preschool years, it continues to develop and become more sophisticated throughout middle and late childhood (Flavell, 2000).

Description of children's social cognitive behavior. Although Piaget's (1962) theory and its contemporary extension, "theory of mind," provide information regarding the cognitive capacities that underlie social understanding and interaction, these theories do not provide a description of children's social capacities in terms of observable behavior. Mildred Parten's (1932) seminal work accomplished a description of children's social behavior as it occurs concurrently with cognitive development in early childhood through her *Scale of Social Participation*. Parten (1932) derived her scale from systematic observations of the social activity of children in nursery school. This scale continues to be influential in understanding children's social behaviors.

The first social participatory behavior defined by Parten (1932) – *unoccupied behavior* – occurs when the child does not interact, or play, with others and occupies him- or herself by watching whatever happens to be of momentary interest. This stage of social interaction is characterized the absence of social interaction with others. The next stage is that of an *onlooker* and occurs when the child spends most of his/her time

watching other children at close proximity. During this stage, the child may begin to interact socially with the children (s)he is observing. *Solitary play* follows and occurs when the child plays alone with toys that are different from those that are used by the children in closest proximity to him- or herself. Parten (1932) noted that the next stage in the developmental sequence of social behavior in the context of play– *parallel activity* – denotes when a child's activity begins to be social. *Parallel activity* describes independent activity that naturally brings the child into contact with other children; however, the child plays beside others and does not interact with others. *Associative play* follows and is marked by group activity with overt recognition of common activity, interests and personal associations. The final developmental stage – *cooperative play* – is the most highly organized type of group activity. Cooperative play has a high social demand and includes a division of labor, group censorship, centralization of control in which one or two members exert leadership, and subordination of individual desires to that of the group. Parten's (1932) description of a hierarchy of social behavior provides a useful description of children's social capabilities in terms of observed and observable behavior.

Social information processing. The social information processing perspective further informs children's social cognition and derives from information processing theory. Information processing theories address the means through which people take-in, process, respond to, and remember the information received from the external world. Information processing theories posit that individuals actively construct the ways in which they understand the world and further describes the processes by which individuals encode, interpret, and remember information (Bjorklund, 2000).

Information processing theories propose that individuals must first sense and perceive (translate into meaning) information in the environment. From this, individuals focus attention on what is meaningful about the information, store it in working, or short-term memory, engage in in-depth processing (i.e., rehearsal, organization, and elaboration), and then store the newly acquired information into long-term memory (McDevitt & Ormrod, 2004). Social information processing derives from the information processing perspective and provides a description of social cognition and the ways in which individuals cognitively process social information (McDevitt & Ormrod, 2004).

Understanding social cognition as the beliefs one has about him- or herself and others (McDevitt & Ormrod, 2004), which guide social interactions, allows researchers and interventionists to examine the ways in which the child observes, understands, and responds to the actions of others. Specifically, according to Dodge's (1986) social information processing model, individuals engage in a series of steps when cognitively processing social information. First, social cues must be encoded (or observed) and then interpreted (or understood). Once the social cues are observed, interpreted, and understood, the child must develop a response to these cues by cognitively generating potential behavioral responses, deciding upon a response, evaluating the likely consequences, and then enacting a chosen response (Dodge, 1986). Consequently, the development of cognitive capacities supports a child's ability to engage in social information processing. Social information processing allows for, and makes possible, spontaneous, genuine social interactions in which the child coordinates his or her actions with another.

During early childhood, the child's social cognition is characterized by "egocentric perspective taking" (Selman, 1980) in which the child's person perception is limited to the physical features of others and does not allow for inferences regarding the internal psychological states of others. Person perception describes an individual's ability to recognize people and interpret their actions by examining their physical features, overt behaviors, and then inferring their internal psychological experiences. During early childhood person perception is egocentric and limited to the physical appearances of others.

Strengths of the Cognitive Perspectives

The cognitive developmental perspective, theory of mind, and social information processing perspectives have a number of strengths, namely their contributions to the understanding of children's cognitive and social development and the descriptions of development of social behavior. Piaget's (1962) stages of development prescribe a predictable sequence of cognitive development that underlies children's engagement with objects and people in the world. As such, the cognitive developmental perspective can be used to guide understanding of social development and contribute to developing social interventions. Ultimately, the cognitive developmental perspective is informative in understanding the developmental tasks of children.

Additionally, the cognitive developmental perspective on social development addresses the nature of social being and social development. Piaget's (1962) prescribed stages address the cognitive underpinnings of social development and, consequently, allow for assessment of this process. Working from the cognitive developmental perspective, one is able to determine a child's level of social development and generate

hypotheses regarding what the child is ready to learn and what is too complex for the child to learn. Therefore, the cognitive developmental perspective provides a clear and meaningful description of the nature of social development and the knowledge that supports social behavior (Parten, 1932; Piaget, 1962).

From an understanding of the knowledge that supports social behavior and the way in which that knowledge develops, the social information processing perspective explains two important components of social interaction: understanding the other individual and coordinating interactions with him/her. The social information processing perspective demystifies and clarifies the processes that support social interaction by explaining that the child must first come to understand him- or herself as separate from others (i.e., person perception), understand the other's perspective (i.e., employ theory of mind), and coordinate his/her behavior with another in order to have a social interaction.

Finally, the cognitive perspectives inform a hierarchy of social behavior in which children develop from solitary to coordinated social interactions. This is a sequence through which all children, including those with developmental delays, progress. Assessment of individual children's cognitive capacities allows researchers and interventionists to develop interventions that target goals at the children's present level and enable them to engage in social interactions at the leading edge of their development.

Limitations of the Cognitive Perspectives

Piagetian theory's (1962) clear definitions of the stages of cognitive development are informative, yet it is up to the researcher or interventionist to determine the observable and measurable social behaviors that correlate with each developmental stage. Consequently, the cognitive perspectives are limited in the extent to which they have

been used in research studies for intervention purposes. These are not approaches that lend themselves to applicability in research and practice without considerable effort on the part of the researcher. However, when used to provide the context of interventions deriving from the behavioral perspective, the cognitive developmental and social information processing perspectives have the potential to be dynamic.

Although Parten's (1932) *Scale of Social Participation* provides an influential and useful description of young children's observable social behavior, it is limited in the extent to which it confounds social behavior with young children's play behavior. That is, Parten's (1932) study describes a hierarchy of social behavior as it exists in the context of children's play. Although play activity and social interaction are very closely related to one another, the conflation of these two categories of child development can be problematic when trying to understand development in either domain and/or plan interventions within either domain.

Theoretical Applications: Interventions for Children with ASD

The theoretical perspectives described above provide guidance for interventions for children with ASD. Specifically, the behavioral perspective, psychosocial perspective, cognitive behavioral perspective, and social cognitive perspective can be used individually or paired together to guide interventions that target social deficits of children with ASD. In order to understand the application of these theoretical perspectives for interventions for children with ASD, it is important to consider whether the intervention derives from a single theoretical perspective or multiple theoretical perspectives. Applied Behavior Analysis represents an intervention that is an application of a single theoretical perspective: the behavioral perspective. Interventions from

multiple theoretical perspectives include: DIR®/Floortime; interventions that use behavioral methods combined with another theoretical perspective; interventions that combine cognitive-behavioral methods with another perspective (i.e., social cognitive); and Social Stories™. Each of these intervention approaches for social interventions with children with ASD will be discussed in terms of the intervention targets, intervention strategies, and intervention outcomes.

Interventions from Single Theoretical Foundation: Applied Behavior Analysis

Applied Behavior Analysis (ABA) is a well-developed and prolifically researched method of intervention for children with autism, which has its roots in the principles of behaviorism. There is also a considerable body of empirically-based research to support this approach. ABA is an intensive intervention approach derived from operant conditioning theory (Lovaas, 1987). ABA can be characterized by its specific methodological approach to skill instruction, the skills targeted for intervention, and the increase in individual's skill use demonstrated after intervention.

Intervention strategies. ABA uses techniques of discrete trial teaching (DTT), which is a teacher-directed intervention strategy where skills to be taught are operationalized into discrete, observable behaviors. DTT provides students with multiple opportunities to practice discrete skills. During a teaching session, the skill to be taught is introduced to the child. In the case of social behavior, for example, this may include speaking in phrases or sentences to a teacher or peer. When the child provides a correct response, he or she is provided with a reinforcing event, such as a piece of food or verbal praise. When the child does not respond, or provides an incorrect response, the child is corrected and the teaching interaction begins again with the presentation of the skill to be

taught. The teaching sequences for each skill contain a clear beginning and end, and the skill is presented identically each time it is taught (Zager, 2005). Intervention can consist of 20 to 40 hours per week of individual skill instruction for a period from at least one year to two years (Lovaas, 1987; Eikseth et al., 2002). An advantage of ABA interventions is that they can be delivered in home and school settings (Lovaas, 1987).

Intervention targets. Working from these strategies, the social skills targeted during intensive ABA interventions include discrete, observable behaviors regardless of the intervention methodology employed. However, the social skills targeted for intervention vary by intervention. This variance is accounted for by the way in which the social skills to be taught are related to one another; targeted skills may be taught in order of complexity or as they relate to specified domains (i.e., language, adaptive behavior).

For example, Lovaas' (1987) intervention organized the targeted skills in order of complexity. Consequently, during the first year of intervention, the targeted social skills included compliance to elementary verbal requests and imitation. Other skills targeted early on included reduction of self-stimulatory and aggressive behavior and the establishment of appropriate toy play. During the second year of intervention, participants were taught social skills that would allow them to interact with others, specifically expressive language skills and skills to foster interactive play with peers (Lovaas, 1987).

Adopting a different approach, Eikeseth et al. (2002) divided the targeted skills across the domains of intelligence, language, and adaptive behavior. The targeted skills that were related to social interaction with others included: responding to adult requests, imitating verbal and nonverbal behaviors, answering questions, conversing, and making

friends. Non-social skills targeted by this research study included labeling objects, identifying actions, and understanding abstract concepts such as color and size (Eikeseth et al., 2002; see Table 1 for an overview of ABA Interventions strategies and targets).

Table 1
Table of ABA Interventions

Author (Year)	Intervention Type	Intervention Strategy	Social Target(s)
Lovaas (1987)	ABA	40 hours per week of one-to-one individual skill instruction using DTT for a period of at least two years delivered in home and school settings	*Year 1*- compliance to elementary verbal requests and imitation. *Year 2*- expressive language skills and skills to foster interactive play with peers.
Eikseth et al. (2002)	ABA	20 hours per week for one year intervention delivered at school outside classroom in a 1:1 setting using a discrete trial format at first	responding to adult requests, imitating verbal and nonverbal behaviors, answering questions, conversing, and making friends

Intervention outcomes. Intensive ABA has been shown to be effective in teaching social skills to children with ASD (Eikeseth, Smith, Jahr, & Eldevik, 2002). In a comparative long-term (i.e., two years or more) study of 19 children under age four with diagnoses of autism, Lovaas (1987) found that children engaging in intensive behavioral treatment using DTT made more social gains than peers with diagnoses of autism who had received minimal treatment, or treatment as usual. In addition, intensive ABA techniques have been shown to be effective for children between ages four and seven with a diagnosis of autism (Eikeseth, et al., 2002). When compared to same-aged peers with diagnoses of autism who received the same amount of intervention (average of 28.5

hours per week), children who received intensive behavior therapy demonstrated significant gains in intelligence, language and adaptive behavior (Eikeseth, et al., 2002).

Eikeseth *et al.* (2002) concluded that the type of intervention (i.e., ABA versus treatment as usual), and not the time in intervention, was influential in teaching social skills to children with autism. In other words, given that the amount of intervention for both the experimental (ABA) condition and the control condition (treatment as usual) was equivalent, the authors concluded the amount of time devoted to intervention was not the only factor to influence skill development. By delivering equivalent hours of intervention each week, Eikeseth *et al.* (2002) demonstrated that it was type of intervention delivered (i.e., ABA), and not the time in intervention, that influenced language and adaptive behavior for children with autism.

Strengths. ABA is an intervention approach that is widely used based on its ability to operationalize behavior. ABA strategies have increased the frequency and duration of skills across domains, including socialization (Eikseth et al., 2002; Lovaas, 1987). When directly, specifically and intensively taught, children with ASD have increased their use of skills such as following commands, using expressive language, responding to requests, answering questions, and conversing, (Eikseth et al., 2002; Lovaas, 1981, 1987). Additionally, ABA can be delivered in home or school settings, which increases its flexibility and allows for the intensive time commitment (i.e., 20 to 40 hours per week) required (Lovaas, 1981; Zager, 2005).

Perhaps the greatest strength of ABA is the extent to which the methods that support skill development are clearly defined. By working from the behavioral perspective in which social behaviors are operationalized into discrete units, ABA

interventionists are able to target specific skills. Additionally, the techniques of DTT are clearly operationalized and specified in the research and applied literature (see Lovaas, 1981). ABA uses standard training methods that incorporate didactic skill teaching, multiple opportunities for the child to demonstrate skills, and reinforcement immediately following each successful skill demonstration by the child. These methods provide a clear structure that can be used by multiple interventionists in a replicable format (Lovaas, 1987; Lovaas, 1981; Eikseth et al. 2002).

Limitations. The weaknesses of intensive ABA interventions are based in this approach's reliance on external mediation (prompting or reinforcement) of behavior. Relying on environmental contingencies to access social interactions calls into question whether ABA procedures target the essence of social behavior in which there is coordination of interactions between the child and another. Consistent reliance on environmental or contingency management and modification may not allow children to develop the skills and capacities they require to independently engage in coordinated social interactions. Although environmental and contingency modification may allow children with social deficits to demonstrate and practice skills, reliance on others and the environment to change does not necessarily provide children with knowledge that extends across settings and situations.

ABA procedures address the topographical elements of socially coordinated behavior (i.e., overt behaviors) and appear to depend upon teaching children the "scripts" or routines of social interactions without necessarily enabling children to develop a cognitive understanding others and of social situations. Again, by teaching children with delays the step-by-step of an interaction or experience, children may not learn how to

flexibly adjust the script as nuances of situations change. Although children who participate in ABA intervention develop a large skill set, children who have participated in ABA may have difficulty applying skills in novel or unique situations.

In order to engage in a truly coordinated social interaction, a child must observe, understand and respond to the actions of others in his/her environment. Although ABA procedures address the child's response to others in the environment, it does not necessarily support children's capacity to observe and understand their social environments. As such, one has to question whether children who participate in ABA interventions come to develop an understanding of social interaction that extends beyond the topography of the targeted behaviors, and the antecedents and consequences of these behaviors. Again, the extent to which ABA interventions address the underlying cognitive understanding of the social environment is unclear. As such, these interventions may not truly address the social elements of person-to-person interaction.

Interventions with Multiple Theoretical Foundations: DIR®/Floortime

The Floortime curriculum derives from the psychosocial and developmental perspectives with an explicit emphasis on "developmental, individual-difference, relationship-based," or DIR®, intervention (Greenspan & Wieder, 2006; Wieder, 2003). In addition, it incorporates multiple intervention strategies and targets, such as language or occupational therapy, in order to create a comprehensive intervention package. DIR®/Floortime is based on three primary principles: that children develop language, cognitive, emotional and social skills through relationships that involve emotionally meaningful exchanges; that developmental progress is interrelated across domains (i.e.,

motor, language, social, etc.); and that children vary in their underlying processing capacities (Greenspan & Wieder, 2006; Wieder, 2003).

Intervention strategies. The developers of the DIR®/Floortime approach to helping children relate, communicate, and think, promote a relationship-based, comprehensive, and intensive intervention program (Greenspan & Wieder, 2006). Floortime intervention consists of daily home-based play and problem-solving sessions integrated with spatial, motor and sensory activities. In addition, families employing the Floortime approach are encouraged to engage their child in speech therapy, occupational or physical therapy, daily educational programming (i.e., school), biomedical interventions (i.e., medication, as appropriate), and examination of the child's nutrition and diet (Greenspan & Wieder, 2006).

Intervention targets. The skills targeted by the DIR®/Floortime intervention vary by child. Floortime promotes a comprehensive evaluation of the child, in which the child's problem behaviors and processing capacities are examined and intervention strategies that have and have not been successful are evaluated. At the core of DIR®/Floortime intervention are activities and experiences in structured, unstructured, and spontaneous situations to target six fundamental skills that underlie all other skills. Specifically, DIR®/Floortime intervention targets include: attention; relating to others; two-way communication; problem-solving interactions; and, eventually, creative and logical use of ideas. In contrast to ABA, Floortime intervention seeks to promote the development of these foundational capacities to make possible genuine, spontaneous social interactions. These social abilities will, ultimately, enable the child to form a self-

concept; develop cognitive, language and social capacities; and progress developmentally (Greenspan & Wieder, 2006).

Intervention outcomes. The success of this widely used approach has been demonstrated through case studies and anecdotal evidence (Wieder, 2003). Additionally, according to Greenspan and Wieder (1997), the DIR®/Floortime intervention model has been successful in improving the relationships and promoting developmental progress for children with ASD. In a longitudinal study, Greenspan and Wieder (2005) assessed 16 children 10- to 15-years post-intervention using the Functional Emotional Assessment Scale (FEAS), which is a validated and reliable behavioral coding system. They also used the Vineland Scales to measure adaptive function. The results of the FEAS demonstrated that 16 participating children's functional emotional capacities were within the average range. Additionally, the 16 target children's FEAS ratings were similar to peers without a history of developmental delay and significantly different from a group of children with continuing delays (Greenspan & Wieder, 2005, as reported in Greenspan & Wieder, 2006).

The outcomes of these studies demonstrate the extent to which the DIR®/Floortime intervention approach is effective in addressing its stated goal – to help children with delays become more relational with others and to promote the development of children with delays. The DIR®/Floortime model demonstrates the extent to which intensive intervention combining multiple theoretical perspectives and intervention strategies is necessary in order to address the social deficits of children with ASD.

Strengths. The DIR®/Floortime approach (Greenspan & Wieder, 2006) has many areas of strength that make it a dynamic and powerful intervention package. Namely, the

DIR®/Floortime approach is a comprehensive intervention that targets many areas of difficulty for children on the autism spectrum. This approach uses individual assessment to target development across domains for children who are not developing independently.

Additionally, the DIR®/Floortime approach targets many components of social interaction with others. Rather than teaching children scripts or routines of behavior, DIR®/Floortime seeks to help children attend, relate to others, engage in two-way communication and problem-solving, and use ideas creatively and logically. These skills address the coordinated social interaction in which the child observes, understands and responds to others.

Limitations. The DIR®/Floortime approach is limited, however, in the extent to which it delineates the elements that make it an effective intervention. Specifically, it is unclear which of the components account for children's success: targeted skills, time in intervention (i.e., up to eight hours per day), or the intervention strategies. Given its uniqueness as an intervention philosophy that influences all family interactions with the child – both in structured therapy sessions and naturalistic spontaneously occurring interactions – the effectiveness of DIR®/Floortime could be the strategies of intervention. Furthermore, given the incorporation of other interventions (i.e., psychopharmacological treatment, speech and language therapy, occupational therapy, educational interventions, diet modification), it is unknown if the actual Floortime intervention component (i.e., parent, or peer, and child with ASD interactions with one another) is the effective treatment. Although the intervention targets, intervention strategies, and time in intervention all work together to create an effective intervention package, it is unclear

which elements of this intervention enable development of children whose development is delayed.

Interventions with Multiple Theoretical Foundations: Behavioral Interventions Combined with Other Theoretical Applications

Interventions deriving from the behavioral perspective vary by design, approach, and targeted skills (i.e., Barry, Klinger, Lee, Palardy, Gilmore, & Bodin, 2003; Mahoney & Perales, 2003; Thieman & Goldstein, 2004). Among the approaches to social intervention from the behavioral perspective are interventions using peer training and written text training (WTT; Thiemann & Goldstein, 2004), interventions targeting maternal responsiveness training (Mahoney & Perales, 2003), and outpatient clinic-based social skills groups (Barry et. al, 2004). These interventions have sought to combine behavioral principles with other theoretical approaches, namely psychosocial theory (Mahoney & Perales, 2003), social-communication (Thiemann & Goldstein, 2004), and social cognitive theory (Barry et al., 2003).

Intervention strategies. Mahoney and Perales (2003) sought to provide instruction and training to caregivers for 20 young children (mean age 32 months) with diagnoses of autism or PDD. These researchers trained parents, primarily mothers, to be more responsive to their children. Training on maternal responsiveness derived from the *Responsive Teaching* curriculum (Mahoney & MacDonald, 2007) and consisted of one-hour weekly intervention sessions for parents and children for periods ranging from eight to 14 months.

Thiemann and Goldstein's (2004) study used the strategies of peer training and written text training (WTT) to target relational interaction in five elementary school aged

children with PDD. Peers were trained in five facilitative social skills in order to promote social-communicative engagement of the targeted child during social interaction. WTT was individualized and directed toward children with PDD. The 25-minute WTT session consisted of 10 minutes of direct instruction, 10 minutes of engagement in a social activity (with one trained and one untrained peer) and 5 minutes of adult feedback and reinforcement.

In addition to responsiveness training of caregivers and peers, interventions deriving from the behavioral perspective are often conducted in the form of outpatient clinic-based social skills groups (Barry et al., 2003). Barry and colleagues (2003) examined the efficacy of an outpatient clinic-based social skills group for four elementary school children with diagnoses of high functioning autism (HFA). During the eight intervention meetings, children with HFA were directly taught social skills and then observed during play sessions with typical peers (who had been educated about autism). The group sessions followed a predictable schedule that involved a warm-up activity to promote group interaction, didactic instruction of a new skill, role play and active practice, snack time for unstructured practice, 2-5 minute play session with a typical peer to assess generalization, show and tell, and discussion with parents. During the discussion with parents, parents observed a role-play, reviewed new skills, and were given worksheets and suggestions for home practice.

Intervention targets. By either directly intervening with the child with ASD or by intervening with significant others in his or her life (i.e., peers or parents), interventionists are able to address a number of social deficits with which children with ASD struggle. Using behavioral principles, interventionists were able to target the social

and emotional well-being of children with ASD (Mahoney & Perales, 2003), their peer interactions and relationships (Thiemann & Goldstein, 2004) and their conversation and play skills (Barry et. al, 2003).

In order to address interaction with peers, Mahoney and Perales (2003) targeted the behaviors associated with maternal responsiveness to promote the emotional well being of children with ASD. Using the *Responsive Teaching* curriculum (Mahoney & MacDonald, 2007) the researchers were able to create individual intervention programs for the 20 young children participating in the study. Intervention targeted parental responsiveness and skill development for children across four developmental domains: cognition, communication, social-emotional functioning, and motivation. Although the majority of interventions for this study were within the cognitive and communication domains, social-emotional objectives targeted by the *Responsive Teaching* curriculum included: trust, empathy, cooperation, self-regulation, feelings of confidence, and feelings of control. By targeting these objectives, the authors argued that the child would progress in his/her social-emotional development (Mahoney & Perales, 2003; Mahoney & MacDonald, 2007).

Similarly, Thiemann and Goldstein (2004) chose to target six social-communication behaviors. From a review of literature on pragmatic language skills, the researchers decided to provide peer support and direct instruction that supported target children's abilities to secure attention, provide contingent responses, initiate requests for actions and objects, initiate comments, provide compliments, and initiate requests for information.

Barry et al. (2003) sought to develop conversation and play skills in children with diagnoses of HFA by directly intervening with the child. Through participation in an eight-week (two hours per week) outpatient social skills group, specific social behaviors related to conversing and play were targeted. The targeted social behaviors during the intervention included: initiating a greeting; initiating and responding in conversation; responding to an invitation to play, and requesting others play (Barry et. al, 2003). The researchers did not state why these specific skills were chosen for intervention (see Table 2 for an overview of the strategies and targets of interventions using behavioral principles).

Table 2
Table of Interventions from Behavioral Principles

Author (Year)	Intervention Type	Intervention Strategy	Social Intervention Target(s)
Mahoney & Perales (2003)	behavioral and psychosocial	8 to 14 months of weekly, 1 hour intervention sessions during which parents were taught responsiveness	Parent behaviors associated with maternal responsiveness from the *Responsive Teaching Curriculum*. Targeted objectives for children included: trust, empathy, cooperation, self-regulation, feelings of confidence, and feelings of control.
Thiemann & Goldstein (2004)	behavioral and social communication	use of trained peers and direct instruction using written text training	peer relationships through six social-communication behaviors: securing attention, providing contingent responses, initiating requests for actions and objects, and initiating comments, compliments, and requests for information

Barry et al. (2003)	behavioral and social cognitive	8 clinic-based social skills group meetings that involved direct teaching of social skills and observation during play sessions with typical peers	initiating a greeting; initiating and responding in conversation; responding to an invitation to play, and requesting others play

Intervention outcomes. Interventions using behavioral principles have been shown to be highly effective in addressing the social needs of children with a variety of ASDs. By using techniques of parent and peer training and direct intervention with the child with an ASD, researchers have been able to address social deficits such as social-communication skills with peers, social-emotional functioning, and conversation skills (Barry et. al, 2003; Mahoney & Perales, 2003; Thiemann & Goldstein, 2004).

For example, when teaching parents to be more responsive to their children with autism or PDD, targeted children demonstrated statistically and clinically significant improvements in their social-emotional functioning following intervention as measured by videotaped observation, parent questionnaire and the Temperament and Atypical Behavior Scale (Mahoney & Perales, 2003). Specifically, improvements in children's social-emotional functioning were evidenced by decreases in problem behaviors and increases in social competence as assessed by the TABS (Mahoney & Perales, 2003). In addition to the children's gains, 80 percent of targeted parents demonstrated positive change in emotionally responding to their children as assessed by the thorough analysis of videotaped observations of mother's interaction styles with their children (Mahoney & Perales, 2003).

In addition, the use of trained peers combined with WTT was demonstrated to be effective in increasing the rates of social-communication skills for the five children in the study (Thiemann & Goldstein, 2004). Four of the five children maintained their use of the targeted communication skills following the intervention (Thiemann & Goldstein, 2004). The results of this study further indicated that peer training alone was not effective for increasing the repertoire or frequency of social communication behaviors in verbal children with PDD (Thiemann & Goldstein, 2004).

The efficacy of outpatient clinic-based social skills groups to intervene with the conversation and play skills of children with HFA was assessed through systematic observations of free play sessions with typically developing peers (Barry et al., 2003). The results of these observations indicated that the social skills group was effective in improving greeting and play skills. However, the intervention did not significantly improve targeted children's conversation skills. Furthermore, post-intervention parent interview indicated that initiating a greeting was the only skill to generalize outside of the clinic setting (Barry et al., 2003). From these findings, it can be seen that instruction of specific skills in isolation, without a clear theoretical or developmental reason for targeting specific skills, may not contribute to the development of social engagement that is spontaneous and authentic.

Strengths. Interventions using behavioral principles have a number of strengths. Similarly to intensive ABA interventions, interventions using behavioral principles have at their core the principles of behavioral theory. Therefore, these interventions use operationalized definitions of social behavior and operationalized intervention approaches. Furthermore, they target specific skills through strategies that have been

empirically proven to increase social skills for children with ASD (Barry et al., 2003; Mahoney & Perales, 2003; Thiemann & Goldstein, 2004).

Additionally, these interventions have a wider scope of targets of and strategies for interventions. Interventionists can target social skills ranging from social-communication to caregivers' emotional responsiveness to conversation skills (Barry et al., 2003; Mahoney & Perales, 2003; Thiemann & Goldstein, 2004). The strategies of interventions from this perspective can vary more widely than those of intensive ABA, and the behaviors of parents and peers can be modified in order to promote social behaviors in children with ASD (Mahoney & Perales, 2003; Thiemann & Goldstein, 2004). As such, interventions using behavioral principles can be delivered individually or in groups.

Perhaps the greatest strength of interventions that incorporate behavioral principles with other theoretical approaches is the way in which two different theoretical approaches combine to more specifically target social behavior. By using overt behavior as a marker of a child's capacities and combining these behavioral markers with a theory that guides the development of true social engagement more comprehensively, interventions using behavioral principles have the potential to target the child's ability to observe, understand and respond to the actions of others. That is, interventions that combine behavioral approaches with another theoretical perspective are likely to provide both the strategies for intervention (from the behavioral perspective) and the targets for intervention (i.e., from the psychosocial, social-communication, or social cognitive perspective), as was the case in the studies described above.

Limitations. Although the potential to truly target social potential exists, interventions using behavioral principles described above appear to be limited in the extent to which they target socially coordinated behavior. Because these interventions address the responses of children with ASD to environmental contingencies, such as the modified behavior of parents or peers, it is unclear whether the target children come to develop an understanding of social interaction. By modifying the environment or teaching children to respond to the overt actions of others in the environment, children with ASD have little opportunity to develop an understanding of the need to observe and understand the actions of others in order to respond in a socially appropriate way.

An additional limitation of interventions from the behavioral perspective is the extent to which these interventions rely on environmental modification. Reliance on environmental modification overestimates the child's understanding of social situations and limits his or her ability to learn to enact social behavior independently and spontaneously. Although it is important to modify the environment so that children with ASD can progress beyond their delayed capacities, relying on contingency management alone does not allow the child the opportunity to develop skills to regulate his/her own social behaviors. This reliance on environmental modification has the potential to be particularly limiting for the child in novel situations or when there is not an individual committed to contingency management available to the child.

Interventions with Multiple Theoretical Foundations: Cognitive-Behavioral Theory with Other Theoretical Applications

Deriving from the behavioral and cognitive traditions, cognitive behavior theory posits that individual's underlying cognitions, or thoughts, influence behavior (Corey,

2001). Cognitive behavior theorists address underlying automatic thoughts or schema that promote maladaptive behavior patterns. Once the core schema is recognized, it is restructured to encompass more adaptive behavior patterns. Cognitive behavior therapy works to restructure cognitive distortions such as arbitrary inferences, overgeneralizations, magnification and minimization, personalization, and polarized thinking (Corey, 2001). By changing these underlying and automatic thought patterns, this time-limited therapeutic intervention aims for behavior change.

Cognitive behavioral interventions for individuals with ASD have been used with children from ages six to 17 who have the capacity for verbal engagement, as is found in individuals with HFA and Asperger's Syndrome, or AS (Bauminger, 2002; Lopata, Thomeer, Volker & Nida, 2006). Cognitive- behavioral interventions target observable social behaviors and seek to teach skills and strategies for interpreting and managing social situations (Lopata, Thomeer, Volker, & Nida, 2006). Additionally, interventions from the cognitive-behavioral perspective can be combined with other theoretical approaches, such as psychoeducational techniques (Lopata, et al., 2006) and social cognitive theory (Bauminger, 2002; Gray & Garand, 1993) to shape intervention targets and strategies.

Unlike the behavioral perspective, the cognitive behavioral perspective addresses cognitive interpretations of social events and relies on the cognitive organization of these social interpretations to promote prosocial behavior (Lopata, et al., 2006). Social behaviors targeted by cognitive behavioral interventions include: interpersonal problem solving; affective knowledge; social interaction; face-affect recognition; and interest expansion (Bauminger, 2002; Lopata, et al., 2006).

Intervention strategies. In order to address the development of social skills through cognitive behavioral intervention, multiple techniques have been used. Interventions from this perspective have been delivered in different contexts, such as school, after school, and summer programming (Bauminger, 2002; Lopata et al., 2006). Additionally, interventions deriving from this perspective vary in the duration of treatment (Bauminger, 2002; Lopata et al., 2006).

Bauminger's (2002) study targeted social skill development through in-school cognitive-behavioral intervention. This intervention consisted of three hours per week of in-class instruction. In addition, participants were given time to practice learned skills with typically developing peers during unstructured times (i.e., recess and free play after school). Furthermore, participating children's parents received weekly progress notes and were encouraged to help children implement learned skills through play dates and phone calls with assigned peers. The in-class intervention curriculum consisted of instruction in foundational concepts of friendship and relationships with others, affective education, and social-interpersonal problem solving (where children were trained in 13 social initiation behaviors). The curriculum was derived from the *Interpersonal Problem Solving Model* (Spivack & Shure, 1974) and the *I Found a Solution* (Margalit & Weisel, 1990) social skills program.

Lopata *et al.* (2006) targeted social skill development during a 30- hours per week, six-week intervention. The intervention was conducted during a summer treatment program for children with AS. Intervention consisted of four 70-minute intervention cycles per day. During the 70 minutes of intervention, 20 minutes were devoted to structured social skills instruction and 50 minutes to therapeutic activities. The 20

minutes of instruction consisted of defining the skill to be taught, modeling the skill, establishing the child's need for the skill, role-playing the skill, performance feedback, and assigning skill homework. The therapeutic activity was designed to foster the skills taught during instruction and consisted of cooperative activities (i.e., activities that required a minimum of two children to work together to complete the task), face-affect recognition activities (i.e., recognizing facial expressions, physiological correlates of emotions, and the connection between expression, emotion, and behavior), and interest expansion activities (i.e., researching and reporting on topics selected by others). Additionally, half of the participants participated in a token economy in which they could earn points and rewards for following program rules and directions and demonstrating prosocial behaviors taught in the program.

Intervention targets. In order to address the cognitive tasks underlying overt behavior, Bauminger (2002) targeted components of interpersonal problem solving (underlying cognitions and overt behaviors), affective knowledge (understanding ten simple and complex emotions), and observable social interactions with peers. The skills chosen were from a social cognitive perspective because of the social cognitive perspective's contribution to understanding the relationship between cognition and socialization. Ultimately, the social cognitive perspective provided a theoretical understanding of the relationship between social engagement and underlying cognitions.

Other researchers (Lopata, et al., 2006) targeted social skills through cognitive behavioral intervention as well. The skills targeted during this study included the ability to recognize the affective expression of another's face, the ability to interpret non-literal statements and idioms, expanding interest to areas beyond a preferred topic, and specific

skills from the Skillstreaming program (Goldstein et. al, 1997) that were related to the diagnostic criteria for AS from the DSM-IV-TR (Lopata, et al., 2006). Skillstreaming involves the use of four strategies to achieve psychoeducational intervention: modeling, role-playing, feedback and transfer (McGinnis & Goldstein, 1997). It further emphasizes the importance of active learning through definition and modeling of the skills to be taught, establishing student skill needs, role-play, providing performance feedback, and assigning homework (McGinnis & Goldstein, 1997; see Table 3 for an overview of the strategies and targets of interventions that combine cognitive behavioral theory with other theoretical applications).

Table 3
Table of Cognitive Behavioral Interventions

Author (Year)	Intervention Type	Intervention Strategy	Social Target(s)
Bauminger (2002)	cognitive behavioral and social cognitive	3 hours per week of in-school intervention by teachers and including typically developing peers for seven months	components of interpersonal problem solving (underlying cognitions and overt behaviors), affective knowledge (understanding ten simple and complex emotions), and observable social interactions with peers
Lopata et al. (2006)	cognitive behavioral and learning	five day (total 30 hours) per week, six week treatment program that included structured social skills instruction and therapeutic activities	ability to recognize the affective expression of another's face; the ability to interpret non-literal statements and idioms; expanding interest to areas beyond a preferred topic; and specific skills from the Skillstreaming program (Goldstein et. al, 1997) that were related to the diagnostic criteria for AS from the DSM-IV-TR

Intervention outcomes. Like other behavioral interventions, cognitive behavioral interventions have been shown to be effective. In a study of 15 children from eight to 17 years old with diagnoses of HFA, Bauminger's (2002) research demonstrated improvement in social-emotional understanding and social interaction after seven months of cognitive behavioral intervention. Specific findings included an increase in participating children's ability to suggest relevant social solutions when solving problems, as assessed by the Problem-Solving Measure, which is a behavioral interview that explores the cognitive reasoning behind problem-solving processes. Participating children also demonstrated increased knowledge of complex emotions as assessed by the Emotion Inventory in which they were asked to identify emotions and describe a time when they felt that emotion. Additionally, participating children demonstrated significant growth in speech that expressed an interest in another child, sharing experiences with a peer, and use of eye contact, as assessed by systematic coding of behavioral observations (Bauminger, 2002).

The results of intensive short-term cognitive behavioral intervention (Lopata, et al., 2006) indicated significant improvement in social skills as rated by both parents and teachers using the Behavior Assessment Scale for Children (BASC). Parents found increases in participating children's adaptability and decreases in their unusual or atypical behaviors; teachers found no significant difference in adaptability and atypical, unusual behaviors from pre- to post-intervention. The mixed results of this study provide tentative support suggesting that the use of cognitive behavioral strategies can be effective during interventions that target social understanding and behaviors in children with AS.

Strengths. Interventions from the cognitive-behavioral perspective represent a significant departure from behavioral approaches in that they can target children's interpretation of social interactions. Individual behavior and behavioral contingencies are used as markers of social exchanges, but are then processed and interpreted to enhance understanding.

Cognitive-behavioral interventions can be delivered in a variety of contexts, such as in schools or in outpatient settings (Bauminger, 2002; Lopata et al., 2006), increasing their flexibility and potential for use. In each of these contexts, cognitive-behavioral interventions have been shown to be effective in increasing both social-emotional understanding and social skill use (Bauminger, 2002; Lopata et al., 2006). By successfully providing interventions to groups of children with ASD, cognitive-behavioral approaches further represent an effective method for the delivery of interventions for the large numbers of children with ASD.

Limitations. Given that CBT interventions traditionally address the reframing of cognitive distortions and the modification of cognitions, this intervention technique does not provide an explanation of cognitive delay. Where CBT targets alterations to existing maladaptive cognitions, it does not provide strategies for developing adaptive cognitions in individuals with developmental or social delay. That is, CBT does not have the same empirically proven strategies for the instruction of initial cognitions that it has for the strategies that address the modification of existing maladaptive cognitions.

Although CBT provides a cognitive scheme for interpreting social situations, interventions from the CBT perspective do not address coordination of social interactions with others. The emphasis in CBT interventions is on environmental contingencies and

cognitive structuring in order to develop an adaptive reaction to the behavioral environment. However, interventions from the CBT perspective do not inherently address an appreciation of the other person in order to generate a truly social response that takes into account the other individual.

Strategies used during cognitive-behavioral interventions constitute another area of limitation. The *Skillstreaming* curriculum (Goldstein et al., 1997) relies heavily on modeling. In order to truly benefit from a model, individuals must understand and appreciate the model and not simply copy it. Cognitive-behavioral strategies do not present opportunities to ensure that the cognitive capacities are in place for the child to benefit from modeling by understanding the model.

Interventions with Multiple Theoretical Foundations: Social Stories™

Also applied as cognitive behavioral intervention are the commonly used "Social Stories" for children with ASD. Deriving from social cognitive theory and clinical experience, Social Stories™ are individualized stories written to describe social situations in terms of relevant cues. Additionally, these stories may help the targeted child define appropriate responses (Gray & Garand, 1993). Social Stories™ provide an informative description of a situation from the child's perspective and include all relevant variables (i.e., the who, what, where, when and why of the situation). They are intended for use with children with intellectual and/or language skills that support the child's reading or comprehension of oral language (Gray & Garand, 1993).

Intervention strategies. Social Stories™ are comprised of three types of short sentences. *Descriptive sentences* introduce what people do and why. *Direct sentences* are statements of desired responses stated positively. Finally, *perspective sentences* describe

others' reactions to a situation. Social stories have been used in practice to teach new routines, behavior, rules, academic skills and judgment (Gray & Garand, 1993).

Intervention targets. Delano and Snell's (2006) study represents one of few empirical examinations into the effectiveness of this commonly used social intervention technique. These researchers examined the effects of social stories on the duration of appropriate social engagement and the frequency of use of four specific social skills in three elementary school students with autism. The four specific social skills targeted for intervention were derived from previous research studies and included: initiating comments and requests; making contingent responses; and seeking attention. Each intervention session consisted of reading the social story, a comprehension check, and a ten-minute play session with a peer.

Intervention outcomes. Following Delano and Snell's (2006) intervention, the duration of social engagement for all three children increased during observations with familiar or novel peers. In addition, the participating children demonstrated increased numbers of targeted social skills during 10-minute play sessions (Delano & Snell, 2006).

Strengths. Social Stories™ represent a widely used intervention strategy for children with ASD. Social Stories™ were developed from the social cognitive perspective and the applied experience of interventionists; as such they have both a strong theoretical foundation to provide the reasoning for intervention *and* experientially derived strategies for practice. Additionally, social stories aim to describe social situations for children who have difficulty understanding social situations. By using clear and distinguishable markers of social situations, Social Stories™ provide cues for social situations. This intervention strategy aims to describe what people do, why they do what

they do, and how they may react to certain situations. As such, Social Stories ™ encourage children with ASD to develop an awareness and understanding of the importance of others when in a social interaction.

Limitations. Social Stories ™ have been the subject of few research studies. Although widely used in the practice field, Delano and Snell's (2006) study represents one of four research studies that have examined the effectiveness of Social Stories™. Given their favorable results, Social Stories™ appear to be a promising intervention for children with ASD, but more outcome studies that replicate these findings are needed in order for there to be a strong evidence base for the effectiveness of Social Stories™.

Social Stories ™ are further limited in that their effectiveness relies on the ability of the child with an ASD to benefit and learn from a visual story. In order to understand the story, the child must have well-developed reading or visual comprehension (i.e., if pictures are used) capabilities. Additionally, the child must then be able to translate the visual story into action. From that, the child must understand the social situation and recall the story at the appropriate time in order for the Social Story ™ to be useful.

Strengths of Interventions with Multiple Theoretical Foundations

Interventions that incorporate more than one theoretical foundation into applied practice have multiple strengths and assets. Namely, by combining two different theoretical foundations, the limitations of either theory can be reduced. For example, by combining cognitive-behavioral applications with social cognitive theory, one would be able to conduct a well-operationalized and specified intervention that is not limited to modifying overt behaviors, but targets the child's ability to observe, understand and respond to the actions of others in the environment (i.e., Bauminger, 2002; Delano &

Snell, 2006). As such, the combination of multiple theoretical foundations in applied interventions allows researchers and interventionists to recognize and employ the strengths of particular theoretical applications while complementing one theory's limitations with another theory.

By providing interventions that are derived from multiple theoretical perspectives, researchers and interventionists are able to create a well-informed combination of strategies and targets for intervention. This eclectic approach is particularly important for children on the Autism Spectrum whose complex diagnoses and pervasive delays warrant comprehensive interventions that target these children's greatest needs (i.e., socialization) using strategies that are appropriate. Although one theory (i.e., social cognitive) may provide a basis for the approach to intervention and the targeted difficulties (i.e., observing, understanding and responding to social interventions), this same theory could be limited in its applicability in intervention. Thus, by combining a theory that informs the targets of intervention with a theory (i.e., behavioral) that provides empirically-proven strategies that are replicable, interventionists and researchers are able to develop and implement dynamic interventions.

Given these strengths, interventions that draw from multiple theoretical perspectives may be better able to target the essence of social behavior and promote a child's ability to engage in coordinated social interactions with others than interventions operating from one perspective alone. For example, although social cognitive theory provides information regarding the coordination of social behavior and the points to target when intervening in a child's social development, this theory does not provide strategies for intervention to accomplish this goal.

Limitations of Interventions with Multiple Theoretical Foundations

Although creating interventions from the combination of multiple theoretical perspectives has many strengths, this approach is not without limitations. Notably, it is important that researchers and those developing interventions thoughtfully combine applications from these theoretical approaches. A risk when drawing from multiple theoretical perspectives to guide intervention is that the resulting intervention will not be comprehensive. For example, a combination of behavioral and cognitive-behavioral approaches may provide interventionists seeking to address socialization with a great number of intervention strategies (i.e., ABA, Social Stories ™), but be limited in the extent to which the intervention targets coordinated social interactions. Conversely, combining psychosocial and social cognitive approaches to address socialization may provide interventionists with multiple intervention targets but may have limited strategies for accessing these targets. Consequently, researchers and those developing interventions must have a balanced combination of theoretical perspectives in order to develop dynamic interventions that target coordinated social interactions and provide the strategies to promote coordinated social interactions.

Context for Intervention

This intervention addressed the nature of "social" by acknowledging a social interaction as an exchange (interaction) between two persons in which the child coordinates with others by observing, understanding, and responding to the actions of others. From the cognitive perspective, social development is posited to occur over time and is the result of underlying cognitive structures. Working from an understanding of "social" as stemming from underlying cognitive capabilities, intervention targets were

derived based on observation of each child's naturally occurring social interaction. From an understanding of the social developmental level of each individual child, social behaviors that the child was beginning to independently demonstrate (i.e., those the child is in the process of learning or about to learn) were taught to the child using behavioral techniques. From assessment of each child's naturally occurring social behaviors, the child's social developmental level was determined and interventions that targeted the emerging behaviors were developed. During and following intervention, participating children's overt social behaviors were observed and evaluated in order to assess skill growth and development.

In order to further explore the relationship of social and play behavior, interventions were delivered in the context of play activities. Unlike other interventions that use play in the service of other developmental domains, this intervention monitored the play environment in which skills were taught. In Phase 1 of intervention, teachers were instructed to administer intervention without attention to the child's play activity. During Phase 2 of intervention, however, opportunities for social intervention occurred when the child exhibited specific play activities selected from individualized assessment of the children.

In order to disentangle the relationship between social and play behavior for the purposes of implementing social interventions from the cognitive developmental perspective, the Social Behavior Scale was used to assess social behavior and the Developmental Play Assessment was used to assess play behavior. Assessment of these domains separately allowed for clarification of children's capabilities within each domain

and allowed for intervention that targeted social activities that were at the leading edge of the child's *social* development.

Assessing Social Behavior: The Social Behavior Scale

The Social Behavior Scale (SocBS) was developed from cognitive-developmental theory as a tool to assess children's interactions with others in naturalistic play settings. Working from cognitive developmental theory, the authors (Pierce-Jordan & Lifter, 2005) assessed descriptive studies of social behavior to determine a developmental hierarchy of social behavior that could be used when observing and coding children's social behavior. The SocBS derives largely from Parten's *Scale of Social Participation* (1932), described above. The authors of the SocBS adopted the less complex social behaviors described by Parten (1932) for use in the instrument, but replaced the more complex social skills that she described in order to separate the social behaviors from the play behaviors. The remaining categories were chosen because they accounted for the acknowledgment of another person and represent behaviors that demonstrate that acknowledgement, which is an essential component of socially coordinated behavior.

Pierce-Jordan and Lifter (2005) developed a continuum of four mutually exclusive categories of social behavior from least to most complex: solitary, onlooking, uncoordinated social and coordinated social. Working from these discrete and operationalized categories, the SocBS allows users to systematically observe and code coordinated social behavior demonstrated by children when reviewing videotaped sessions of social interactions.

Assessing Play Behavior: The Developmental Play Assessment

Similarly to the SocBS, the Developmental Play Assessment (DPA: Lifter, 2000) derives from a cognitive developmental understanding of development. The DPA targets play as a developmental domain in its own right and codes play behavior as it relates to a developmental hierarchy of play skills (Lifter, 2000). Derived from cognitive developmental theory and review of literature that categorizes play activities, the DPA consists of 15 categories of play activity ranging from indiscriminate actions to thematic fantasy play (Lifter, 2000). From videotaped recordings of children in naturalistic play environments with specific toys, children's play behaviors and activities can be assessed along the DPA hierarchy (Pierce-Jordan & Lifter, 2005).

Research Questions

In order to examine the effectiveness of the socially-focused intervention administered in the context of mastered play activities, two research questions were answered:

Research Question One. Will the frequency of social behaviors that are socially coordinated be *increased* through intervention per se and further increased in the context of mastered play activities?

Research Question Two. Will the frequency of teaching (i.e., prompting) for social behaviors that are socially coordinated be *decreased* through intervention per se and decrease more markedly in the context of individually determined play activities?

CHAPTER 3

Methods

Chapter three provides a description of the instruments and procedures used in this intervention study. The participating children and staff, the setting, measures, materials and equipment, research design, procedures, and the analyses are presented.

Participants

Children. The participants in this intervention study included four children with diagnoses of Autism Spectrum Disorders (ASD) in the kindergarten, first grade, or second grade at a school in Massachusetts that specializes in the education of children with autism. Children were recruited for participation in coordination with the director of the Preschool Core of classrooms at the school because the Preschool Core of classrooms serves children up to age 6 years 11 months. Informational letters describing the study were sent home in children's backpacks to guardians and caregivers whose children met the inclusionary criteria. The informed consent paperwork was then sent home in children's backpacks to provide additional information about the study, confirm parental interest in participation, and secure permission for participation in the intervention study.

Children were included in this investigation if they were between the ages of five and seven and a half, and had a diagnosis of an ASD (i.e., Pervasive Developmental Disorder, Pervasive Developmental Disorder- Not Otherwise Specified, Autism, or Asperger's Syndrome). The children's diagnoses were determined by physicians or licensed psychologists specializing in the assessment and diagnosis of children with Autism Spectrum Disorders.

Teachers. Additional participants were the clinical director of the Preschool Core classrooms, the head classroom teacher of the integrated preschool classroom, and two assistant classroom teachers. The clinical director holds certification as a Board Certified Behavior Analyst (BCBA), as well as a master's degree in education. Her role at the site is to oversee the clinical and administrative needs of each of the three classrooms in the Preschool Core. Her participation included facilitating initial contact with teachers and caregivers, and the establishment of the research team in the school's integrated preschool core. Additionally, she provided ongoing consultation and support throughout the study.

Teachers in the school's integrated preschool classroom— which serves children with pervasive developmental delays up to 6 years, 11 months of age— were recruited for participation to administer the intervention to all participating students. Participating teachers hold bachelor's degrees in education or a related field and have received specialized training in education, intervention, and behavior management for children with ASD. These teachers were asked to support the initial assessment procedures, participate in training, and administer the intervention.

Research assistants. Research assistants were recruited from the Northeastern University School Psychology MS/CAGS and PhD programs in the Department of Counseling and Applied Educational Psychology. They were recruited based on their interest in child development, autism spectrum disorders, and applied research. In addition, the research assistants were chosen for their interpersonal skills. These students have bachelor's degrees in psychology or a related field, and at least one year of master's level work in school psychology.

In addition, research assistants with bachelor's degrees or those working toward bachelor's degrees were recruited to assist with coding the videotaped observations for the target goals during baseline and intervention and to establish inter-rater reliability. These students were recruited based upon their interest in child development and their sophisticated capacity for coding the videotaped observation.

Setting

School. The study took place at the May Institute, Inc. in Randolph, Massachusetts, which is where the participants attend school. The May Institute offers clinical and educational services to children with ASD. This setting is committed to conducting applied research and using empirically-validated practices in treatment and educational settings. In addition to serving children with ASD, the teachers and therapists serve children with brain injury, mental retardation, and children with behavioral healthcare needs. The May Institute offers full-time year-round programming for individuals from the age of 2 years, 9 months to 22 years, 0 months. There are four classrooms in the Preschool Core (three self-contained and one integrated) serving approximately 20 children.

Classroom. The intervention sessions took place in the integrated preschool classroom at the school. The students in this classroom were three children with documented ASD and, accordingly, Individualized Education Plans. The classroom also included six typically developing peers. This room, which measured approximately 25 feet by 30 feet, had separate carpeted and tiled sections and was equipped with age-appropriate toys, furniture, and materials for the participating children. For purposes of

this study, children played and engaged in intervention at the table with peers and a teacher.

Measures

Several assessment measures were used to evaluate the children prior to the initiation of the intervention: the Leiter International Performance Scale, Revised Edition (Leiter-R; Roid & Miller, 2002); select subtests from the Battelle Developmental Inventory – Second Edition (BDI-2; Newborg, 2005); the Preschool Language Scale-Fourth Edition (PLS-4; Zimmerman, Steiner, & Pond, 2002); the Social Behavior Scale (SocBS; Pierce-Jordan & Lifter, 2005); and the Developmental Play Assessment (DPA; Lifter, 2000).

Leiter International Performance Scale-Revised. For purposes of this study, the brief intelligence quotient (Brief IQ), or screening measure, of the Leiter-R was used to assess the participating children's intelligence quotients. The Leiter-R is an individually and nonverbally administered, norm-referenced assessment of intelligence that measures cognitive ability, memory, and attention; it is appropriate for use with individuals from 2-0 to 20-11 years of age. The Leiter-R is especially appropriate for children with limited language abilities, such as children with Autism Spectrum Disorders (ASD), because there is no expressive or receptive verbal language demand during the administration.

The Leiter-R is composed of 20 subtests that group into either the *Visualization and Reasoning Battery* or the *Attention and Memory Battery*. The *Visualization and Reasoning Battery* assesses visualization, reasoning, and spatial ability through ten subtests: Figure Ground, Design Analogies, Form Completion, Matching, Sequential Order, Repeated Patterns, Picture Context, Classification, Paper Folding, and Figure

Rotation. The *Attention and Memory Battery* assesses nonverbal attention and memory through ten subtests: Associated Pairs, Immediate Recognition, Forward Memory, Attention Sustained, Reverse Memory, Visual Coding, Spatial Memory, Delayed Pairs, Delayed Recognition, and Attention Divided. All subtests do not need to be administered during assessment using the Leiter-R because different subtests are intended for administration to children at different ages.

The Leiter-R provides a brief screening measure of intelligence comprised of four subtests from the *Visualization and Reasoning* battery, which was the measure used during this study. The four subtests administered for the Brief IQ assessment were: Figure Ground (FG), Form Completion (FC), Sequential Order (SO), and Repeated Patterns (RP). This assessment yields a standard score description of each child's level of intellectual functioning. It was administered in order to describe, as fully as possible, the population participating in the study.

The results from the subdomain and domain scores of the Leiter-R have been established to be reliable through the application of test-theory and item-response theory (Roid & Miller, 2002). Additionally, the validity of the Leiter-R was established through extensive data analysis, including factor analysis, of content-validity, criterion-validity, and construct-validity (Roid & Miller, 2002).

Battelle Developmental Inventory, Second Edition. The BDI-2 (Newborg, 2005) is an individually administered, norm-referenced instrument intended for use with children from birth to seven years, eleven months of age. The BDI-2 consists of 450 items that can be assessed through parent interview, observation or structured procedures. The BDI-2 provides developmental quotients expressed as standard scores for five areas of

development, which are the *Adaptive Domain, Personal/Social Domain, Communication Domain, Motor Domain*, and *Cognitive Domain* (Newborg, 2005).

For purposes of the present study, participating children were administered both subtests of the *Communication Domain*, (*Expressive Communication* and *Receptive Communication)*, as well as one subtest from the *Personal/Social Domain* (*Self-Concept-Social Role*).

The results from the subdomain and domain scores of the BDI-2 have been established to be reliable with regard to internal consistency, stability over time of scores, and consistency between scorers (Newborg, 2005). Additionally, the validity of the BDI-2 was established through extensive data analysis of content-validity, criterion-validity, and construct-validity. The BDI-2 domain scores have been shown to be consistent with scores attained from other frequently used instruments that assess development (Newborg, 2005).

The BDI-2 was used in an effort to obtain norm-referenced measures of the child's expressive and receptive language capacity, as well as his or her inter- and intrapersonal functioning. Both subtests of the *Communication Domain* (*Expressive Communication* and *Receptive Communication)*, and the *Self-Concept and Social Role* subdomain were administered to each child in order to provide a norm-referenced description of the participating children in the social domain.

Preschool Language Scale, Fourth Edition (PLS-4). The PLS-4 (Zimmerman, Steiner, & Pond, 2002) is an individually administered, norm-referenced assessment of children's language for use with children from birth through 6 years, 11 months of age or

individuals who function within that age range. It is used primarily to identify children with language disorders or language delay.

The PLS-4 yields a Total Language Score, comprised of the *Auditory Comprehension* and *Expressive Communication* subtest scores, as well as subtest scores for each of the two domains assessed. The *Auditory Comprehension* subtest is designed to assess the amount of language understood by the child. It is composed of a range of tasks that assess the precursors of language development, comprehension of basic vocabulary and concepts, understanding complex sentences, and making comparisons and inferences. The *Expressive Communication* subtest is designed to assess how well a child communicates with others. It is composed of a range of tasks including early vocal development and early social communication, naming common objects and using specific grammatical markers and sentence structures, pre-literacy skills such as phonological awareness, and using language to define words.

Social Behavior Scale. The SocBS, developed by Pierce-Jordan and Lifter (2005), is designed to assess the extent of a child's interaction with others. The SocBS allows for the categorization of a child's observed interactions with others into the operationalized categories of *solitary*, *onlooking*, *uncoordinated social,* and *coordinated social* (see Table 1). Children's social interactions and behaviors are coded in 1-second intervals and assigned one of the four categories on a second-by-second basis. During scoring it is the timing of social behaviors, not the behaviors themselves, that is used to distinguish coordinated from uncoordinated social interactions. As such, the second-by-second records allows for an analysis of the coordination of social behaviors.

The SocBS was established to be a valid instrument by practitioners who work with young children. The content validity of the SocBS was established by Pierce-Jordan (1999) by asking 20 school psychologists and 20 special education teachers to respond to the descriptions of the four categories, as well as the organization and sequence of the categories. These practitioners were asked to rank-order the category descriptions; their rank orders were consistent with the ranked order of the SocBS categories. Content validity was established by 100 percent agreement indicating that practitioners endorse the SocBS as capturing young children's social behavior.

For the SocBS, mean percentages of inter-rater agreement was .892 for Solitary, .735 for Onlooking, .821 for Uncoordinated Social agreement, and .841 for Coordinated Social (Pierce-Jordan & Lifter, 2005).

Table 1
Description of SocBS Categories

1. Solitary	child sits, plays or engages himself in some type of activity; child gazes at the toys in front of him/her or away from the play area without looking at or interacting with others; this is the only nonsocial activity
2. Onlooking	child gazes at another person or at a person's actions; the child is an observer, not a participant
3. Uncoordinated social	child's verbal and nonverbal behaviors are socially-focused, including talking sharing objects, eye contact or physical contact but

	the behavior is not coordinated with the verbal and nonverbal behaviors of others (i.e., child states "look at my tower" and tips over tower before anyone can look)
4. Coordinated social	child's verbal and nonverbal behaviors are socially-focused, including talking, sharing objects, making eye contact or physical contact and the behavior is coordinated with the verbal and nonverbal behaviors of others; the child coordinates his or her focus of attention and timing of language or actions with the focus of attention and timing of language or action with others (i.e., child states "look at my tower" and tips over tower after obtaining someone's attention)

from Pierce-Jordan & Lifter (2005) p. 38.

For the purposes of this study, the SocBS was used to analyze the videotaped naturalistic observations of the social behaviors of the children. The groups in which the children were observed for this analysis were the groups children participated in for the study. The children were observed on four separate days for 5 minutes each observation. The groups included children with and without developmental delay.

Developmental Play Assessment. The DPA (Lifter, 2000) consists of a continuum of 15 categories of play that range from indiscriminative actions to socio-dramatic and fantasy play (presented in Table 2).

Table 2
Categories of play activities from the Developmental Play Assessment

I	Indiscriminative Actions	child treats all objects alike
II	Discriminative Actions	differentiates single objects
III	Presentation Combinations	re-assembles presentation
	General Combinations	assembles undifferentiated configurations
	Pretend Self	relates object to self in pretend fashion
IV	Specific Physical Combinations	preserves physical features in configuration
V	Child-as-Agent	extends familiar actions to dolls, figures
	Specific Conventional Combinations	preserves features in configuration
VI	Single Scheme Sequences	extends same action to multiple figures
	Substitutions	uses one object to substitute for another
VII	Doll-as-Agent	attributes actions to dolls, figures
	Multi-Scheme Sequences	extends different actions to dolls, figures
VIII	Socio-Dramatic	role adoption in play
	Fantasy Play	role adoption of fantasy characters

from Lifter, Ellis, Cannon, & Anderson (2005) p. 252.

Naturalistic, 30-minute, videotaped observations of a child's play with four groups of toys are coded for the frequency of a category of play (how many times) and variety (how many different exemplars of the category) a child displays an activity that represents the play category. If a child demonstrates a category of play with a frequency of 10 activities and with a minimum of four different examples/activities that represent the category, the play activity is determined to be *mastered*, or already acquired, by the child. If a child demonstrates a play category with a frequency of four activities and with at least two different examples, that category is considered *emerging*. If a child

demonstrates a play category less than two times and with less than two examples, it is considered to be *absent* from the child's repertoire.

According to Lifter, Ellis, Cannon, and Anderson (2005), the reliability of DPA was assessed to be .91 by interobserver agreement. Trained observers were able to achieve agreement in identifying the behaviors assessed by the DPA ranging from .82 to 1.00 on a sample of children with and without PDD.

Materials and Equipment

Audiovisual and written materials were developed for the training and intervention phases of the study. Additional materials included the toy sets the children used during the intervention. Finally, audio-visual equipment and computers were used to record intervention sessions and code recordings.

Teacher training materials. Materials for the teacher training included PowerPoint slides, handouts, and QuickTime video clips of recorded data (see Appendix A). The PowerPoint slides were created by the primary investigator and included the purposes of the intervention and the procedures for the intervention. Additional handouts for the teachers provided specific information regarding intervention and coding procedures, target objectives for each child, and descriptions of the teaching methods to be used. The QuickTime videos provided examples of children's natural social behaviors, which were used to inform goal selection, and examples of the intervention procedures.

The teacher training materials provided an introduction to the study, an overview of the intervention, and specific information regarding the teacher's role in the project. Once initial assessment data were collected, the teacher training materials provided a structure and outline for determining the intervention targets for each participating child.

Upon initiation of Phase 1 of the intervention for the first two participants, teachers were provided documents that addressed the methods for implementing the social objectives, including a description of the least-to-most prompting hierarchy and strategies for following the child's attention and interest. Finally, teachers were shown QuickTime videos of naturally occurring social interactions and of the teachers administering the intervention to guide intervention integrity.

Toy sets. Four toy sets from the integrated preschool classroom were used which were organized around typical preschool themes, as preschool classrooms are often organized around themes (Brown & Bergen, 2002). The four themes were: school, house, trains, and barn. The four toy sets were rotated through use with each group on a designated schedule to facilitate generalization (Celiberti & Harris, 1993; Lifter, Ellis, Cannon, & Anderson, 2005). By using different toy sets during intervention, it was anticipated that the target children would develop the target objectives that would not be reliant on specific materials. Descriptions of the four sets of toys are presented in Appendix B.

Digital video camera. A Sony Digital Video Camera Recorder, model number DCR-TRV50, was used to record the pre-intervention assessments and interventions sessions. For two assessments— the Developmental Play Assessment, and the Social Behavior Scale— and the intervention sessions, naturalistic observation was required.

The video camera recorder was placed on a tripod during assessment. In addition, this camera recorded onto Mini-DVs, which were stored in a locked cabinet in the office of the supervising investigator.

Computer and software. A Macintosh G5 computer, iMovie '08 (Version 7.1.4), and QuickTime software were used to analyze the recorded data. The recordings from the digital video camera recorder were uploaded to iMovie '08 on the Macintosh G5 Computer. From the iMovie software each 5-minute initial social observation and 15-minute baseline and intervention session was transferred to an individual QuickTime file. All data transferred into iMovie and QuickTime videos were stored on external, non-networked hard drives. In addition, the final QuickTime videos were stored on DVDs.

Data coding sheets. For the intervention sessions, teachers were provided with three documents that detailed each child's target goal, the training procedures, and data recording procedures. The first was a description of the each child's targeted goal written as a short-term objective (see Appendix C). This short-term objective sheet provided the teachers with detailed information regarding goals and procedures to be used in a format familiar to them. The second document outlined the teaching procedures to be used: namely, least-to-most prompting and guidance. The third set of documents were additional data record sheets that provided a succinct, easy-to-read summary of the procedures to be used and a place on which the child's response to teaching could be coded. The data sheets for each child (see Appendix D) were created by the primary investigator to address the targets and procedures for each child at each phase of the intervention.

Research Design

The intervention study conformed to a single-subject, multiple-baseline design (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005). Each of the participating children's progress was assessed against him- or herself. A single-subject design allows

for precise assessment of individual progress. Examination of participants' progress using multiple baselines allows for the determination of effectiveness of the intervention across participants.

Single subject design begins with the collection of baseline data. Children participating in the intervention were assessed during baseline in the same setting in which intervention occurred, as each participant acted as his or her own control. In the baseline condition, the dependent variable (which for this study consisted of the child's identified social target) was observed until a response pattern was established. Once a response pattern was established from which future predictions could be made, the intervention was begun. That is, once the child's social behavior was demonstrated to be consistent, he or she transitioned into Phase 1 of the intervention.

The multiple baseline was implemented across two pairs of the four target children in their respective integrated play groups. The first child from each group began the intervention at the same time, while the corresponding second target child in the group was held in baseline. Once each of the first children demonstrated an intervention effect, the second child in the group began the Phase 1 of the intervention. This procedure allowed for an analysis of the effect of the independent variable— the intervention— both within each data series (i.e., for each child) and across the data set (i.e., the pairs of the participating children taken together). The use of this multiple-baseline procedure allowed for the establishment of conclusions regarding the impact of the intervention on social behavior (Horner et al., 2005).

Procedures

Procedures for the investigation consisted of: training of the teachers; assessment of the children; identification of the target behaviors; implementation of the intervention (Baseline, Phase 1 and Phase 2 of the intervention, and Generalization); and coding the target behaviors.

Table 3
Timeline of Study Procedures

Procedure	Timeline
Initial Teacher Training	10 bi-weekly sessions over 4 months
Assessment of the Children	6 sessions over 3 weeks
Intervention	20-34 sessions over 5.5 months

Teacher training. Training for teachers prior to the initiation of the intervention sessions occurred during ten 40-minute sessions held at the conclusion of the school day. Training consisted of seminars, guided practice, and directed rehearsal (Dyer, Williams, & Luce, 1991; Petscher & Bailey, 2006; Petursdottir, & Sigurdardottir, 2006; Ward, Smith, & Makasci, 1997). The purposes of the teacher trainings were to: establish rapport with the teachers and develop an understanding of the facility's policies and procedures; provide an introduction to the intervention study; clarify expectations for the teachers; determine target goals for each child; and prepare teachers for implementing the intervention procedures. PowerPoint and Word documents were provided to teachers to outline each session's purpose and to facilitate information sharing, feedback, and collaboration.

Throughout the pre-intervention training sessions, attention was devoted to understanding the teachers' terminology, as well as to what was and was not effective in

their classroom. Conversations regarding their standard procedures, the culture of their classroom, and each child's individual behavior were important in establishing the framework in which the intervention would take place. Attention was devoted to providing intervention procedures that were feasible in the course of the classroom's daily activities (see Table 6).

Once the intervention sessions began, six additional 40-minute sessions were held to provide feedback to teachers regarding the administration procedures, to establish and maintain treatment fidelity, to provide feedback regarding each child's progress toward his or her goals, and to provide additional training for the administration of the intervention procedures for the second phase of the intervention.

Table 6
Pre-Intervention Teacher Trainings

Session	Focus	Detailed Description
1	Introductions	During this session, the primary researcher and teachers met for the first time. Personal introductions were shared and a brief project overview was provided.
2-3	Establishment of rapport and description of the school context	During these sessions, standard operating procedures at the facility were inquired about and described by the participating teachers. Specific attention was devoted to prompting hierarchies used, social targets, and intervention contexts.
4-6	Descriptions of the participating children and logistics	During these sessions, teachers were provided with a detailed description of the research project, with emphasis on the initial assessment of the children, which began shortly after the sixth teacher training session. Also discussed was the teacher's knowledge about the participating children, including reinforcers used for each child.
7-10	Input regarding goal selection and intervention procedures.	The remaining sessions focused on determining and agreeing upon appropriate social goals for the participating children. The groupings of children and times of intervention were determined with consideration for the classroom's scheduling and capacities. Finally, techniques of the intervention

were discussed in detail, including the procedures for providing opportunities for the children to demonstrate target social objectives. Following the 10th session, a description of the procedures of intervention for the initial children to start (Jane and Joshua), was provided for the teachers in the form of a Short-Term Objective (STO).

Once Phase 1 of intervention began, teacher trainings continued to occur bi-weekly. The focus of these trainings was to provide feedback on the teachers' administration of the intervention, provide feedback regarding each child's progress toward his or her goal, and to provide additional training for Phase 2 of intervention.

Assessment of the children. Prior to initiating the intervention, participating children were assessed by the primary investigator. Assessments took place during the six weeks before initiating the intervention. The standardized and naturalistic assessments were administered in the integrated preschool classroom. For the standardized assessments, each child sat across from the primary investigator with his or her back to the classroom. For the SocBS, each child was recorded on four separate days over three weeks while playing and interacting naturalistically with typical peers and peers who are developmentally delayed; during each social observation, each child sat at a table with two typically developing peers and a peer with delays. The play group was recorded for 5 minutes playing with one toy set. For the DPA, each child was recorded playing with designated toys on the carpet area with a familiar teacher.

Table 4
Standardized description of the children

Name	Diagnosis	Age	Leiter-R	PLS-4	BDI-2/ RC	BDI-2/EC	BDI-2/SC-SR
Jane	Autism	84 mos	85	20 mos	37 mos	15 mos	31 mos
Joshua	PDD-NOS	75 mos	46	21 mos	7 mos	28 mos	28 mos
Tyler	PDD-NOS	77 mos	74	23 mos	31 mos	12 mos	36 mos
Lucas	Autism	68 mos	40	6 mos	4 mos	10 mos	11 mos

Note. Age is reported as chronological age at time of assessment; Leiter-R Brief IQ results are reported as Standard Scores with a mean of 100 and standard deviation of 15; PLS-4 describes the child's overall communication composite (expressive and receptive); BDI-2/RC describes the child's Receptive Communication; BDI-2/EC describes the child's Expressive Communication; and BDI-2 SC-SR describes the child's Self-Concept and Social Role.

The results of the standardized assessments are presented in Table 4. Jane's and Tyler's nonverbal intelligence quotients (85 and 74, respectively) were assessed to fall within the Average and Low Average ranges, respectively. Joshua and Lucas were assessed to have nonverbal intelligence quotients in the Extremely Low range (46 and 40, respectively), indicating significant delay in cognitive development. The results of the standardized cognitive assessments demonstrate that the participating children are considerably delayed with regard to same-aged peers. It is perhaps because of this level of delay that these children are receiving individualized and intensive education in a substantially separate setting, as is the case in this special school the children attend. Cognitive levels in the low end of the Average range, Low Average range, and Extremely Low ranges suggest that the participating children have difficulty learning and developing new knowledge.

The children's language capacities ranged from the equivalent of 6 months of age, for Lucas, to 1 year, 11 months, for Tyler. These standardized findings highlight the level of language delay for each of the participating children and indicate that language-based

tasks are an area of particular challenge for these children. Each child's total language composite, as measured by the PLS-4, was assessed to fall between the child's scores on the BDI-2 Expressive and Receptive Communication subtests. These findings are to be expected given that the PLS-4 assesses overall language, whereas the BDI-2 subtests assess expressive and receptive language separately.

Beyond differences in the language composites, there was variability in children's assessed expressive and receptive communication on the BDI-2. Jane's and Tyler's receptive communication (37 months and 31 months, respectively) was assessed to be more developmentally advanced than their expressive communication (15 months and 12 months, respectively). The results of these assessments indicate that Jane's and Tyler's expressive and receptive language is delayed as compared to same-aged peers. Although the standardized assessment provides information regarding Jane's and Tyler's language delay, the results of the standardized assessment do not provide information regarding each child's naturally occurring language behavior.

Joshua's and Lucas' receptive communication (7 months and 4 months, respectively) was assessed to be less developmentally advanced than their expressive communication (28 months and 10 months, respectively). Notably, Joshua has a diagnosis of Landau-Kleffner Syndrome, a disorder of receptive and expressive communication characterized by auditory agnosia (difficulty understanding what is said) and aphasia (difficulty producing spoken language). Additionally, Lucas was assessed to be nonverbal. Lucas' lack of spoken language was reflected in the assessment of expressive communication because this subtest assessed language beginning with initial communicative expressions (i.e., different cries, production of vowel sounds). However,

his language capacities were not adequately assessed on the measure of receptive communication due to the sophistication of receptive language assessed at an early level on this test, including prepositions, simple possessive forms, and "wh-" questions.

Whereas the standardized assessments are helpful in approximating the children's developmental levels and describing their level(s) of delay, analysis of each child's expressive language demonstrated during the initial social observations allowed for complementary measure of each child's language. For example, Jane used three-word utterances for requests ("I want ….") and single word utterances ("done") during the initial social observation. Although Joshua used four- and five-word utterances spontaneously (i.e., "I don't want to" and "I want it the same") during the initial social observation, most of his verbalizations were single words (i.e., "yeah," "no," "done," "bee"). Tyler used single-word utterances spontaneously (i.e., "oops," "yay") and routine phrases (i.e., "thank you") when prompted. Additionally, Tyler's language usage was characterized by delayed echolalia; he repeated video game, book, and cartoon scripts throughout the initial social observations. Lucas was observed to be nonverbal; he did not demonstrate meaningful use of language or words.

The Self-Concept and Social Role subtest from the BDI-2 Social Domain was administered to obtain a norm-referenced measure of social development. The developmental ages for children's social abilities ranged from 11 months for Lucas, to 3 years for Tyler. The results of this assessment indicated that the participating children had limited to very limited understandings of themselves and others as social beings and in relationships with others. Additionally, the results further indicated that there were large discrepancies among the children. Some children, for example Tyler, had developed a

self-concept and understanding of themselves as social, whereas others, for example Lucas, had not yet demonstrated behaviors that would indicate a sense of self according to the assessments. These findings indicate the significant need for intervention in social interaction for these children, which is consistent with characteristics of children with ASD.

Four 5- minute observations of each child for the SocBS were conducted prior to baseline. The primary investigator video-recorded and coded these observations. The onset and offset time of each child's episodes of social engagement was recorded. Each interval coded was then assigned a label to describe the quality of the social engagement from the categorization prescribed by the SocBS (e.g., solitary, onlooking, uncoordinated, coordinated). This coding was based on the social quality of the interaction occurring during that interval and the timing of the behavior in coordination with others in the child's environment. Then, a description of the behavior occurring at that time (e.g., ":21-:24-looking at teacher," "4:35-4:46- banging cow on table," etc.) was noted. This process yielded a social code that provided categories of social interaction, duration of each episode coded within each social category, and a description of the behavior that occurred within each social category.

To determine the inter-rater agreement of the SocBS coding, 25% of the SocBS samples were re-coded by a research assistant. Prior to coding the data, the research assistant was trained on the SocBS using didactic presentation of information and conversation. Training focused on understanding the SocBS categories and on using the data sheets. The research assistant also practiced coding the SocBS on samples not to be used for the reliability coding and was provided with feedback regarding the timing

notations, categorization of the quality of interaction, and behaviors noted. Once this research assistant demonstrated an understanding of the categorization and coding, as demonstrated through practice coding samples, one 5-minute observation of each child was randomly selected to be re-coded. The reliability between the primary investigator and research assistant for coding the quality of social behavior demonstrated from moment to moment was assessed to be .817 and ranged from .74 to .89.

The results of the SocBS analysis are presented in Table 5. All four participating children demonstrated Solitary activity and Onlooking engagement. The participating children in this study engaged in solitary behaviors from 69% to 94.6% with an average of 81.7%. As can be seen, the duration of time spent in a single episode solitary engagement for the children ranged from 11.68 seconds for Joshua to 42.44 seconds for Tyler. The results of the SocBS indicate that Tyler spent the majority of his time engaged in Solitary activity across the observations and also demonstrates that he remained in Solitary activity for extended durations of time. The children's high percentages of time spent in Solitary activity and the duration of each episode of solitary activity indicate the need for intervention in social interaction.

In addition, each child's percentage of time and duration for each episode of Onlooking social engagement, Uncoordinated Social engagement, and Coordinated Social engagement was assessed. As can be seen, the children each demonstrated Onlooking engagement, ranging from 11.5% of the SocBS for Lucas to 4.4% for Joshua. As with the duration of Solitary activity, the duration of each episode of Onlooking engagement varied among the children, ranging from 4.0 seconds for Jane to 2.8 seconds for Tyler and Lucas.

All children demonstrated engagement in Uncoordinated Social interactions, although for Tyler and Lucas, Uncoordinated Social interactions were infrequent. Whereas Jane and Joshua spent 2.5% and 8.4% of time engaged in Uncoordinated Social interactions respectively, Tyler and Lucas spent less than 1% of their time engaged in Uncoordinated Social interactions. Notably, the duration of Lucas' episodes of Uncoordinated Social interaction was similar to Jane's and Joshua's: 3.5 seconds for Lucas, 4.0 seconds for Jane, and 3.54 seconds for Joshua. However, Tyler's engagement in Uncoordinated Social interaction was both infrequent and brief, occurring for 1.0 seconds on average. Data from the Uncoordinated Social category suggests that this is an appropriate category of social interaction in which to intervene for Tyler and Lucas, given its infrequent occurrence for both children and, for Tyler, its brief duration.

Jane and Joshua engaged in episodes of Coordinated Social interaction whereas Tyler and Lucas did not. The results of the SocBS indicate that Joshua engaged in Coordinated Social interactions for 18.1% of the observation, indicating a high frequency of Coordinated Social engagement. Jane engaged in episodes of Coordinated Social interaction 6.4% of the time. The average duration of Coordinated Social interaction was 5.82 seconds for Joshua and 3.83 seconds for Jane. The results of the SocBS indicate that examination of behaviors occurring within episodes of Coordinated Social interaction for Jane and Joshua would provide information regarding appropriate social targets for intervention.

Table 5
Initial Social Observation Results

Child	Solitary	Onlooking	Uncoordinated Social	Coordinated Social
Jane	.796 (16.09)	.115 (4.0)	.025 (4.0)	.064 (3.83)
Joshua	.691 (11.68)	.044 (2.9)	.084 (3.54)	.181 (5.82)
Tyler	.946 (42.44)	.033 (2.8)	<.01 (1.0)	.011 (1.7)
Lucas	.836 (14.46)	.155 (2.8)	<.01 (3.5)	-- (--)

Note. Percent of time in each category presented as decimal. Average duration in seconds of time spent in each category presented in ( ).

Analysis of the SocBS data provides information regarding each child's naturally occurring social engagement and interaction. Given its previous use in research, it is possible to compare the results of the SocBS with diagnostically similar peers studied by Pierce-Jordan and Lifter (2005). Additionally, the SocBS data allows for a comparison of the participating children with same-aged peers. Notably, the SocBS data suggests different levels of social development for each child than the results of the Self-Concept-Social Role subtest on the BDI-2.

Compared to Pierce-Jordan and Lifter (2005), where children with PDD who had been assessed using the SocBS spent an average of 72% of the time in solitary engagement, participants in the present study spent more time engaged in this category of social interaction. The amount of time Jane and Joshua spent engaged in solitary interaction (79.6% and 69.1%, respectively) more closely approximates the amount of time the children with PDD from the Pierce-Jordan and Lifter (2005) study spent in solitary social engagement. Tyler's and Lucas' time in solitary engagement (94.6% and 83.6%, respectively), however, is markedly greater than this comparison group.

It can be seen that Jane and Joshua are more socially advanced and appear to be as socially engaged as diagnostically similar peers. Comparison with these peers underscores the level of Tyler's and Lucas' social delay.

Although Jane and Joshua were assessed to have similarly delayed social development by the BDI-2 (31 months and 28 months, respectively), the SocBS data indicates differences in naturally occurring social interactions for Jane and Joshua. Although the standardized assessment indicated that Jane's social development was slightly more advanced than Joshua's, Jane spent more time engaged in Solitary and Onlooking interactions than Joshua. Joshua spent more time engaged in Uncoordinated and Coordinated Social interactions than Jane. Therefore, the results of the SocBS analysis provide information regarding each child's naturally occurring social interaction and social behavior, which can be operationalized into target behaviors and linked to intervention.

Tyler spent the majority of the initial social observation engaged in Solitary activity. It can be seen that his engagement in social interactions with others when not prompted is limited, despite his performance BDI-2 *Self-Concept and Social Role Subtest* where he was assessed to have the most advanced social development (36 months) of the four participating children. Therefore, despite his social capacities when probed, he required targeted intervention to engage in social interactions with others.

Lucas demonstrated limited social interaction as determined by the SocBS and spent the majority of his time engaged in Solitary activity. As would be expected based on the results of the BDI-2, in which Lucas was determined to have the greatest social delay of the four participating children (11 months), he did not demonstrate engagement

in Coordinated Social interaction. The SocBS data allows for an analysis of naturally occurring social engagement for Lucas and provides data necessary to determine developmentally appropriate social targets for him.

The analysis of the children's social engagement and the children's time spent in Solitary activity, particularly as compared to diagnostically similar peers, further underscores the children's need for targeted social intervention. Although the standardized assessments may have measured the magnitude of the children's delay, the SocBS data allows for an understanding of the ways in which the children are socially delayed that informs individualized intervention planning.

Identification of target social behaviors. For this study, social targets were selected (1) based on the behaviors identified using the SocBS data and (2) with input from teachers familiar with the students. The four 5-minute observations were used to determine the quality and duration of social engagement (i.e., Onlooking, Uncoordinated Social, Coordinated Social) for each child. In addition, the activities that the children demonstrated during the episodes of social engagement were recorded.

Each child's initial observation data were first examined for the number of observations in which each category of social engagement (i.e, Onlooking, Uncoordinated Social, and Coordinated Social) was present. Solitary activities were not included in this analysis because Solitary activities do not require interaction with others. The observations for each child were analyzed first for the occurrence of Coordinated Social engagement. Each child's social target was determined by the behavior demonstrated during either Uncoordinated or Coordinated Social engagement.

Examination of behaviors demonstrated during Coordinated Social engagement was possible for three children (Jane, Joshua, and Tyler) but not for the fourth (Lucas) because he did not demonstrate Coordinated Social engagement.

Jane demonstrated 24 occurrences of episodes of Coordinated Social engagement, as can be seen in Table 8. Of these 24 Coordinated Social episodes, eight were requests for a toy or place with interactive gaze and one was a comment on the ongoing play activity with interactive gaze. Given the frequency of requests, it was determined that Jane had acquired the ability to request. On the other hand, she demonstrated only one Coordinated Social comment on an ongoing activity with coordinated gaze. Therefore, commenting on an ongoing activity and then looking at the teacher to "share" was Jane's determined social target for intervention.

Teachers familiar with Jane who would be administering the intervention agreed that commenting would be an important social behavior for intervention. They stated, based on their personal experiences of Jane, that commenting on an ongoing play activity with interactive gaze would be an appropriate social target for her.

Table 8
Jane's Social Behaviors

Category	Total	Description of Social Behaviors	Frequency
Onlooking	28	watches peer play/looks at peer's toys;	14
		watches teacher or teacher and peer interaction;	13
		watches as person comes across line of sight	1
Uncoordinated Soc.	7	requesting an item of teacher when	5

		teacher is not attending to her;	
		touching peer aggressively after a hug (peer demonstrates dislike of contact);	1
		answers teacher's question without coordinating eye contact	1
Coordinated Soc.	24	*makes a request with coordinated joint attention eye gaze;	8
		leans into person or encourages physical contact;	5
		follows peer's command (look at this…);	2
		orients to speaker (peer);	2
		responds to peer's initiation to share;	1
		orients to peer after peer initiates with touch;	1
		pulls peers hand to face;	1
		verbalizes to peer;	1
		hugs peer;	1
		answers teacher's question;	1
		*comments on play activity with coordinated gaze	1

Note. Social behaviors that have an * next to them indicate behaviors selected for intervention.

Of Joshua's 43 behaviors that occurred during Socially Coordinated episodes, he was observed to comment on an object with interactive gaze three times (i.e., labeling an

object, pointing, and looking at the teacher) and comment on an ongoing activity with interactive gaze once. It was therefore determined that commenting was a behavior that he was beginning to demonstrate in his Coordinated Social episodes. Commenting on an ongoing activity was selected as a target for Joshua because it was just beginning to appear in his socially coordinated interactions.

Joshua's teachers who had known him for over a year agreed that commenting on an ongoing play action would be an important social behavior for Joshua to learn. They stated that the assessment data was consistent with their observations of him.

Table 9
Joshua's Social Behaviors

Category	Total	Description of Social Behaviors	Frequency
Onlooking	15	watches peers;	12
		watches 2 people interact;	2
		watches teacher set up toys	1
Uncoordinated Soc.	29	*commenting on objects/events without securing another's attention;	8
		visually attends to toys while talking/listening;	4
		reaches for peer's toys;	3
		imitates peer;	3
		orients to peer, does not answer question she asked;	2
		verbalizes unintelligibly with coordinated eye gaze;	2
		makes face at teacher;	1

		laughs to self, looks around;	1
		tells teacher to “stop” without eye contact;	1
		grabs for toy from teacher;	1
		keeps playing with toys after peer indicates a transition to another toy/activity	1
Coordinated Soc.	43	follows peer’s movements;	6
		orients to peer after initiation and responds;	6
		responds to initiation for joint attention to toy;	5
		responds to peer’s command;	3
		re-orients to peer following a completed interaction;	3
		*comments on objects he’s playing with, points, and looks to teacher;	3
		answers peer’s questions;	2
		looks at teacher after tower falls;	2
		orients to teacher and smiles in response to verbal praise;	1
		orients to object and says “what” after teacher says “look”;	1
		says “its what I want” after peer grabs toy;	1
		hides object from peer;	1
		references teacher’s face while playing (joint attention);	1

looks at peer after he grabbed for her toys, waits, and smiles when she offers toy;	1
looks at toy, repeats peer, points;	1
asks teacher "why";	1
verbalizes to peer;	1
verbally requests toy and waits for peer to hand him one;	1
looks at teacher after being loud;	1
requests help;	1
*comments on play	1

Note. Social behaviors that have an * next to them indicate behaviors selected for intervention.

Tyler demonstrated only two episodes of Coordinated Social interaction, as can be seen in Table 10. For both of these episodes, which occurred in separate observations, he responded to others. Because Tyler demonstrated Coordinated Social behaviors in which he oriented to the speaker and, separately, acknowledged a greeting with low frequency, responding to initiations to establish joint attention was determined to be his social target.

Tyler's teachers agreed that responding to initiations of joint attention would be an important goal for him. They reported that the analysis of the SocBS data was consistent with Tyler's social behavior in the classroom. The teachers expressed interest in providing social intervention targeting joint attention for Tyler due to their concerns regarding his tendency to remain in solitary activity and his readiness, as assessed for this study, to learn to respond to initiations of joint attention.

Table 10
Tyler's Social Behaviors

Category	Total	Description of Social Behaviors	Frequency
Onlooking	13	watches peer play with toys;	8
		watches peer after peer makes noise/engages in gross motor activity;	2
		looks at peer who crosses across his line of sight;	2
		watches adults converse (follows back-and-forth)	1
Uncoordinated Soc.	1	looks at peer while clapping exclaiming "Yaaaay!"	1
Coordinated Soc.	2	*makes eye contact, smiles when teacher says "Hi";	1
Social		*orients to speaker in response to name	1

Note. Social behaviors that have an * next to them indicate behaviors selected for intervention.

Lucas did not demonstrate any episodes of Coordinated Social behavior during the four initial social observations, as can be seen in Table 11. He did, however, demonstrate episodes of engagement in Uncoordinated Social interaction, which consisted of responding to physical sensation with eye contact and a smile as well as seeking to share affect with a teacher without eliciting her attention. He also demonstrated ongoing observations of his environment (i.e., Onlooking engagement). Because Lucas demonstrated Uncoordinated Social behaviors that included eye gaze and the intent to share in addition to frequent Onlooking engagement, his social target was

determined to be responding to initiations to establish joint attention. The goal of the intervention for Lucas was, then, to shape his uncoordinated efforts to share eye contact into a social interaction characterized by coordinated response to joint attention in a play context.

Lucas' teachers agreed that responding to initiations of joint attention was an important social target for him. They stated that data from the analysis of the initial social observation was consistent with their observations. Teachers also stated that they believed Lucas' Onlooking behaviors could be shaped into the shifting eye gaze required to respond to an initiation of joint attention.

Table 11
Lucas' Social Behaviors

Category	Total	Description of Social Behaviors	Frequency
Onlooking	67	watches multiple peers engaged in another activity;	24
		watches peer ("interactant") play;	20
		looks for teacher;	14
		watches teacher do an action	9
Uncoordinated Soc.	2	*responds to teacher grabbing his foot with eye contact and a smile;	1
		*smiles and moves body, looks up	1
Coordinated Soc.	0		

Note. Social behaviors that have an * next to them indicate behaviors selected for intervention.

A summary of the target social objectives for each child is presented in Table 12.

For Jane and Joshua, the target social objective was determined to be commenting on an ongoing play activity. For this objective, each child was taught to state an action word and then secure eye contact with the teacher while playing. Accordingly, Tyler's and Lucas' social objective was determined to be responding to another's effort to initiate joint attention. A response to an initiation of joint attention was determined to be a shift in eye gaze to the initiator's (teacher's) hands, to her eyes, and back to her hands when the teacher stated, "look what I'm doing."

Table 12
Summary of intervention targets

Child	Social Target	Description
Jane	commenting on an ongoing play action with coordinated gaze	Jane will label her play action and look at the teacher when asked, "what are you doing with the (object in her hand)?"
Joshua	commenting on an ongoing play action with coordinated gaze	Joshua will label his play action and look at the teacher when asked, "what are you doing with the (object in her hand)?"
Tyler	responding to bids for joint attention	Tyler will look at the teacher's hands, at her eyes, then at her hands in sequence when the teacher exclaims, "look what I'm doing!"
Lucas	responding to bids for joint attention	Lucas will look at the teacher's hands, at her eyes, then at her hands in sequence when the teacher exclaims, "look what I'm doing!"

Identification of target play behaviors. The *play* activities that formed the context in which Phase 2 of the social intervention was administered were selected based on the results of assessment with the DPA (Lifter, 2000), as presented in Table 13. The activities chosen were those that were possible to demonstrate with the toy sets provided as well as representative of categories of play activities that were determined to be either mastered or emerging by the participating children. The activities chosen were chosen in order to decrease the cognitive load required when an opportunity to share a social interaction—whether through commenting or responding to initiations to establish joint attention—was provided, based on the results provided by Pierce-Jordan and Lifter (2005).

Table 13
DPA Play Profiles for Individual Children

	Play Categories	Jane	Joshua	Tyler	Lucas
I	*Indiscriminative* treats all objects alike				
II	*Discriminative* differentiates single objects	6/26 (M)	3/7 (E)	5/16 (M)	1/2 (A)
III	*Presentation Combinations* re-assembles presentation	7/36 (M)	4/19 (M)	5/94 (M)	4/40 (M)
	General Combinations assembles undifferentiated configurations	4/4 (E)	1/23 (A)	5/69 (M)	5/8 (E)
	Pretend Self relates object to self in pretend fashion	__	2/3 (A)	__	__
IV	*Specific Physical Combinations* preserves physical features in configuration	3/20 (E)	3/18 (E)	1/3 (A)	4/12 (M)
V	*Child-as-Agent* extends familiar actions to dolls, figures	4/12 (M)	__	2/37 (E)	__
	Specific Conventional Combinations preserves features in configuration	1/3 (A)	__	1/1 (A)	__
VI	*Single Scheme Sequences* extends same action to multiple figures	__	__	__	__
	Substitutions uses one object to substitute for	1/1 (A)	2/5 (E)	__	__

	another				
VII	*Doll-as-Agent* attributes actions to dolls, figures	—	—	—	—
	Multi-Scheme Sequences extends different actions to dolls, figures	—	—	—	—
VIII	*Socio-Dramatic Play* role adoption in play	—	—	—	—
	Fantasy Play role adoption of fantasy characters	—	—	—	—
	Total Codable Actions	102	75	220	62

Note. M= mastery (4 types, 10 frequencies); E= emergence (2 types, 4 frequencies); A= absent or anything less than emergence.

Jane demonstrated an emergent use of Specific Physical relationships in her play consisting of three different play activities demonstrated 20 times (see Table 13). In addition, Joshua demonstrated emergent use of Specific Physical relationships in his play through three different play activities demonstrated 18 times. For Lucas, however, Specific Physical relationships were assessed to be mastered through the demonstration of 12 Specific Physical activities that included four distinct Specific Physical relationships.

Within Tyler's play activities, Specific Physical relationships were assessed to be absent with a single Specific Physical play activity occurring three times. However, the profile of Tyler's play demonstrated by the DPA suggested that he may have been ready to acquire an understanding of Specific Physical relationships in his play. His mastery of three other categories of play activity (Presentation Combinations, General Combinations, and Child-as-Agent)- one of which (Child-as-Agent) is a more complex play activity than Specific Physical- indicated that Specific Physical activities were an appropriate play context in which to target the social intervention for Tyler. For all of the

participating children, play activities consistent with Specific Physical relationships were chosen as the play context during Phase 2.

Table 14
Variety and frequency of Specific Physical play activities by child

Child	Variety	Frequency	Level
Jane	3	20	Emergent
Joshua	3	18	Emergent
Lucas	4	18	Mastered
Tyler	1	3	Absent

Examination of the toy sets (see Appendix 2) provided information regarding the opportunities for Specific Physical actions that could be demonstrated with each toy set. Additionally, data from analysis of Jane's and Joshua's spontaneously occurring play activities during Phase 1 (see Table 15) provided information regarding the play activities for Phase 2.

Table 15
Specific Physical Activities During Phase 1

Toy Set	Specific Physical Activities
barn	--
house	• putting figure in car or skateboard
	• sitting figure in chair*
	• sliding figure down slide
	• rolling skateboard down slide*
school	• sliding figure down the slide*
	• putting figures in see-saw
trains	• putting together train tracks*

- rolling train on tracks
- making a tunnel*

Note. Actions denoted with a * indicate actions demonstrated by children in Phase 1.

For Phase 1, the teachers determined the labels to be used for the play activities play activities the children demonstrated; therefore, there was no consideration for the complexity of the play activity in which the child was engaged when an intervention sequence was administered. However, the play activities that provided the context for each child's Phase 2 were specific physical relationships that could be demonstrated by the toy sets used during Phase 1 (see Table 16). Additionally, for Jane and Joshua specific verbal labels were required for labeling the play action in Phase 2 of intervention (see Table 16).

Table 16
Play activities for intervention

Toy Set	Play Activities for Intervention	Verbal Label
barn	putting animals in the truck;	"putting (in)"
	connecting the truck to the trailer	"connecting"
house	rolling the skateboard down the ramp;	"rolling"
	sitting the figure in the chair	"sitting"
school	sliding the figure down the slide;	"sliding"
	pushing the figure in the cart	"pushing"
train	putting the tracks together;	"putting (together)"
	making a tunnel	"making"

The toy sets provided the opportunity for at least two exemplars of activities from the play categories identified for a child at the mastery or emergent level. Confirmation

of each child's use of the specific physical activities was verified through observation and coding of the baseline observations for all four participating children.

Teaching procedures. During Phase 1 of the intervention, the teachers followed the child's lead to guide natural teaching opportunities that were consistent with each child's individual social targets. Teachers sought natural opportunities (i.e., when the target child was engaged in any play activity) to implement the prompting hierarchy. During Phase 2 of intervention, the specified play activities served as the activity context for implementation of the individual social targets. Teachers provided social consequences consisting of smiles, hugs, and high-fives with animated verbal acknowledgment of performing the target activity. If during an intervention session a child attempted a target activity, teachers implemented the least-to-most prompt hierarchy (Sulzer-Azaroff & Mayer, 1991) to facilitate completion of the target activity.

In Phase 1, there was no consideration for the complexity of the play activity in which the child was engaged when an intervention sequence was administered. Teachers were instructed to simply wait for "natural opportunities," defined as activities in which the child held an object in one or both hands and was seen to engage in an action with that object.

For Jane and Joshua, the social target was to label an action and then look at the teacher in a continuous behavioral chain in response to the teacher's query, "what are you doing?" During Phase 1, teachers were instructed to present an initial prompt, "what are you doing with the (object in the child's hand)?" and provide least-to-most prompting (i.e., phonetic cues approximating an entire action word such as "playing," "building," "rolling," etc.) when the child had an object in his or her hand and was engaged in a play

activity. Once the child answered, the teacher was instructed to repeat the child's verbalization with neutral affect (i.e., "you're playing") and immediately offer the second prompt, "look at me." Jane and Joshua were then guided, if necessary, to look at the teacher, who upon receiving eye contact rewarded the child with enthusiasm and a high-five or tickle while repeating the child's verbalization (i.e., "you *are* playing!").

For Tyler and Lucas, the target social objective was to respond to an initiation of joint attention (namely, "look what I'm doing") by shifting eye gaze from the teacher's hands, to the teacher's eyes, back to the teacher's hands. Each trial began with the teacher stating the directive, "[child's name], look what I'm doing." The teacher then waited two seconds for the child to respond by looking at her hands before providing the least-to-most prompting hierarchy (i.e., pointing at the object in her hands, pointing from the child's eyes to the object in her hands, guiding the child's gaze) to look at her hands. The child was then instructed to look at the teacher's eyes, if he did not do so spontaneously. Teachers stated, "[child's name], look at my eyes" and, again, provided least-to-most prompting to gaze at her eyes. In order to complete the final step of the response to an initiation of joint attention, the child was then required to return his gaze to the teacher's hands. The child was offered two seconds in which to complete this step independently before being verbally prompted to "look what I'm doing" and offered least-to-most prompting through points and guidance in order to complete this final gaze shift.

During Phase 2, Jane and Joshua were instructed to "show me (the target play activity)" (i.e., putting animals in a truck, rolling a skateboard down a ramp). When the child began to engage in the specified play activity, teachers administered the social intervention as they had in Phase 1. During Phase 2*,* each child's data coding sheets were

modified to include a list of the specified play activities as well as the intervention procedures.

During Phase 2, Tyler's and Lucas' response to joint attention trial consisted of the teacher eliciting joint attention when she was engaged in the specified play activity (see Table 15). The teaching procedures for Phase 2 were nearly identical to those in Phase 1; however, teachers were asked to first demonstrate the specified play activity before administering a response to joint attention trial for Tyler and Lucas. During Phase 2, each child's data coding sheets were modified to include a list of specified play activities as well as the intervention procedures.

Implementation of the intervention. Three sessions per week were recorded to provide data to assess each child's progress toward the targeted goal, to determine treatment fidelity, and to monitor the occurrence of specified play activities to establish that (1) the specified play activities spontaneously occurred during Phase 1 and (2) that the intervention occurred in the context of the specified play activities during Phase 2.

Participating children were divided into two different intervention groups. Each group consisted of four children: two target children with diagnoses of ASD and two typically developing peers. The two target children were the core of each group and typical peers rotated through the groups. Group One consisted of Jane and Tyler; and Group Two consisted of Joshua and Lucas.

The intervention consisted of four phases: baseline, Phase 1, Phase 2, and generalization. The baseline sessions were 15 minutes in duration and conducted in the integrated preschool classroom at the facility with groups of four children. During baseline sessions, the teacher put out one set of toys and the children were recorded

playing and interacting with one another naturally. Baseline sessions were coded for the presence or absence of each child's target social behavior.

Sessions for both Phase 1 and Phase 2 were 15 minutes in length and occurred three times per week. The sessions were conducted in the same setting and in the same groups as the baseline intervention sessions. In order to facilitate the comfort of the typically developing peers and provide an additional foundation for generalization, when possible, the typically developing peers were offered the opportunity to switch with another peer from playing in the intervention group to another play area in the classroom halfway through each 15 minute session. Because two of the participating children, Jane and Lucas, were not students in the integrated preschool classroom, one participating teacher went to each child's classroom and transitioned the child from his or her classroom to the integrated preschool classroom.

All intervention sessions were divided into two parts: 10 minutes of intervention and 5 minutes of naturalistic play. During the first 10 minutes, teachers were asked to administer the intervention procedures for teaching the behaviors with Jane and Joshua; the remaining five minutes were then devoted to naturalistic play in order to probe for spontaneous social interactions. For Tyler and Lucas, the first five minutes were devoted to naturalistic play and as a probe for spontaneous social interactions and the intervention procedures were administered during the final 10 minutes of the session. Staggering the intervention times (i.e., the first versus the final 10 minutes of the intervention session) allowed teachers to administer teaching procedures when both children were in active phases of the intervention.

Teachers were directed to interact naturally with the children playing at the table for the five-minute probe of each intervention session. Specifically, teachers were instructed to provide a narration of the ongoing play activities at the table for all children, respond to any child's initiation, and to offer help and/or guidance when needed.

The video record of the five-minute probe of each session was then reviewed to evaluate progress toward targeted goals. Once a child demonstrated a response to the intervention based on the increasing occurrence of his or her target behaviors, that child transitioned to the next phase of intervention (i.e., Phase 2 or generalization). At the time of Jane's and Joshua's shift from Phase 1 to Phase 2, Tyler and Lucas transitioned into Phase 1 of intervention, respectively (i.e., Tyler transitioned into intervention when Jane transitioned to Phase 2, and Lucas' initial transition was dependent upon Joshua's response to Phase 1). After that point (i.e., when Jane and Joshua were in Phase 2 and Tyler and Lucas were in Phase 1), each child's transition into the next phase depended on his or her response to the intervention.

During the generalization phase of the intervention, target children were probed 5 times during a naturalistic play session in the carpet area of the classroom. During Generalization, target children received social consequences for the occurrence of the targeted social behavior on an intermittent schedule (Sulzer-Azaroff & Mayer, 1991). By providing social consequences intermittently, it was hoped that target children's demonstration of his or her target goal within a socially coordinated interaction would be maintained across settings.

Data management and translation. The SocBS, DPA, and video recorded baseline and intervention sessions were recorded onto mini-DVs using a digital video recorder.

These mini-DVs were then uploaded to a Mac G5 computer using iMovie '08. From iMovie '08, the digital records were converted to QuickTime video format. Each observation was saved into an individual QuickTime file. The QuickTime video clips of each observation served as the record for the data coding an analysis. The digital records, in both iMovie and QuickTime format, were stored on external hard drives. Additionally, the QuickTime videos were saved on to DVDs for backup.

Assessment of intervention targets. The occurrence of each child's targeted social behavior was assessed throughout the four phases: baseline, Phase 1, Phase 2, and generalization. Three small group naturalistic play and intervention sessions per week were video-recorded and coded to assess the children's progress. Each child's response to intervention was assessed by analysis of the video-recorded data. Data regarding each child's demonstration of the target behavior independently and during teaching trials was recorded. Any instances of independent demonstration of the target behavior were coded by marking the onset and offset time of the behavior and by noting a description of the behavior that occurred.

Data regarding demonstration of the target behavior during teaching trials was also recorded. Each child's response to the initial statements or queries was recorded. Additionally, the level of prompting required for the child to demonstrate each component of target behavior was recorded.

For Jane and Joshua, the social target was to label an action (i.e., "playing," "building," "rolling," "opening," etc.) and coordinate eye gaze with the teacher. Coding of this social target included recording the prompting required, if any, for each child to both label the ongoing activity and coordinate his or her eye gaze. For Tyler and Lucas,

the social target was to respond to an initiation of joint attention by gazing at a teacher's activity (i.e., placing figures on a train, rolling a tractor, placing figures on a see-saw, etc.) and then, in a continuous behavioral chain, look at the teacher and then back to her hands. Coding of this social target included recording the prompting required, if any, for each child to shift his eye gaze to the teacher's hands, to her face, and then to her hands.

Acquisition criteria. The children's acquisition of the target objectives was determined by examining the teaching required for the children to engage in the target social behavior. For Jane and Joshua, the teaching of both the language (i.e., providing full verbal prompting to label the action word) and looking behavior (i.e., providing physical guidance to coordinate eye gaze) was examined. Once Jane and Joshua required full prompts for labeling and looking for fewer than three of the eight trials across four sessions, they transitioned to Phase 2 of intervention. Jane and Joshua discontinued intervention after they required full prompting for both labeling and looking for fewer than two of the eight trials across three of four sessions.

For Tyler and Lucas, full teaching consisted of physical guidance to look at either the teacher's hands or her eyes. Tyler and Lucas transitioned from Phase 1 to Phase 2 of intervention when they required 10 or fewer (out of 24) looks to be guided for three out of four sessions. Acquisition was achieved when Tyler and Lucas required physical guidance for six or fewer looks in three out of four sessions during Phase 2 of intervention.

Treatment fidelity. During intervention, teachers were provided in vivo feedback and, at times, brief written reminders for components of the intervention implementation that they were having difficulty doing. For example, Teachers 1 and 2 required reminders

to repeat the children's verbalizations for Jane and Joshua and to label the child's activity (i.e., "you're looking at me") for Tyler and Lucas. All three teachers required reminders to provide praise to the children, particularly after trials that were extended in duration due to the child's response time and after trials in which the teacher appeared to have difficulty administering the teaching.

Treatment fidelity was assessed by coding 25% of each teacher's total number of intervention sessions administered. In order to assess fidelity, these video records were reviewed for the presence of intervention procedures and, during Phase 2, to include the use of the play activities and teaching strategies that were listed on the data coding sheets. Specifically, the records were reviewed for the teacher's provision of instruction, whether teachers prompted or guided each target activity only if needed, whether the teachers provided least-to-most prompting only after the child was given an opportunity to respond, the teacher's repetition of the child's language or labeling of the child's behavior, the teacher's use of praise, and, during Phase 2, the teacher's use of targeted play activities and specified language.

The teacher fidelity data are reported in Table 17. Teacher 1 demonstrated fidelity ranging from 81.3% to 88.8%, averaging 85.3% for accurate intervention implementation. Teacher 2's fidelity of implementation ranged from 83% to 98.9%, averaging 92.3% for accurate intervention implementation. Teacher 3 demonstrated intervention fidelity ranging from 96.3% to 98%, averaging 97.1% for accurate intervention implementation.

Table 17
Teacher Fidelity Data

Teacher	Average Fidelity	Range of Fidelity
1	.853	.813-.888
2	.923	.830-.989
3	.971	.963-.980

Interobserver Agreement

Agreement between the primary investigator and the three teachers was achieved through comparison of 25% of each child's observational data. Interobserver agreement was evaluated for each of the target activities within a category during Phase 1 and Phase 2 of intervention. Agreement was calculated by dividing the total number of agreements by the total number of agreements plus disagreements. Interobserver agreement was assessed to be 86.3% across all four children.

Interobserver agreement was determined for all four children (see Table 18). For Jane, interobserver agreement between the primary investigator and intervening teachers ranged from 79.2% to 100%, with an average agreement of 91.7%. For Joshua, interobserver agreement ranged from 62.5% to 95.8%, with an average agreement of 78.7%. For Tyler, interobserver agreement between the primary investigator and intervening teachers ranged from 87.5% to 91.7%, with an average agreement of 89.6%. For Lucas, interobserver agreement ranged from 79.2% to 96.9%, with an average agreement of 85.2%.

Table 18
Interobserver Agreement by Child

Child	Range of Agreement	Average Agreement
Jane	.792-.100	.917
Joshua	.625-.958	.787
Tyler	.875-.917	.896
Lucas	.792-.969	.852

Data Analysis

The children's progress was graphed following the procedures for a single subject and multiple baseline design. Phase 1 for the first child in each group began following a period of steady baseline performance. Phase 1 for the second child in each group began following observations of the effect of the intervention for the first child, in addition to the observation of steady baseline performance.

Analysis of the data was based on evidence of baseline behavior and the impact of the intervention. The evidence consisted of visual analysis of the level, trend, and variability of performance during baseline and intervention following Gay and Airasian (2003) and Horner and colleagues (2005). Visual analysis of the *level* of performance consisted of examining graphed data in order to assess the mean performance during a phase (baseline or intervention) of the study. Visual analysis of the *trend* of performance consisted of examining the rate of increase, or decrease, of the best-fit straight line for the dependent variables for each child within the baseline and intervention conditions. Finally, visual analysis of the *variability* of performance consisted of examining the extent to which a child's performance fluctuated around the mean or the slope (best-fit line) during each condition (Horner, et al, 2005).

CHAPTER 4

Results

Chapter four will present the results of the intervention study. In this chapter, an overview of the process of engagement with the field site, which includes a description of the teacher training and implementation of intervention, will be presented. Then, descriptions of each child's response to the intervention will be presented. Next, the results according to the two pairs of participating children in terms of the multiple baseline design for intervention will be provided. Lastly, a summary of the children's responses to intervention will be presented.

General Overview of Intervention

The assessment of the children, selection of intervention targets, and administration of intervention occurred over a period of 9 months from spring through fall 2008. The academic program at this school runs full-time for 12 months of the year; as a result, the study could be implemented through the summer months. The intervention included two stages: (1) teacher training and (2) implementation of the intervention (Baseline, Phase 1, and Phase 2 of the intervention, and, for two children, Generalization probes).

Teacher training. The first stage of the research project included introducing the participating teachers to the project and gathering information to determine the social targets and intervention procedures used at the school. Throughout the spring, teachers participated in training sessions with the primary investigator once to twice per week. The teachers appeared eager to share information regarding the participating children, the children's peers in the classroom, the social and behavioral goals for the children, and the

intervention procedures. The teachers appeared receptive to materials provided for the training. The teachers shared the constraints on classroom scheduling for intervention, with particular regard to the feasibility of video recording in the classroom. The constraints included: times of day children were available for intervention, the duration of the time children were available for intervention sessions, and teacher schedules.

Implementation of the intervention. In collaboration with the teachers, the intervention schedule was determined to be two 15-minute sessions per day on 3 days of the week. Intervention sessions occurred at 9:45-10:00 am and 12:30-12:45 pm in order to accommodate the classroom schedule. Occasionally, these times were interrupted by changes in classroom staff, schedule, or school events. For example, on days in which there were school-wide assemblies, classroom observations, half-days, or prospective students in the classroom, intervention sessions did not occur.

During the Baseline sessions, each of the participating children played at the table with another participating child and two typically developing peers for 15 minutes. During the 15 minutes of play, the participating children engaged in non-directed play with one of the four toy sets (on a rotating basis). During the Baseline sessions, teachers were instructed to respond to all players if the child initiated a play activity or requested help. Teachers were instructed to intervene when a child's behavior became unsafe (i.e., hitting, biting), when a child's behavior became repetitive, or when a child demonstrated a behavior being targeted through a pre-existing behavior plan for elimination.

Following stable baseline behavior, when provided natural opportunities for socialization, each child transitioned into Phase 1 of intervention. During Phases 1 and 2, the children played at the table in play groups with the other participating child of the pair

who remained the same (i.e., Jane with Tyler and Joshua with Lucas). The typically developing peers rotated through the group. During intervention, in addition to non-directed play-time within the observation session, each child participated in eight teaching trials to allow the opportunity to learn the target social behavior.

Children's Responses to Intervention

The results of the children's response to intervention for each child's individualized social target are described below. Jane's and Joshua's intervention results will be presented first because (1) they both transitioned into Phase 1 of intervention after six baseline sessions given that they were the first children in each of the multiple baseline pairs to receive intervention and (2) they had similar social targets due to the similarities in their social behavior during assessment. Following Jane and Joshua, Tyler's and Lucas' intervention results will be presented. Tyler and Lucas were each held in baseline until the other member of their intervention pair (Jane and Joshua, respectively) demonstrated a response to Phase 1 of intervention. For each child, performance across baseline, responses to the two Phases of the intervention, and generalization data, if available, are described.

Jane's Response to Intervention

The results below present Jane's ability to engage in the target behavior of commenting on the ongoing play activity (i.e., label) while coordinating her eye contact (i.e., looking). In addition, the amounts of prompting required for this target behavior to occur are presented. In Phase 1, Jane was required to label while looking using any word(s) she chose (i.e., playing, rolling, etc). In Phase 2, Jane was required to label while looking using target words to describe specific play activities.

In the results that included Jane's labeling of action words (i.e., independent occurrence of target behavior, teaching the target behavior, and labeling of action words), the data provided presents the frequency of the number of action words uttered in each session for both phases. Although specific target words that were not required in Phase 1 were required in Phase 2, the same behavior (i.e., stating an action word) was recorded across both phases, which is a requirement of single subject design, according to Tawney and Gast (1984).

Jane's independent demonstration of the target social behavior will be presented first; then the teaching required to support Jane's learning will be presented; and finally her independent demonstration of separate components of the target behavior (i.e., labeling and looking) will be presented.

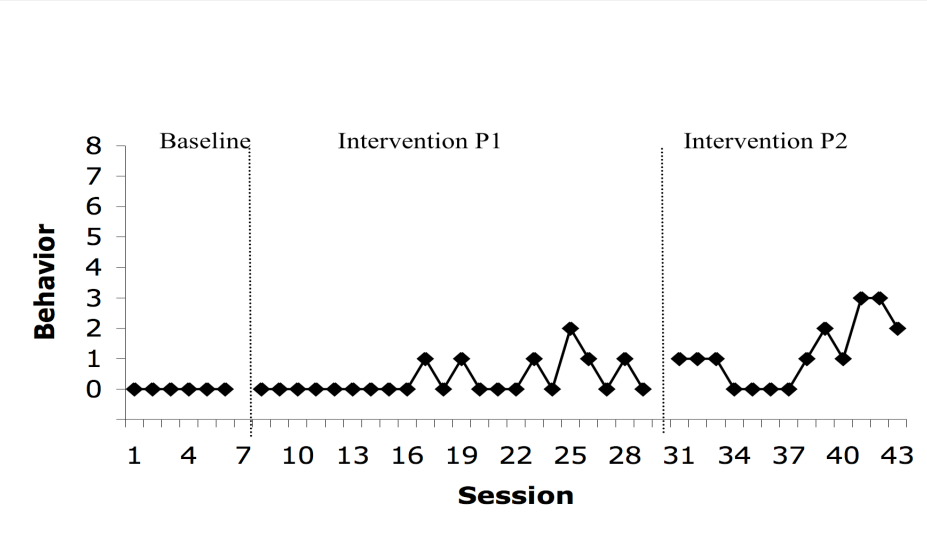
Independent occurrence of target behavior. Figure 1 presents the occurrences in which Jane demonstrated the target behavior (label while looking) in response to the question "what are you doing with the…?". For these occurrences, she required no verbal cueing and no verbal or physical directive to "look at (the teacher)."

As can be seen in Figure 1, Jane did not demonstrate the target behavior during Baseline. Once intervention sessions began, Jane first demonstrated a response to the initial question ("what are you doing with the…?") after 9 intervention sessions, underscoring her need for targeted intervention in this area. Jane required time to reach acquisition of this behavior, which she learned in Phase 2 of intervention. She achieved acquisition of this behavior when she responded independently to the initial cue 2 or more times in three out of four sessions. Due to scheduling constraints and a foreclosed

timeline for intervention, Jane did not have the opportunity to achieve acquisition in Phase 1.

It can be seen in Figure 1 that Jane's response to intervention is characterized by a rising trendline in Phase 2, indicating that she achieved the acquisition criteria to label and look during the course of the intervention. It is likely that Jane required multiple sessions of intervention to learn the target behavior given her level of social delay.

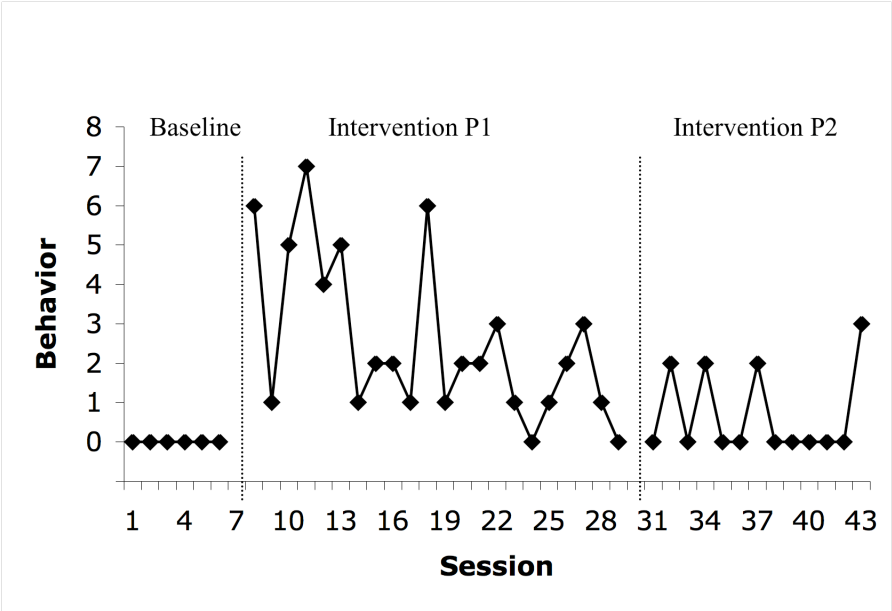
Figure 1. Jane's independent occurrence of target behavior (label and look).



Prompts required during intervention. Figure 2 describes the prompts offered by Jane's teachers over the course of the intervention. This figure presents the occurrences in which Jane required a verbal cue to respond to the question "what are you doing with the…?" as well as verbal and physical directives to "look at me." As can be seen, Jane did not receive prompting or teaching during the baseline. She required full teaching to complete the target response for four or more of the eight trials in the first six sessions, underscoring her need for targeted social intervention. In Phase 1, a decrease in the amount of teaching required indicates that Jane responded to intervention and was better able to demonstrate these coordinated behaviors independently over the course of

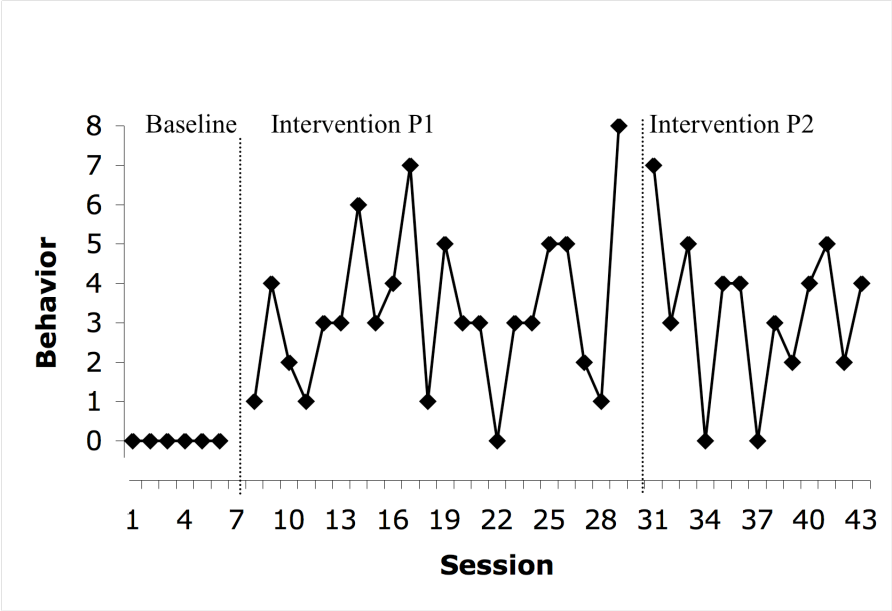
intervention. When Phase 1 was concluded (which was planned to be based on the acquisition criterion for the independent occurrence of the target behavior), it was the case that three or less trials required full teaching in the final four intervention sessions. Finally, in Phase 2, the teaching that Jane required for demonstrating the target behavior occurred for two or fewer of the eight trials, with the exception of an outlier where she requires full teaching in the final session of Phase 2. Jane's responses in Phase 2 indicate that she was able to more independently employ the target behavior when taught.

Figure 2. Jane's prompts required during intervention.



Independent labeling of action words. Figure 3 describes Jane's correctly stating the action word after being asked "what are you doing with the …?" without being provided a verbal cue for the target word. (Information regarding her co-occurring looking behavior is not included in this graph.) As can be seen, Jane did not demonstrate labeling of action words during baseline. The trendline for Jane's independent labeling remains stable across the intervention.

Figure 3. Jane's independent labeling of action words.



The stability of the trend line is likely due to the requirement that Jane state specific action words that encoded her play activity in Phase 2 (i.e., the targeted play activities), whereas specific words were not required in Phase 1. In Phase 1, Jane independently stated 14 different action words (see Table 1), four of which were words required in Phase 2 of intervention. In Phase 2, Jane used three new play-action words independently, which provides tentative support for the importance of individualized play activities for providing a context for learning words.

Table 1
Jane's Action Words

Phase 1 Word	Frequency	Phase 2 Word	Frequency
*putting on	1	putting together	0
speaking	1	rolling	1
drinking	1	making	2
seesawing	1	pushing	3
open	1	connecting	4
sleeping	2	putting in	7
going (down the slide)	2	sliding	9

spinning	3	sitting	16
climbing	3		
seesaw	4		
*sliding	4		
*rolling	5		
*sitting	6		
eating	6		
driving	11		
playing	15		

* Target words required in Phase 2

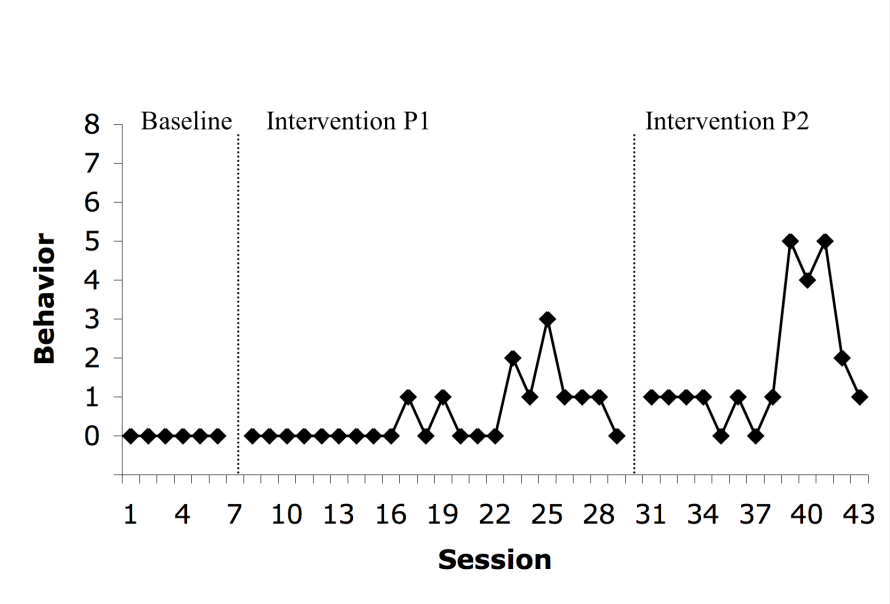
The results for Jane's independent labeling of action words suggest that Jane required a consistent amount of teaching and support throughout the intervention to label the action word. Jane's stability across trials is consistent with her observed language development, in which she used three word utterances and single word utterances spontaneously during naturalistic observation. Therefore, Jane was able to provide single words to describe her play action in Phase 1 and learn and acquire the meaning for the single words taught to her in Phase 2.

Independent coordinated gaze. Figure 4 presents Jane's spontaneous looking behavior. The data presented in this figure describe the occurrences for which Jane responded with coordinated eye gaze independently after labeling her play action. (Information regarding the supports required, if any, for Jane to provide the target label is not included in this graph.) As can be seen, Jane did not demonstrate any independent eye gaze during baseline. During Phase 1, Jane participated in 9 teaching sessions before demonstrating eye contact independently, which indicates that she needed to be directly taught to coordinate her eye gaze. Jane began to coordinate her eye gaze during Phase 1.

During Phase 2, Jane began to independently coordinate her gaze indicating that she responded to the intervention and required direct teaching in order to coordinate her

gaze. It can be seen that Jane is better able to coordinate her eye gaze in Phase 2 after 25 intervention sessions, underscoring the amount of teaching required for Jane to learn to coordinate her eye gaze. Jane reached acquisition of independent eye gaze as indicated by her demonstration of this behavior during four or more learning trials across five sessions at the conclusion of the intervention.

Figure 4. Jane's independent coordinated gaze.



Joshua's Response to Intervention

The results below describe Joshua's ability to engage in the target behavior of commenting on the ongoing play activity (i.e., label) while coordinating his eye gaze (i.e., looking). In addition, the amounts of prompting required for this learning to occur also are presented. In Phase 1, Joshua was required to label while looking using any word(s) he chose (i.e., playing, rolling, etc). In Phase 2, he was required to label while looking using target words to describe specific play activities. Notably, in addition to a

diagnosis of PDD-NOS, Joshua has been diagnosed by a physician with Landau-Kleffner Syndrome, which is a receptive language disability.

In the results that included Johua's labeling of action words (i.e., independent occurrence of target behavior, teaching the target behavior, and labeling of action words), the data provided presents the frequency of the number of action words uttered in each session for both phases. Although specific target words that were not required in Phase 1 were required in Phase 2, the same behavior (i.e., stating an action word) was recorded across both phases, which is a requirement of single subject design, according to Tawney and Gast (1984).

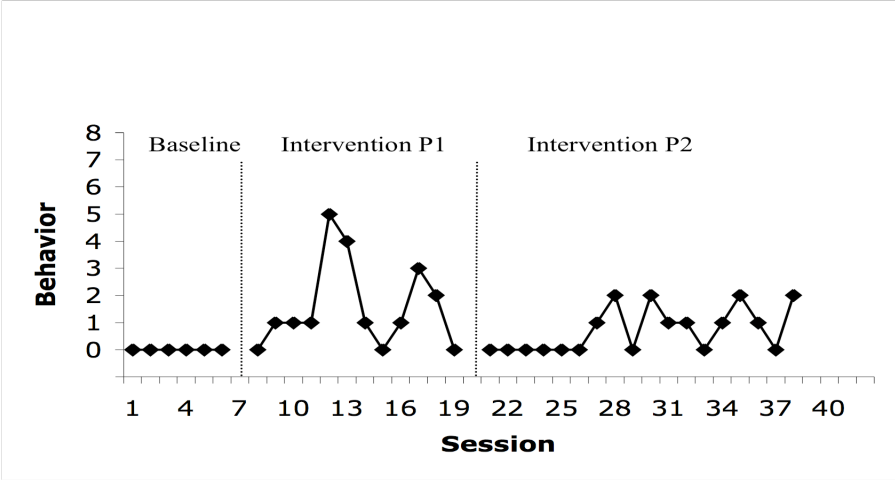
Joshua's independent demonstration of the target social behavior will be presented first, then the prompting required to support Joshua's learning will be presented, and finally his independent demonstration of separate components of the target behavior (i.e., labeling while looking) will be presented.

Independent occurrence of the target behavior. Figure 5 presents the occurrences in which Joshua demonstrated the target behavior (label the action word and look) in response to the question "what are you doing with the…?". For these occurrences, he required no verbal cueing and no verbal or physical directive to "look at (the teacher)." As can be seen, Joshua did not demonstrate this behavior at any time during baseline. During Phase 1, the trendline for Joshua's labeling and looking behavior increased, indicating that he required targeted intervention and began to learn this skill.

During Phase 2, the trendline stabilized. The stabilization of Joshua's response to intervention during Phase 2 is likely due to two features of the intervention at that time. First, Joshua demonstrated a high frequency and duration of interfering and noncompliant

behavior; at times he completed fewer than five of eight teaching trials in the session. Second, specific language was required in Phase 2 of intervention. Given Joshua's diagnosis of Landau-Kleffner Syndrome, in which he has a difficult time processing oral language, he had difficulty learning these words. In Phase 1 of intervention, Joshua frequently stated "playing" (46 times total) and, thus, the language did not interfere with his learning during Phase 1 of intervention; however, during Phase 2 Joshua was required to state the more specific target words, which appeared to interfere with his ability to respond to intervention. Although there were many demonstrations of two or more independent occurrences of the target behavior across sessions, Joshua did not reach the acquisition criterion.

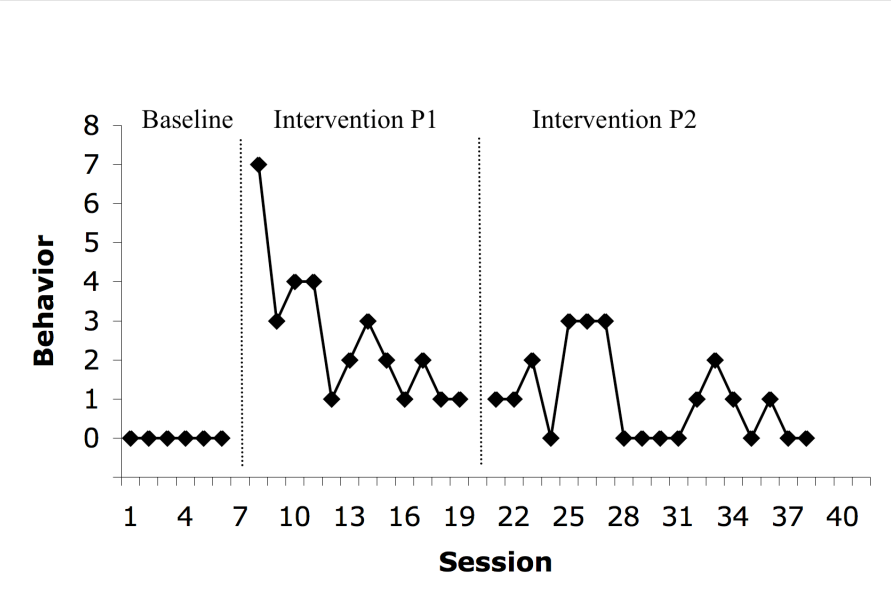
Figure 5. Joshua's independent occurrence of target behavior (label and look.)



Prompts required during intervention. Figure 6 presents the prompting required for Joshua to demonstrate the target behavior over the course of the intervention. This graph describes the occurrences in which Joshua required a verbal cue to respond to the question "what are you doing with the…?" as well as verbal and physical directives to "look at (the teacher)." As can be seen, teachers did not offer prompts for verbalizing

and looking during baseline. During Phase 1, the trend line decreased from seven trials requiring full teaching in the first session to two or fewer trials requiring full teaching across four sessions, indicating that Joshua was able to demonstrate the behavior independently once prompted. Finally, in Phase 2, the number of trials per session that require teaching can be seen to continue to decrease, indicating that Joshua maintained the social behaviors he had acquired during Phase 1 despite language-based difficulties. Joshua reached concluded Phase 2 when he achieved the acquisition criterion for independent occurrence of the target behavior, which occurred simultaneously with him requiring full teaching for one or fewer trials across three sessions.

Figure 6. Joshua's prompts required during intervention.

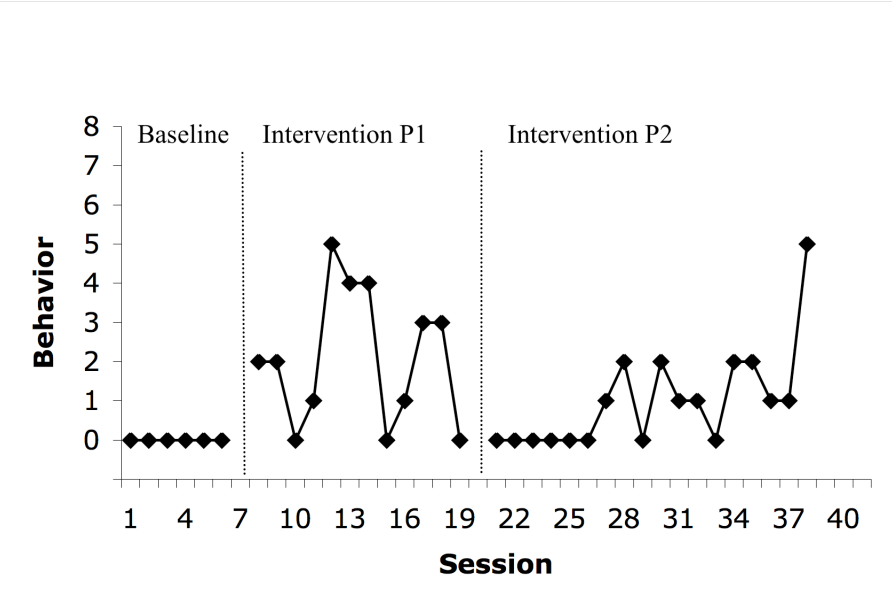


Independent labeling of action words. Figure 7 presents Joshua's correctly stating the action word after being asked "what are you doing with the …?" without being provided a verbal cue for the target word. (Information regarding his co-occurring

looking behavior is not included in this graph.) As can be seen, Joshua did not verbally label his play action during baseline.

During Phase 1, a stable trendline is evident, indicating that Joshua's ability to label his play action when asked "what are you doing with the…?" remained stable during Phase 1. During Phase 1, Joshua independently stated 8 action words (see Table 2), two of which were words required in Phase 2 of intervention.

Figure 7. Joshua's independent labeling of action words.



During Phase 2, no spontaneous verbalizations are seen during the first six sessions due to Joshua's difficulty learning the target words. It can be seen that Joshua began to independently state the target words during the final five sessions of intervention, underscoring both the extent of his language delay and his need for intervention in labeling his behavior. Similar to Jane, in Phase 2, Joshua used five new play-action words independently, which provides tentative support for the importance of individualized play activities for providing a context for learning words.

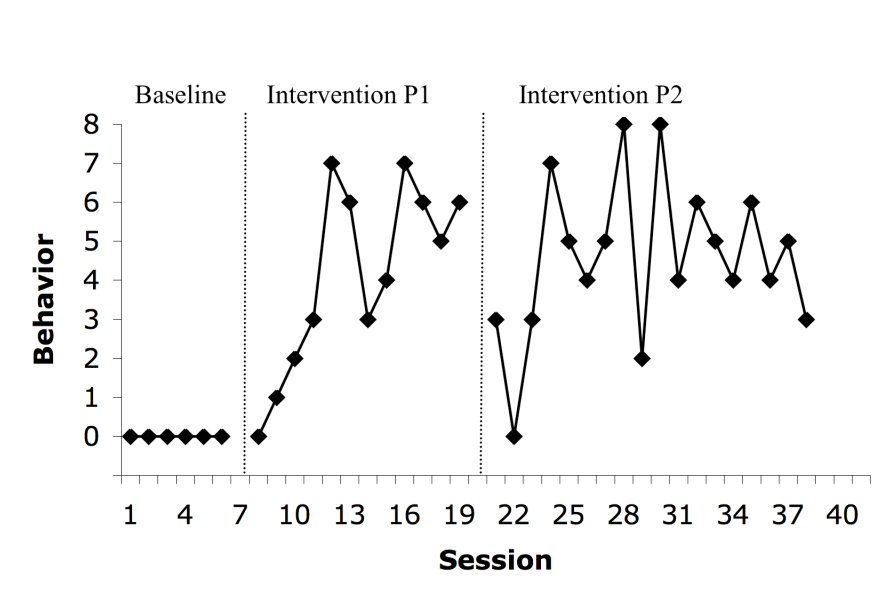
Table 2
Joshua's Action Words

Phase 1 Word	Frequency	Phase 2 Word	Frequency
jumping	1	connecting	1
climbing	1	sliding	2
flying	1	pushing	2
*sliding	1	making	3
*sitting	1	putting together	3
riding	1	putting in	4
driving	1	sitting	6
playing	27	rolling	7

* Target words required in Phase 2

Independent coordinated gaze. Figure 8 presents Joshua's independent looking behavior. The data points describe the occurrences for which Joshua offered coordinated eye contact spontaneously after labeling his play action. (Information regarding the supports required, if any, for Joshua to provide the target label is not included in this graph.) As can be seen, Joshua demonstrated no coordinated eye gaze while labeling an action word during baseline. In Phase 1, Joshua responded to intervention, highlighting his readiness to learn to coordinate his gaze and his need for targeted intervention. In Phase 2, Joshua's coordinated eye gaze stabilizes, indicating that he learned this behavior and was able to continue to demonstrate it despite interfering and noncompliant behavior. His response to intervention indicates that he was prepared to learn this behavior at the time of intervention.

Figure 8. Joshua's independent coordinated gaze.



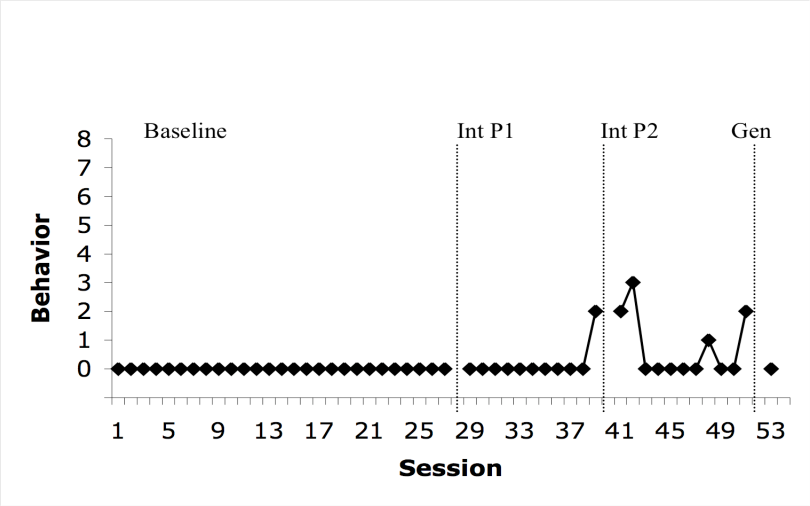
Tyler's Response to Intervention

The results below present Tyler's ability to engage in the target behavior of responding to initiations of joint attention as well as the amount of prompting he required to respond. His independent demonstration of the target social behavior will be presented first, then the total number of independent looks he demonstrated per session will be presented. The prompting required for Tyler to engage in coordinated responses to joint attention will be presented as the total number of looks that Tyler required to have guided by the teacher's hand first, then the total number of looks that Tyler had to be verbally prompted to demonstrate, and finally the number of times per session that Tyler required physical guidance to complete the entire sequence of looks in a single trial.

Independent occurrence of full target behavior. Figure 9 presents the number of times that Tyler spontaneously looked at the teacher's hands, then her eyes, then her hands during the intervention session. As can be seen, Tyler did not independently

demonstrate coordinated joint attention eye contact during baseline. During Phase 1, Tyler did not demonstrate the target behavior independently except twice in the final session of Phase 1, highlighting his need for intervention to coordinate his looking, or eye gaze, behavior with others. During Phase 2 and Generalization, Tyler continued to have difficulty independently demonstrating coordinated eye contact when asked to respond to an initiation of joint attention. However, the figures below describe the progress that Tyler was able to make toward demonstrating this target behavior.

Figure 9. Tyler's independent occurrence of target behavior (coordinated eye gaze).

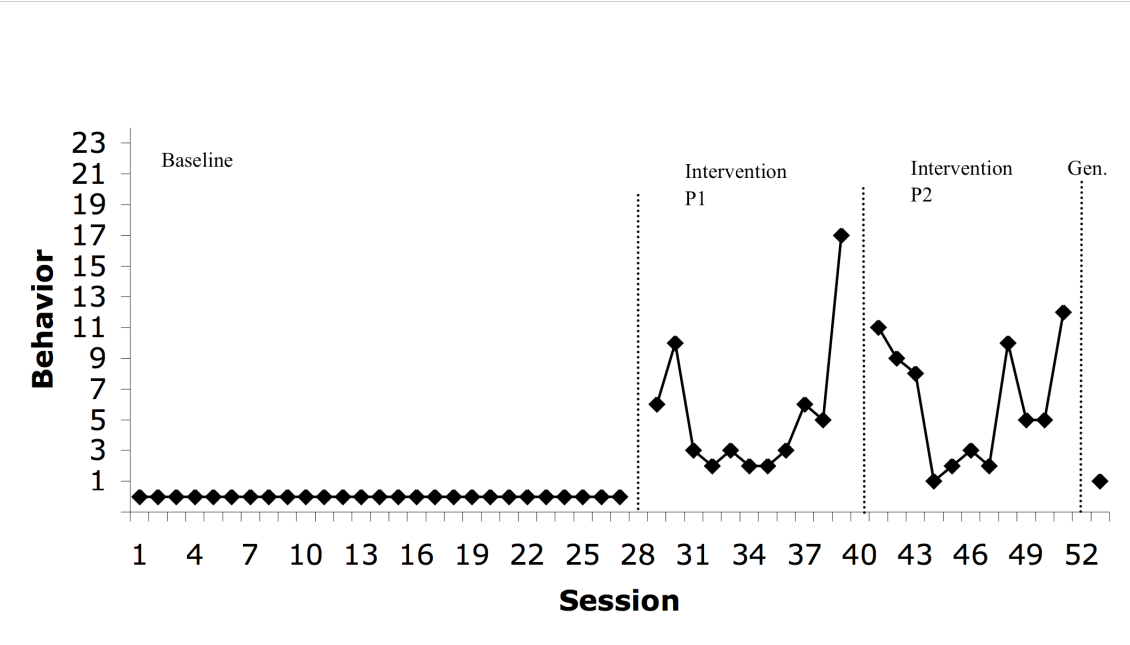


Total independent looks. Figure 10 presents the total number of independent looks during coordinated joint attention interactions across all 8 trials. Each trial includes a potential of 24 looks (3 looks per trial for 8 trials). The figure presents the number of times per session that Tyler looked at the teacher's hands or her eyes without being asked to or guided to as part of a response to joint attention sequence of eye gaze behavior.

As can be seen, Tyler demonstrated no independent looks as part of a coordinated response to joint attention sequence throughout baseline. During Phase 1, Tyler began to demonstrate independent looking behavior and the trendline is stable with the exception

of an outlier in the final session of Phase 1, indicating that Tyler required prompting to coordinate his eye gaze. Tyler's independent demonstration of the target behavior remained relatively stable during Phase 2 as well, indicating that he required extensive prompting in order to the achieve acquisition criteria of fewer than 6 guided looks in three of four sessions. Finally, he demonstrated difficulty generalizing the spontaneous response to joint attention behavior to another setting, suggesting that he would have benefited from additional time in intervention, had it been available to him.

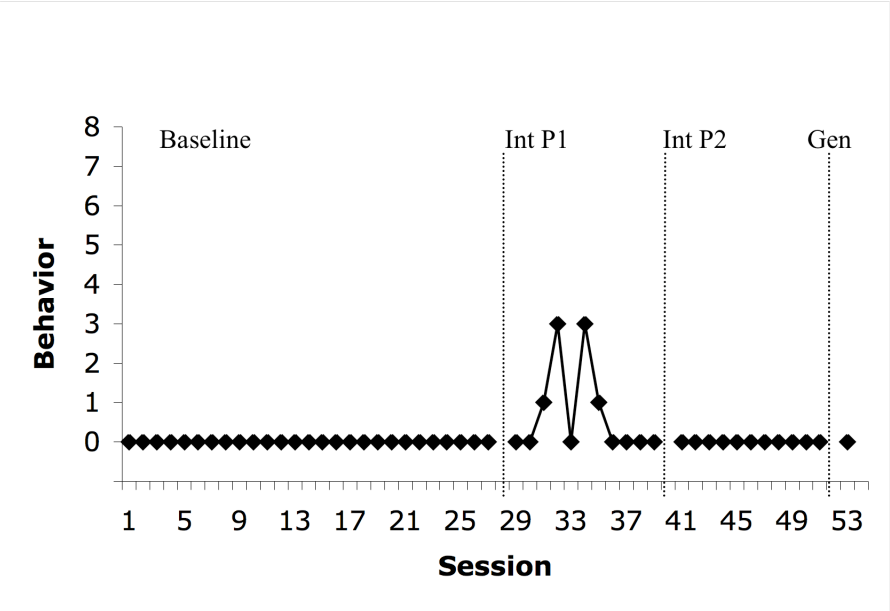
Figure 10. Joshua's total independent looks (shifts in eye gaze).



Prompting required for the full target behavior. Figure 11 presents the number of times per session that Tyler required physical guidance for all 3 looks in order to demonstrate the target response. For these occurrences, Tyler had to be guided to look at the teacher's hands, then guided to look at her eyes, and finally guided to look at her hands. As can be seen, Tyler was offered no prompts to coordinate eye gaze in response to joint attention during baseline. In Phase 1, Tyler required full teaching for zero to three

trials during the initial seven sessions of intervention, indicating that he required teaching to consistently coordinate his eye gaze. During Phase 2, Tyler did not require full teaching to demonstrate the target behavior, indicating that he was able to learn elements of coordinated eye gaze when explicitly taught. Additionally, Tyler maintained this behavior for the generalization probe, indicating that he retained this social behavior after being taught.

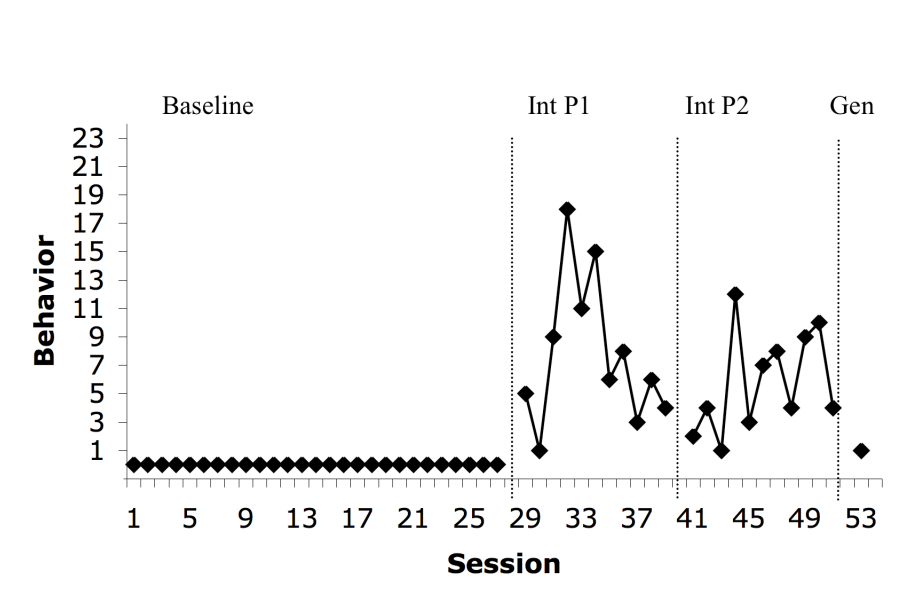
Figure 11. Tyler's prompting required for the full target behavior (coordinated eye gaze).



Total prompting for looking behavior. Figure 12 describes the total number of times per session that Tyler required that his gaze be physically prompted and directed to the teacher's hands or her eyes in order to demonstrate the target sequence of shifts in eye gaze. As can be seen, teachers did not guide Tyler's eye gaze during baseline. In Phase 1, Tyler's looking behavior is characterized by a decreasing trendline, indicating that he required fewer prompts and was able to learn to shift his eye gaze during intervention. Once Tyler achieved acquisition criteria for the independent occurrence of the target

behavior, he transitioned to Phase 2; he also required six or fewer guided looks per session across three sessions at this transition time. Tyler had difficulty maintaining this behavior during Phase 2 of intervention, which could be due in part to the efforts to prevent Tyler's echolalic behavior and provide him with cues to use contextual language during intervention in Phase 2. He required only one guide to demonstrate the appropriate look in the coordinated joint attention interaction in the Generalization Phase of intervention indicating that he was able to generalize his learned behavior to new settings.

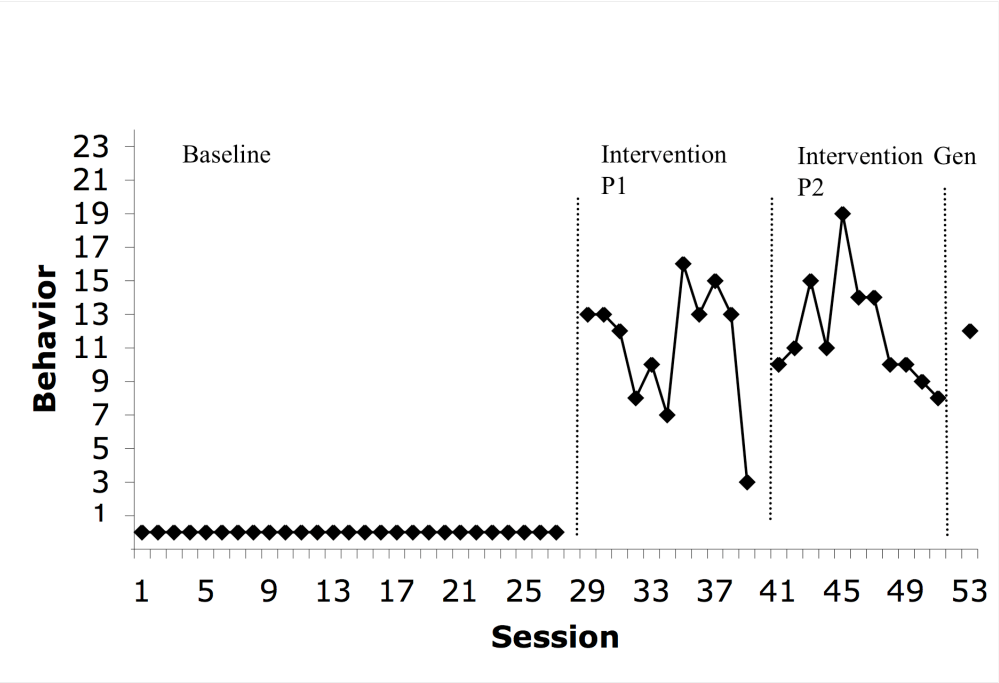
Figure 12. Tyler's total prompting for looking behavior (prompting for each shift).



Verbally cued target behavior. Figure 13 presents the total number of times that Tyler looked at either the teacher's hands or at her eyes when verbally directed to "look what I'm doing" or "look at my eyes." As can be seen, teachers provided no prompting or cueing during baseline. During Phase 1, Tyler demonstrated a stable trend line in which he required a verbal cue to look for 10 or more looks in each session, with the exception of the final session. The stability of this trend line suggests that Tyler required teaching to

shift his eye gaze during intervention. During Phase 2, the trend line decreases indicating that he began to shift his eye gaze more independently. At the same time he reached acquisition for the independent occurrence of the target behavior, he required ten or fewer verbal prompts to look over four sessions. Finally, Tyler demonstrated difficulty generalizing this behavior to a new setting, suggesting that he would have benefited from continued teaching had time been available.

Figure 13. Verbally cued target behavior (cues for each shift).



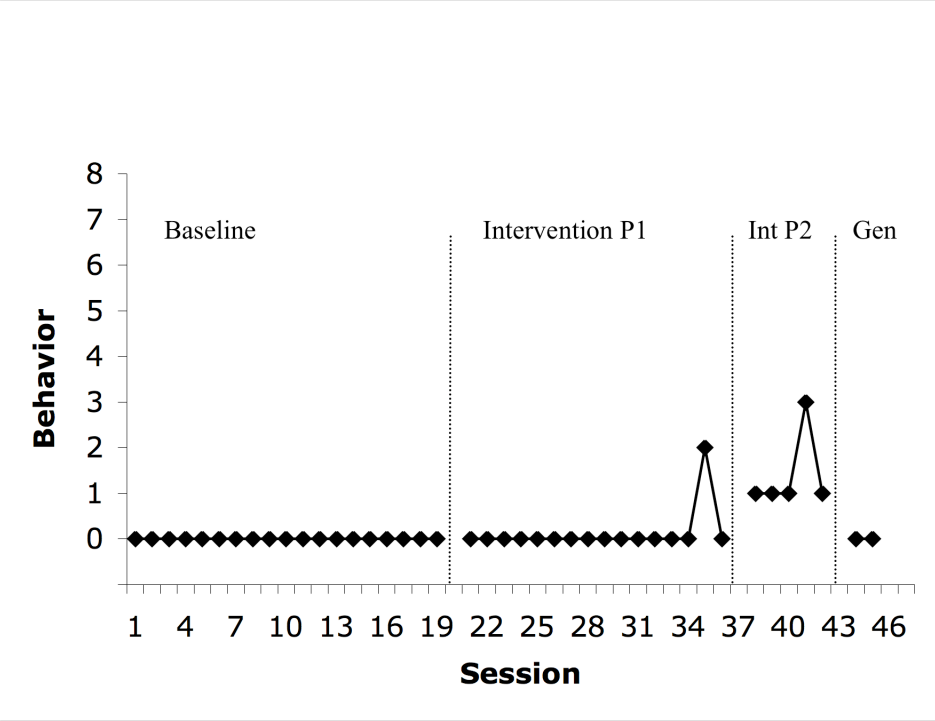
Lucas' Response to Intervention

The results below describe Lucas' ability to engage in the target behavior of responding to initiations of joint attention as well as the amount of prompting he required to respond. His independent demonstration of the target social behavior will be presented first, then the total number of independent looks he demonstrated per sessions will be presented. The teaching required for Lucas to engage in coordinated responses to joint

attention will be presented as the total number of looks that Lucas required to have guided by the teacher's hand first, then the total number of looks that Lucas had to be verbally prompted to demonstrate, and finally the number of times per session that Lucas required physical guidance to complete the entire sequence of looks in a single trial.

Independent occurrence of full target behavior. Figure 14 presents the number of times that Lucas spontaneously looked at the teacher's hands, then her eyes, then her hands during the intervention session. As can be seen, Lucas demonstrated no spontaneous coordinated gazes as part of a joint attention sequence during baseline. Additionally, in Phase 1, Lucas demonstrated this behavior in only one session, indicating that he required direct teaching in coordinating his eye gaze. In Phase 2, it is evident that Lucas began to independently demonstrate the target behavior of coordinating his gaze in joint attention interactions, suggesting that he benefited from the intervention and teaching offered. Because the intervention phases of the study were terminated before Lucas could achieve the acquisition criteria, he was unable to fully learn this behavior nor was he able to demonstrate the behavior completely spontaneously during generalization.

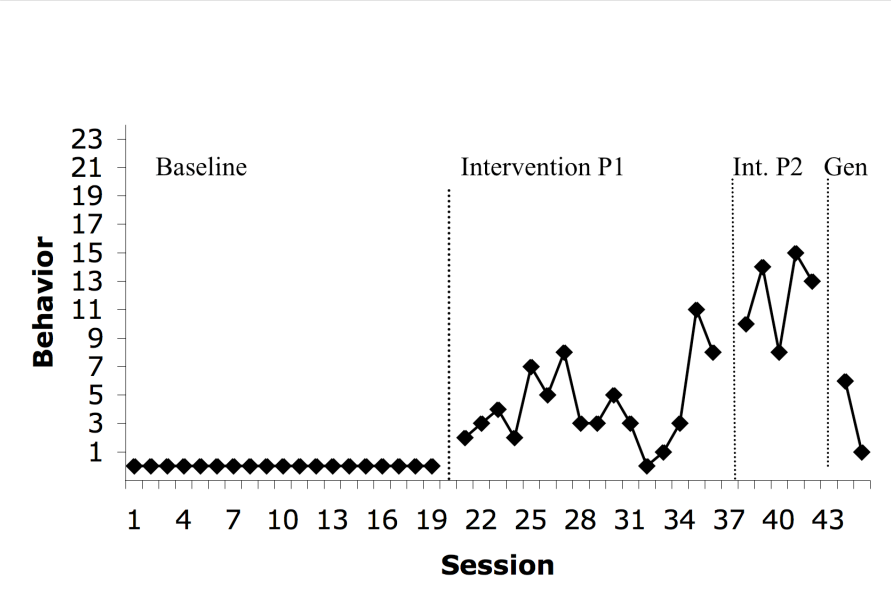
Figure 14. Lucas' independent occurrence of full target behavior (coordinated eye gaze).



Total independent looks. Figure 15 presents the total number of independent looks across all 8 trials that Lucas demonstrated. Each trial includes a potential of 24 looks (3 looks per trial for 8 trials). Figure 15 presents the number of times per session that Lucas looked at the teacher's hands or her eyes without being asked or guided to as part of a response to joint attention sequence of eye gazing behavior. As can be seen, Lucas demonstrated no spontaneous looks as part of a coordinated joint attention sequence during baseline. In Phase 1, Lucas demonstrated independent, coordinated looking behavior in each session, indicating that he responded to the teaching offered and demonstrated the target behavior. In Phase 2 of intervention, it can be seen that Lucas began to demonstrate increased frequency of spontaneous looking behavior as part of a coordinated joint attention interaction, further underscoring his ability to learn this behavior during intervention. Finally, Lucas demonstrated difficulty generalizing

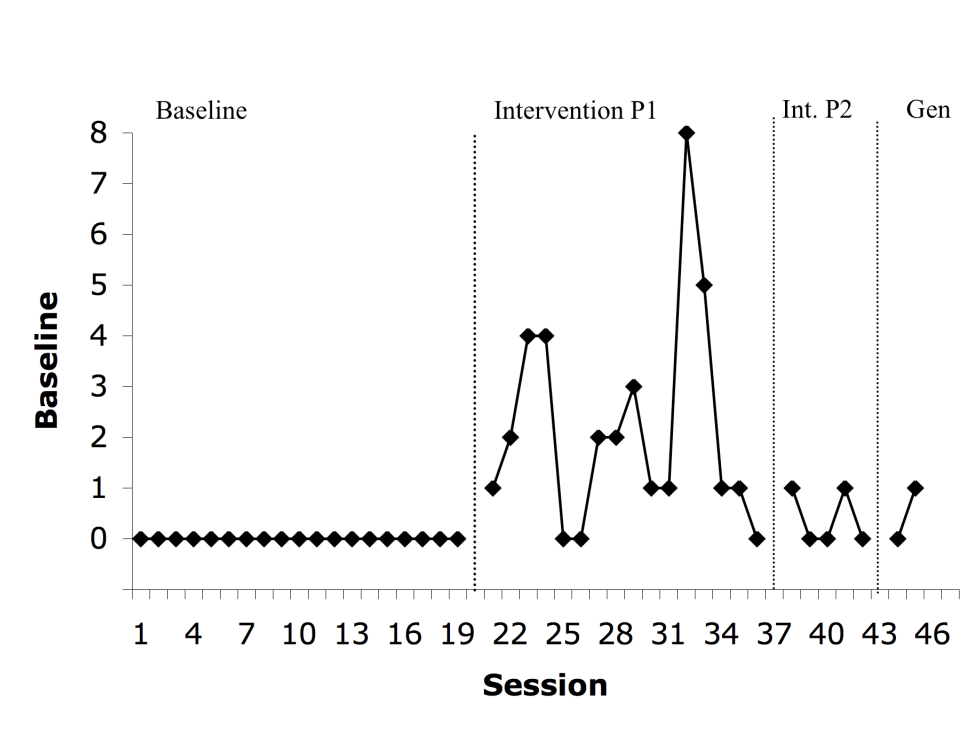
spontaneous looking behavior due to the time constraints that prevented him from more stably learning the behavior in Phase 2.

Figure 15. Lucas' total independent looks (shifts in eye gaze).



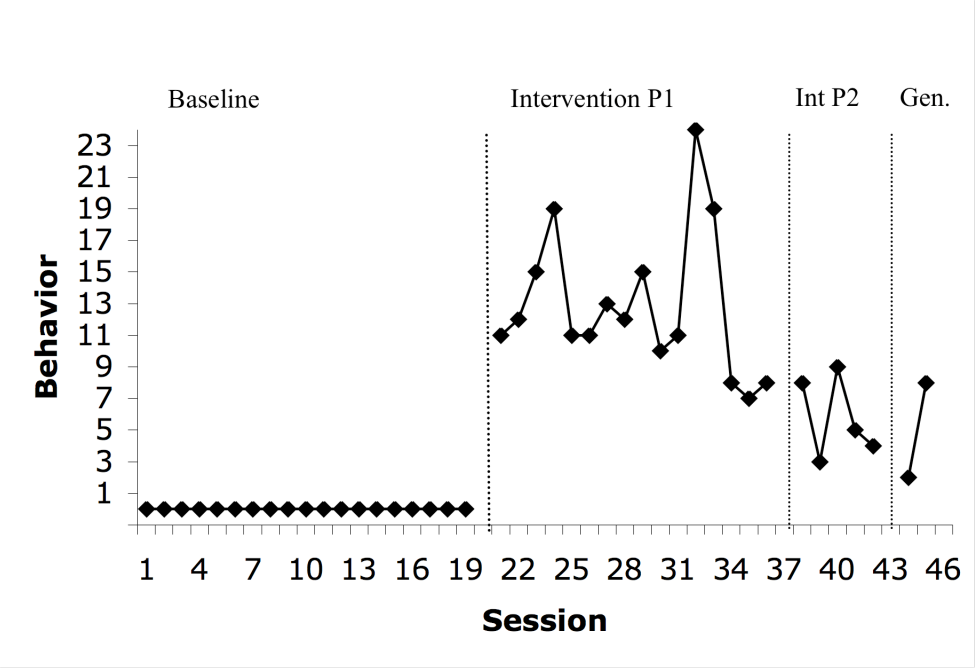
Prompting required for the full target behavior. Figure 16 presents the number of times per session that Lucas required physical guidance for all 3 looks in order to demonstrate the target response. For these occurrences, Lucas had to be guided to look at the teacher's hands, then guided to look at her eyes, and finally guided to look at her hands. As can be seen, the teachers did not guide Lucas' looking behavior during baseline. During Phase 1, Lucas required a high level of support, including for all eight trials in one session, to demonstrate coordinated joint attention eye gaze, indicating his level of need for targeted intervention. During Phase 2, however, Lucas clearly began to demonstrate this behavior and requires less teaching during the trials. Additionally, Lucas was able to maintain his learning at Generalization and required full support for one or fewer trials.

Figure 16. Lucas' prompting required for the full target behavior (coordinated eye gaze).



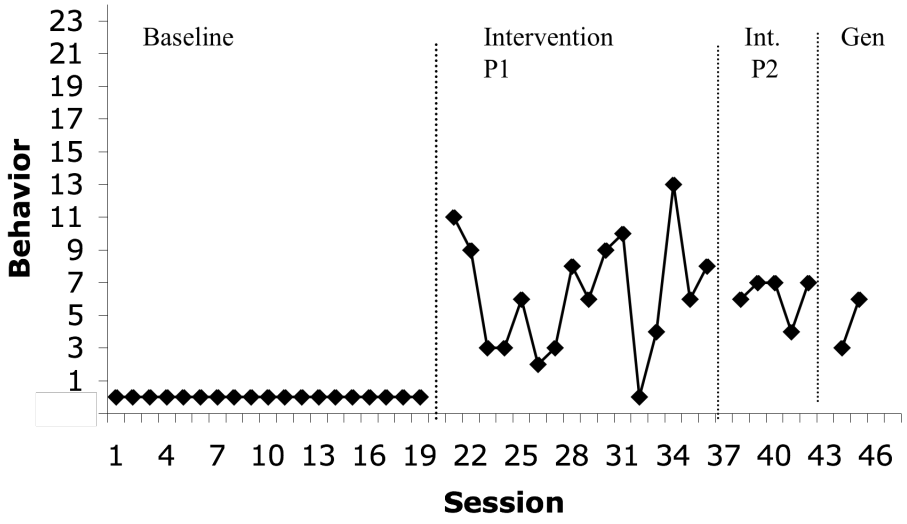
Total prompting for looking behavior. Figure 17 describes the number of times per session that Lucas required that his gaze be physically directed to the teacher's hands or her eyes in order to demonstrate the target sequence of shifts in eye gaze. As can be seen, the teachers did not provide guidance for any looking behavior during baseline. During Phase 1, Lucas required physical guidance to shift his eye gaze at different points during the coordinated joint attention sequence, underscoring his need for intervention. In Phase 2, Lucas required less physical guidance, and required physical guidance to look for ten or fewer looks in each session, indicating that he began to learn to shift his eye gaze when explicitly taught. Lucas demonstrated that he was able to shift his eye gaze with minimal physical support in the Generalization Phase of intervention, which suggests that he had begun to independently demonstrate this behavior and was able to maintain his learning across settings.

Figure 17. Total prompting for looking behavior (prompting for each shift).



Verbally cued target behavior. Figure 18 presents the total number of times that Lucas looked at either the teacher's hands or at her eyes when verbally directed to "look at what I'm doing" or "look at my eyes." As can be seen, teachers did not provide prompts or verbal cues to coordinate his looking behavior during baseline. In Phase 1, the trend line for the verbal prompts that Lucas required remained stable across the Phase, indicating that he consistently required teaching and verbal cues to coordinate his eye gaze. In Phase 2, however, Lucas required seven or fewer verbal cues to "look" across the five intervention sessions, indicating that he began to rapidly learn to coordinate his eye gaze during Phase 2. He maintained this acquisition criteria during generalization, which demonstrates that he was able to maintain his acquisition of this social behavior across settings.

Figure 18. Lucas' verbally cued target behavior (cues for each shift in eye gaze).



Implementation of the Multiple Baseline

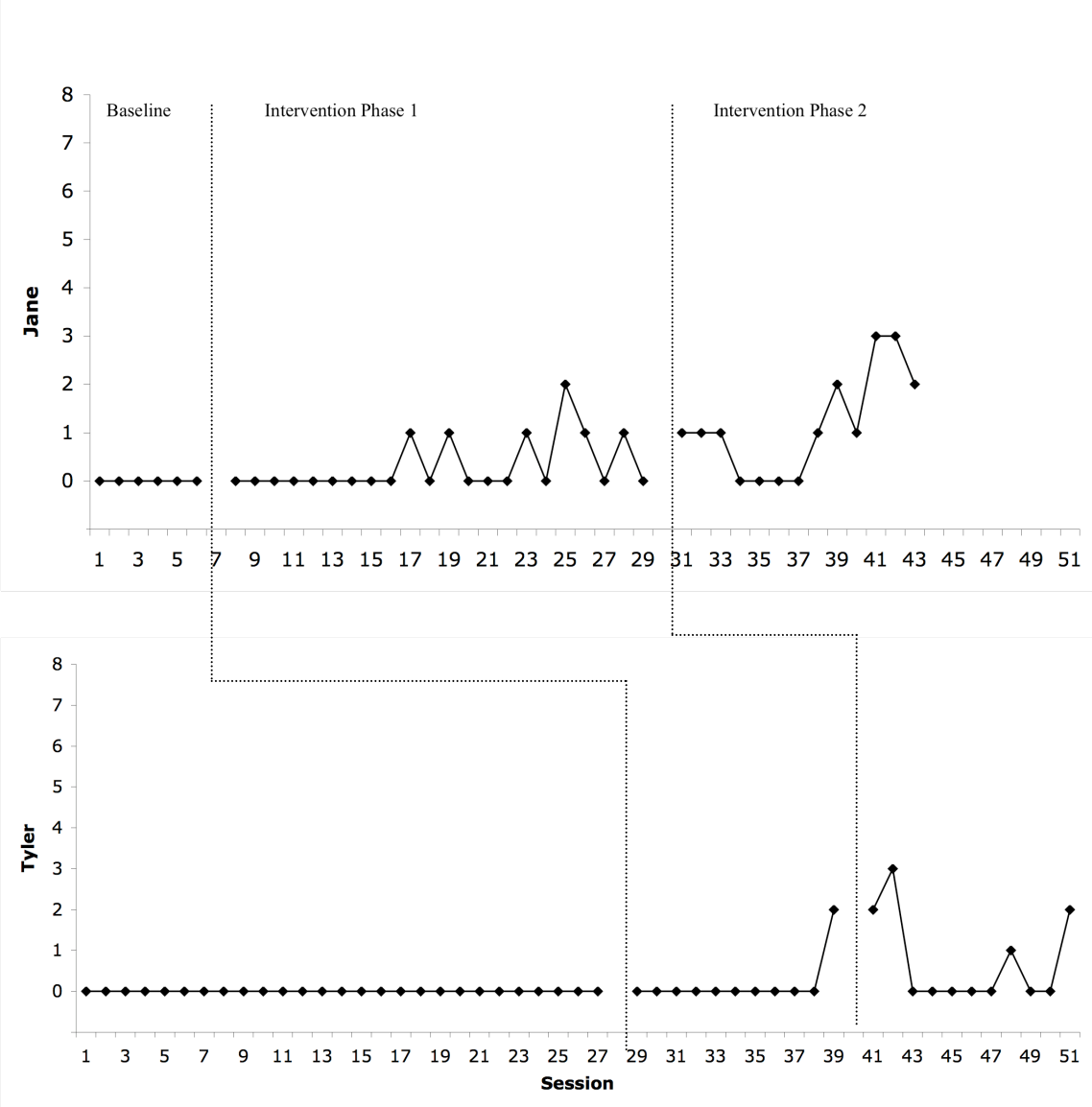
In addition to measurement of individual responses, each child's progress as a member of a two-child multiple baseline design was monitored. In this section, the results of the multiple baseline data will be reported for each of the two dyads: Jane and Tyler and Joshua and Lucas. Jane's and Tyler's findings will be reported first. The data will describe each dyad's demonstration of the target behavior as it occured in sequence as well as the prompting require for both children in each dyad.

Jane's and Tyler's Demonstration of Target Social Behavior

Figure 19 presents Jane's and Tyler's demonstration of the target social behavior across all intervention phases. The data included on this graph presents the results for the children's target social behaviors. For Jane, this graph describes her coordinated verbal and looking behavior in response to the question, "what are you doing with the (object in

your hand)?" For Tyler, this graph describes the occurrences in which he spontaneously looked to the teacher's hands, her face, and then her hand's without being verbally or physically directed to "look." As can be seen, change in the target social behaviors did not occur until the interventions were implemented. Moreover, change was observed between phases 1 and 2 for both children, However, an increasing trend line occurred at the end of Phase 1 for Tyler, indicating that it was too soon to transition for Phase 2.

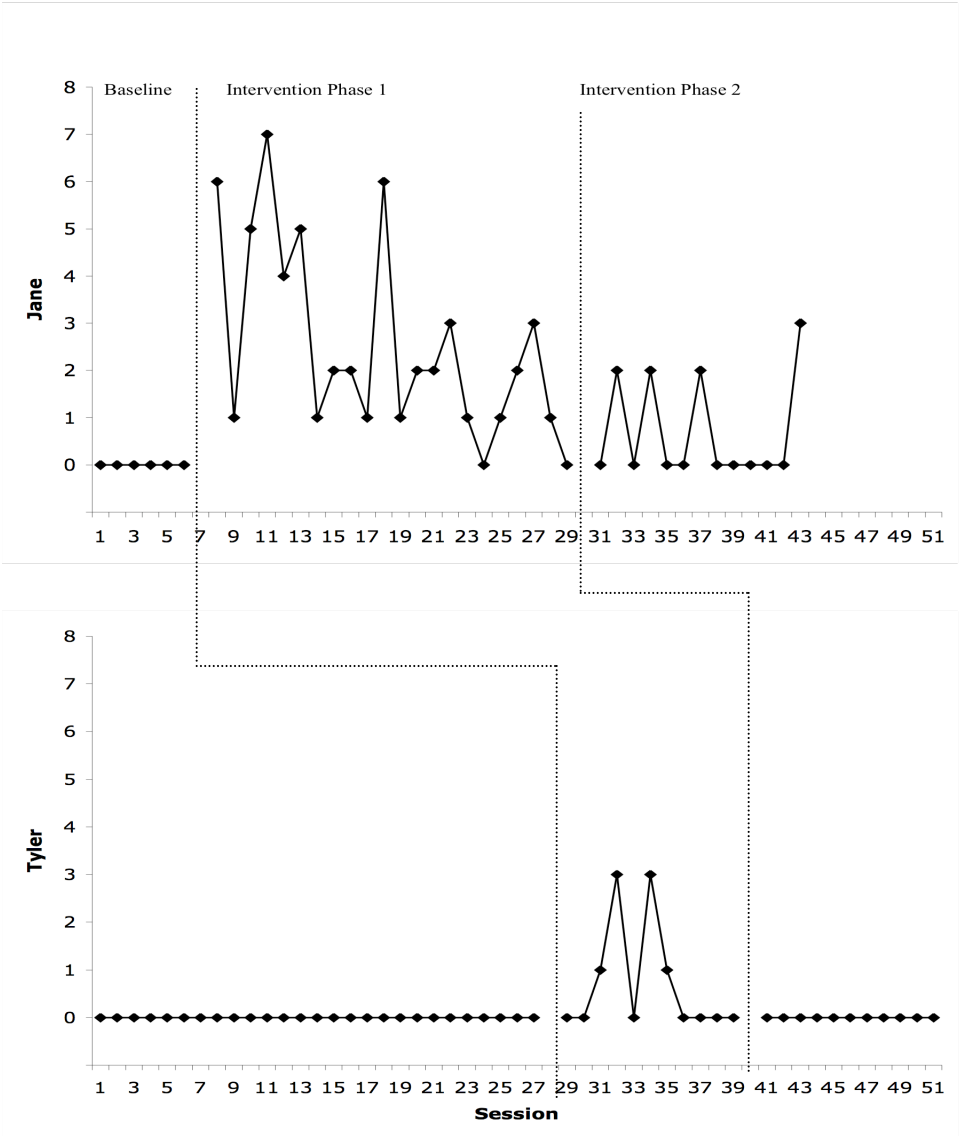
Figure 19. Jane and Tyler spontaneous demonstration of the target social behavior.



Jane's and Tyler's Prompting Required for the Target Social Behavior

Figure 20 presents the occurrences during intervention for which Jane and Tyler required full teaching and support to complete each step of the target social behavior. For Jane, then, this graph describes the trials in which she required verbal cueing to label her play action and physical guidance to coordinate her eye gaze. For Tyler, this graph describes the instances for which he required physical guidance for each of the three steps of his response: to look at the teacher's hands, to look at her eyes, and then to look at her hands. As can be seen in Figure 20, both Jane and Tyler required more teaching in phase 1 than in phase 2, indicating that during intervention they began to demonstrate components of the target social behavior spontaneously.

Figure 20. Jane and Tyler full prompting required (prompt each step of target behavior).

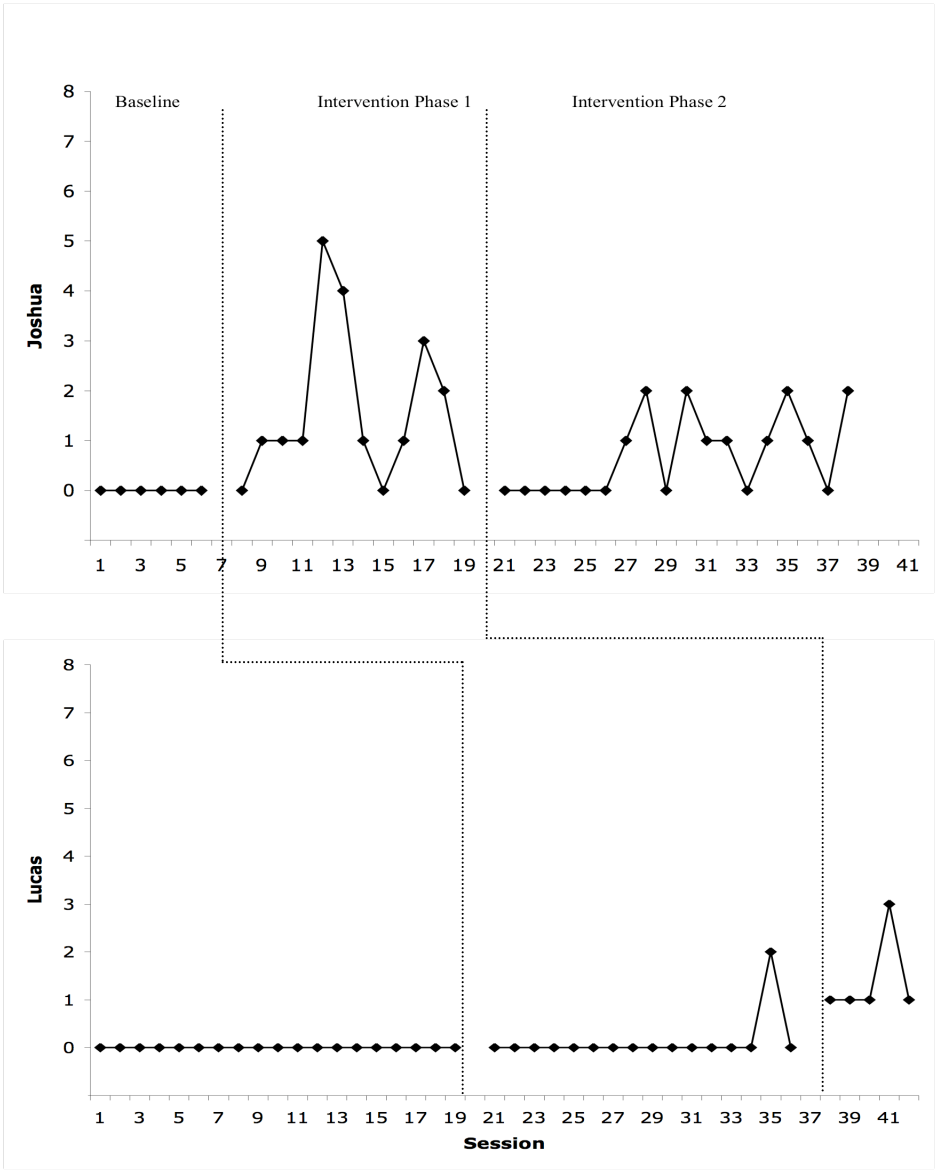


Joshua's and Lucas' Demonstration of Target Social Behavior

Figure 21 presents Joshua's and Lucas' demonstration of the target social behavior across all intervention phases. The data included on this graph presents the children's demonstration of the target social behaviors. For Joshua, this graph describes his coordinated verbal and looking behavior in response to the question, "what are you

doing with the (object in his hand)?" For Lucas, this graph describes the occurrences in which he spontaneously looked to the teacher's hands, her face, and then her hand's without being verbally or physically directed to "look. It can be seen in Figure 21 that Joshua's trend line remained stable across intervention, indicating that he demonstrated the target social behavior (i.e., label and look) consistently across both intervention phases. Lucas, however, spontaneously demonstrated the target social behavior (i.e., coordinated eye gaze) more frequently in phase 2 than in phase 1, indicating that either he had learned the behavior or that the play context might have provided a more effective context for coordinating his gaze.

Figure 21. Joshua's and Lucas' spontaneous demonstration of the target social behavior.

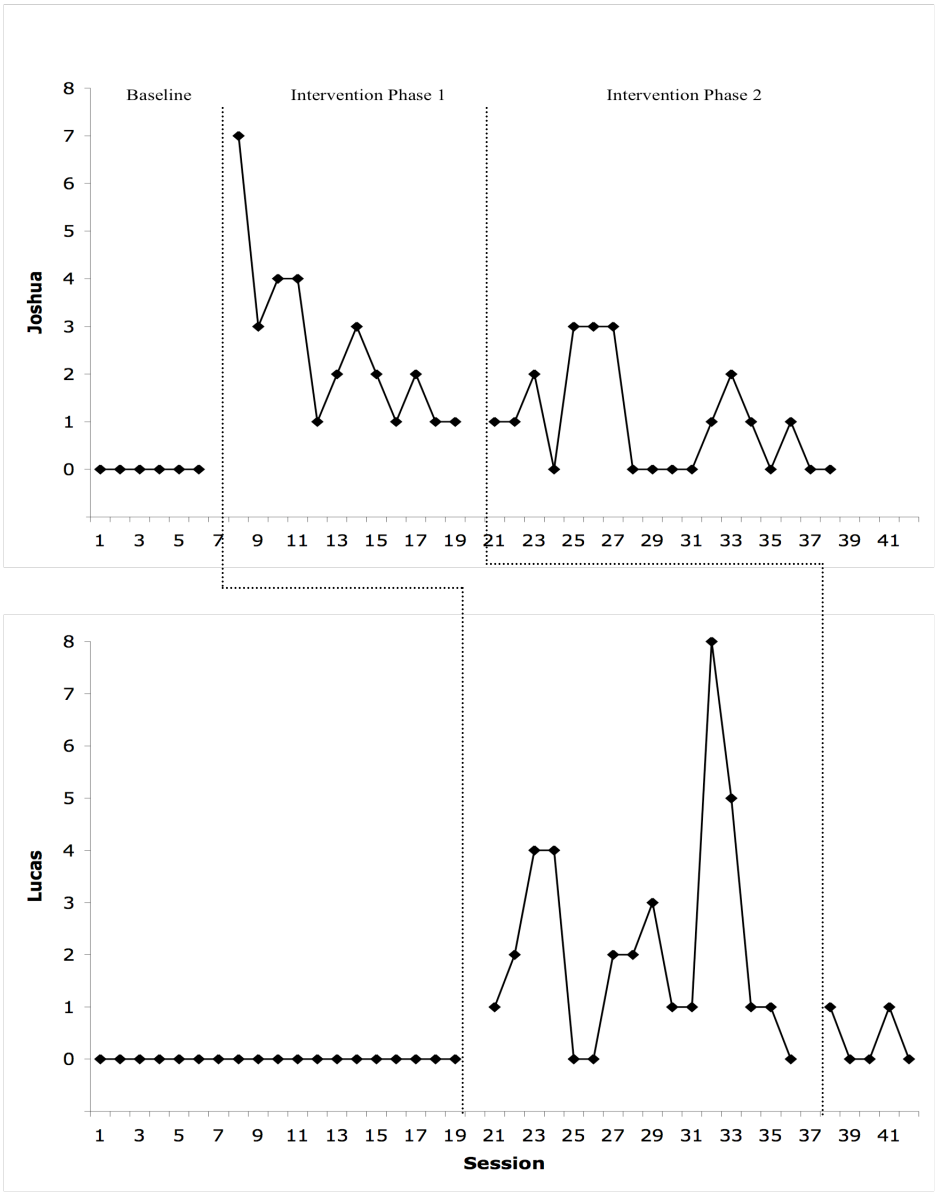


Joshua and Lucas Prompting Required for the Target Social Behavior

Figure 22 presents the occurrences during intervention for which Joshua and Lucas required full teaching and support to complete each step of the target social behavior. For Joshua, this graph describes the trials in which he required verbal cueing to label his play action and physical guidance to coordinate his eye gaze. For Lucas, this graph describes the instances for which he required physical guidance for each of the

three steps of his response to coordinate his eye gaze. As can be seen in Figure 22, both Joshua and Lucas required prompting for each step of the target social behavior for fewer trials per session in phase 2 than in phase 1. These data suggest that first, the children began to acquire social behaviors as a result of intervention, and second, that either Phase 2 was easier or that the children learned the behavior in Phase 1.

Figure 22. Joshua and Lucas full prompting required (prompt each step).



Summary of the Children's Responses to Intervention

The children's responses to intervention were examined for the frequency of occurrence of target social behaviors and frequency of occurrence of teaching (and prompting) required during intervention. It was hypothesized that the frequency of the individualized target social behaviors would increase, and that the frequency of teaching and prompting required would decrease, as a result of intervention that, first, targeted social behaviors in coordinated interaction, and, second, occurred in the context of individually determined play activities.

Occurrence of Target Social Behaviors

The data from Phases 1 and 2 were compared for each child in order to determine any differences that may have occurred based on inclusion of individually determined play activities. The frequency of occurrence of each child's target social behavior was examined to determine if there was an increase in frequency in Phase 2 compared to Phase 1. Both Jane and Joshua, whose social goals included labeling new play actions, in addition to performing new play actions, in Phase 2 used more different words spontaneously in Phase 2. These results provide tentative support for individualized play activities as providing an important context for learning new words.

Each of the four participating children did not demonstrate the targeted social behavior (i.e., labeling and looking for Jane and Joshua and responding to initiations of joint attention for Lucas and Tyler) during the beginning sessions of Phase 1. The children's response to intervention when examining the independent occurrence of the target behavior varied. Joshua demonstrated a response to intervention after 1 intervention session, whereas the other children demonstrated an independent occurrence

of the targeted social behavior after 9 to 14 sessions of intervention. With the exception of Joshua, the children demonstrated low frequencies, ranging from 0 to 2 times out of 8 trials, of targeted behavior in Phase 1. Joshua's response to intervention in Phase 1 included independently labeling his play activity while looking from 0 to 5 times per session, which most often (i.e., for 5 sessions of 12) occurred 1 time per session.

With the exception of Joshua, the children demonstrated increases in the frequency of independent occurrence of the targeted social behavior during Phase 2, in which individually determined play activities were used as the context for social intervention. Joshua demonstrated independent labeling and looking from 0 to 2 times per session in Phase 2. Jane and Tyler demonstrated frequencies between 0 and 2 (Jane) and 0 and 3 (Tyler) of independently demonstrating the targeted social behavior during intervention in Phase 2, which represented a slight increase in frequency from Phase 1.

Lucas, however, demonstrated a marked increase in frequency of independently responding to initiations of joint attention in Phase 2 as compared to Phase 1. In Phase 1, Lucas independently responded to initiations of joint attention twice in one session and never in any of the other 15 sessions. However, in Phase 2 of intervention, Lucas' frequency of response ranged from 1 to 4 times per session. The difference between Phase 1 and Phase 2 of intervention for Lucas represents the magnitude of greatest difference among all participating children.

Frequency of Teaching Target Social Behaviors

In addition to data regarding each child's independent demonstration of the target behavior, the frequency of teaching that each child required to demonstrate the target behavior was examined. The data regarding the frequency of teaching during intervention

were examined to determine if there was less teaching required during Phase 2 than was required during Phase 1 of intervention.

In Phase 1, the full teaching (i.e., prompting to complete each element of the target behavior) required ranged from 0 to 8 trials during each session. The greatest variability was for Lucas and Jane, whose required teaching was from 0 to 8 trials each session for Lucas and from 0 to 7 trials each session for Jane in Phase 1. Joshua required teaching from 1 to 7 trials each session in Phase 1 of intervention. Tyler had the least variability, requiring teaching for 0 to 3 trials during Phase 1 of intervention. The frequency of teaching required for Jane and Joshua decreased during Phase 1 of intervention.

In Phase 2 of intervention, Jane, Tyler, and Lucas required less teaching of the target social behavior than they had in Phase 1. The frequency of teaching required remained similar for Joshua as it had in Phase 1 and his trend line stabilized in Phase 2, whereas it was decreasing in Phase 1. Jane required teaching of both labeling and looking behavior for 0 to 3 trials in all Phase 2 sessions and most often (8 of 12 sessions) required no teaching to complete both elements (i.e., label and look) of the target social behavior. Across all Phase 2 sessions, Tyler had no trials in which he required teaching for every element of his targeted social behavior, responding to initiations of joint attention.

As with the independent occurrence of the targeted social behavior, the magnitude of difference in teaching required between Phase 1 and Phase 2 of intervention was the greatest for Lucas. In Phase 2 of intervention, Lucas required teaching for 0 to 1 trials in each session, as compared to requiring teaching to shift each of his eye gazes for up to all 8 trials in Phase 1 of intervention.

Constraints on Implementation of the Intervention

The participating children's needs and behavior influenced the administration of the intervention. For example, Joshua demonstrated interfering behaviors (such as crying, noncompliance, throwing toys, and out of seat behavior) during the final Phase 1 sessions and throughout the Phase 2 sessions. Additionally, the children's needs influenced their participation in the intervention. For example, Tyler had to be administered medication during the morning intervention time and occasionally had to leave early or could not participate if his group was scheduled to receive intervention in the morning session.

As the study progressed, the typically developing peers demonstrated difficulty remaining in the play sessions for the entire 15 minutes. Accordingly, the typical peers were offered the opportunity to remain playing at the table or to switch to another activity and be replaced by another peer at the table after approximately 7.5 minutes of the play session.

A final constraint of the intervention was the transitional changes to the classroom that were anticipated to occur shortly after the conclusion after the research project. One of the participating children was preparing to transition to a public school part-time. A second participating child was preparing to transition to another classroom in the same school due to his chronological age. As such, the children would no longer be available for participation in the intervention Phase of the research project. Phase 2 of the intervention was concluded within a few weeks to allow for the changes to these children's educational programming. This timeline foreclosed opportunities for the children to participate in generalization and maintenance sessions.

CHAPTER 5

Discussion

This chapter will provide a discussion of the research project. A discussion of the children's response to intervention, the participating children, and the identification of target social and play behaviors will be presented. Then, the strengths and challenges of field-based research will be discussed. Finally, the limitations of the present study and directions for future research will be discussed.

Children's Responses to Intervention

This study represents a field-based research study that linked assessment to intervention targeting social behaviors in children with ASD. The administration of intervention in the school setting allowed the children to remain in their natural environments but was challenged by scheduling constraints.

The social assessment used to link assessment to intervention was based on the analysis of each child's naturally occurring social behavior which allowed the investigator to both assess and target the participating children's specific social needs. This procedure is unlike many other research studies in which social targets are pre-determined by researchers, who then assess the children's need for intervention in the pre-selected social behaviors (Barry et al., 2003; Bauminger, 2002; Delano & Snell, 2006; Eikeseth et al., 2002; Lopata, et al., 2006; Lovaas, 1987; Mahoney & Perales, 2003).

For the present study, analysis of the children's naturally occurring behaviors was based on an understanding of child development as presented in the cognitive developmental empirical literature. By framing the analysis of the children's naturally

occurring behaviors within the cognitive developmental perspective, it was possible to generate hypotheses regarding the children's readiness to learn social behaviors. Additionally, the children's play behavior was analyzed from the same perspective, allowing for thoughtful integration of social and play activity.

Given the linkage between assessment and intervention, 3 of 4 children responded to intervention in the manner predicted. The participating children's frequency of demonstrating the target behavior independently increased across intervention and the frequency of teaching prompts required decreased across intervention.

Given the research design, it was possible to assess differences in the children's response to intervention in Phase 1 and Phase 2 of intervention. Joshua responded to intervention similarly in Phase 1 and Phase 2. Jane's and Tyler's demonstration of the target behavior slightly increased between Phases 1 and Phase 2 of intervention. As predicted, the frequency of teaching and prompting Jane and Tyler required decreased between Phase and Phase 2 of intervention.

Lucas' response to intervention was consistent with the research hypotheses. Additionally, the changes observed between Phase 1 and Phase 2 of intervention represent the greatest magnitude of difference among the participating children. Lucas' independent response to joint attention increased slightly in Phase 1 of intervention and then increased again in Phase 2 of intervention. Conversely, the amount of teaching required decreased slightly in Phase 1 of intervention and decreased again in Phase 2 of intervention. Analysis of Lucas' response to intervention data indicate that he both began to acquire the target social behavior and his rate of acquisition was more accelerated in Phase 2 than in Phase 1.

Jane's, Tyler's, and Lucas' responses to intervention confirm the research hypotheses. Additionally, Lucas' response to intervention suggests that the alterations made to the play environment during Phase 2 of intervention allowed for an accelerated rate of acquisition of the target social behavior.

The participating children in this research study were similar in age and diagnoses to children who often receive social intervention (Thiemann & Goldstein, 2004; Eikeseth et al., 2002; Delano & Snell, 2006; Barry et al., 2003). However, the participating children's cognitive and language abilities as assessed through standardized measures were more delayed and impaired than children whose response to social intervention is studied by researchers. Although researchers do not often conduct initial assessments on behaviors from other domains, the participating children had social delays similar to children who are studied for their response to social intervention.

Additionally, this research study represents an addition to the literature base because of the manner in which intervention targets were determined. Social targets for intervention are often pre-determined by researchers and may be verified through observation or interview; however, researchers rarely link social assessment to intervention.

Participating Children: Children with Autism and PDD

The target children were one girl and three boys, aged 5 years, 8 months, to 7 years. Each child had been diagnosed with an autism spectrum disorder by a physician; two children were diagnosed with Autism and two children were diagnosed with PPD-NOS. These children are similar in age and diagnosis to many children who have

participated in social interventions that have been examined for efficacy (Thiemann & Goldstein, 2004; Eikeseth et al. 2002; Delano & Snell, 2006; Barry et al., 2003).

This study represents one of the few research studies of a social intervention for children with ASD with delayed cognitive development, delayed language development, and delayed social development. The participating children's intelligence ranged from the Extremely Low to Low Average ranges as assessed by the Leiter-R (Roid & Miller, 2002), indicating that it would be difficult for the participating children to learn and acquire new knowledge independently. Researchers occasionally include children with cognitive delays similar to the participating children in this study; however, those studies include children with Above Average intelligence quotients as well (Thiemann & Goldstein, 2003). In fact, researchers often exclude children with impaired cognitive development from research studies examining the efficacy of social interventions for children with ASD (Barry et al., 2003; Bauminger, 2002; Eikeseth et al., 2002; Lovaas, 1987). Children with impaired cognitive development are excluded from participation because researchers report children with low intelligence quotients are less likely to benefit from behavioral treatment (Eikeseth et al, 2002) or because of uncertainty of diagnosis on the autism spectrum when cognitive impairment is present (Lovaas, 1987; Lopata et al., 2006).

The children's language composites, as evaluated with the PLS-4 (Zimmerman, Steiner, & Pond, 2002), ranged from age 6 months to 23 months. Lucas was nonverbal, Jane used three-word utterances for requests and single word utterances to comment, Joshua used mostly single- word utterances and also demonstrated four- and five-word

utterances spontaneously, and Tyler used single-word utterances spontaneously and demonstrated delayed echolalia.

Similarly to cognitive development, researchers either administer intervention to children with more advanced language development (i.e., use of simple sentences) or explicitly exclude children with significantly delayed language development in research studies examining children's response to social intervention (Bauminger, 2002; Barry et al, 2003; Thiemann & Goldstein, 2004; Delano & Snell, 2006). Children with significantly delayed language development are excluded from participation in research studies examining the efficacy of social intervention because the social interventions examined are language-based. These interventions teach social skills through verbally mediated strategies, including: Social Stories, written cueing, and teaching social scripts (Barry et al, 2003; Bauminger, 2002; Delano & Snell, 2006; Thiemann & Goldstein, 2004). Children with language development that is delayed similarly to the participating children are rarely included in studies examining the efficacy of social interventions (Lovaas, 1987).

For the present study, the children's social development was assessed to range from age 11 months to 36 months by the BDI-2 (Newborg, 2005). To assess children's social development, researchers administer rating scales (Barry et al, 2003; Bauminger, 2002; Lopata et al, 2006), individually administer standardized assessments (Thiemann & Goldstein, 2004; Eikeseth et al., 2002; Lovaas, 1987), and assess children's naturally occurring behavior (Bauminger, 2002; Mahoney & Perales, 2003; Lovaas, 1987). Often, individual, standardized social assessment is used to confirm diagnosis (Thiemann & Goldstein, 2004; Eikeseth et al, 2002; Lopata et al, 2006). In the present study, the

children's levels of social impairment as assessed by individually administered, standardized measures were evaluated as similar to social delays of other children with ASD who have received social intervention (Mahoney & Perales, 2003; Thiemann & Goldstein, 2004), but very different procedures were used to identify the target social behaviors.

Linking Assessment to Intervention: Identification of Target Social and Play Behaviors

Researchers often focus on social development and social skill development for children with ASD, given the high need of intervention in this area (Bauminger, 2002; Delano & Snell, 2006; Eikeseth et al., 2002; Mahoney & Perales, 2003; Thiemann & Goldstein, 2004). The strategies used to link intervention to assessment in the present study represent an addition to the literature base. Instead of determining intervention targets prior to recruiting children for participation in the study, the target social and play behaviors were determined based on naturalistic observations that were analyzed from the cognitive-developmental perspective. Further, assessment was linked to intervention because the selection of intervention targets was based on individualized assessment according to a developmental curriculum of social and play skills.

Identification of target behaviors based on naturalistic observation. In order to link assessment to intervention, the determination of the social targets for intervention was based on an analysis of episodes to social engagement identified in children's naturally occurring play behaviors with peers. This kind of analysis provided a different view of the children's social capacities than was revealed in their performance on the standardized tests of social development. These differences were most notable for Tyler, who was assessed to have the most advanced social development on the BDI-2 (36

months), yet spent the majority of his time (94.6%) engaged in solitary activity when observed in a natural small-group play setting. Analysis of naturally occurring behavior informed the selection of intervention targets, which were chosen based on social behaviors that the participating children were beginning to demonstrate independently.

Similar to the present study, DIR/Floortime ® interventionists observe children's naturally occurring behaviors to determine appropriate intervention targets. The strategies for linking observational assessment to intervention are not described in the literature on DIR/Floortime ® (Greenspan & Wieder, 2006; Wieder, 2003). Although there is emphasis on both development and individual differences in the DIR/Floortime ® intervention package, specific skills (i.e., attention, relating to others, two-way communication, problem-solving interactions, and creative and logical use of ideas) are targeted for all children. Interventionists using DIR/Floortime ® methods assess the children based on the preparedness to learn pre-determined skills, whereas the present study represents determination of social targets based on the children's naturally occurring social behavior.

Cognitive developmental theory. Research studies examining the efficacy of social intervention may be based on psychosocial theory, behavioral theory, cognitive-behavioral theory, or an integration of multiple theoretical perspectives (Barry et al., 2003; Bauminger, 2002; Delano & Snell, 2006; Eikeseth et al., 2002; Greenspan & Weider, 1997; Lopata et al., 2006; Lovaas, 1987; Mahoney & Perales, 2003; Theimann & Goldstein, 2004). Although these theoretical orientations may inform strategies to be used for intervention, they may be limited in determining the selection of intervention

targets that address children's individualized needs (Barry et al., 2003; Bauminger, 2002; Eikeseth et al., 2002; Lopata et al., 2006; Lovaas, 1987).

A strength of the present study was the use of the cognitive developmental perspective and information from empirical studies on cognitive development to inform selection of social and play targets for intervention (Flavell, 2000; Piaget, 1963; Parten, 1932). The cognitive developmental perspective informs a hierarchy of social behavior in which children develop from solitary to coordinated social interactions (Parten, 1932; Pierce-Jordan, 1999; Pierce-Jordan & Lifter, 2005). Additionally, the cognitive developmental perspective informs a developmental sequence of play behavior (Lifter, 2000). Because understanding of social and play behavior and development was based on the cognitive developmental perspective as presented in the empirical literature (Flavell, 2000; Parten, 1932; Piaget, 1962), it can be presumed that the social hierarchy and play sequence by which the children were assessed are schemes through which all children, including those with developmental delays, progress.

The systematic analyses of the participating children's naturally occurring social and play behavior were based on organizations of social and play development derived from cognitive developmental theory (Lifter, 2000; Pierce-Jordan & Lifter, 2005). The children's social behavior was examined to determine the level of each child's social development and generate hypotheses regarding what the child was ready to learn and what was too complex for the child to learn (Parten, 1932; Piaget, 1962). Similarly, the children's play behavior was examined from this same perspective to inform selection of play activities to would create a context for intervention that would not tax the child's cognitive capacities (Pierce-Jordan & Lifter, 2005).

Individualized assessment. In order to link assessment to intervention, it was necessary to analyze each child's behavior individually (Thomas & Grimes, 2002). Individual assessment of each child's naturally occurring social and play behaviors allowed for determination of intervention targets that addressed each child's individual behaviors and needs.

Interventionists often select targets for intervention based on: targets used by other researchers, a theoretical perspective, published curricula, and skills related to the diagnostic criteria for ASD (Bauminger, 2002; Goldstein et al, 1997; Gray & Garand, 1993; Lopata et al., 2006; Mahoney & Perales, 2003). Often, interventionists do not state from where the targets for intervention for the participating children are derived (Barry et al., 2003; Eikeseth et al., 2002; Lovaas, 1987).

Therefore, it is often the case that interventionists have selected intervention targets in consideration of the children's general needs (i.e., social intervention) but not based on the children's specific needs (Barry et al., 2003; Bauminger, 2002; Eikeseth et al., 2002; Lovaas, 1987; Thiemann & Goldstein, 2004). Researchers occasionally tailor curricula to children's developmental profiles (Mahoney & Perales, 2003) or verify the children's need for intervention in the pre-determined social behavior or social skill through observation and teacher interview (Delano & Snell, 2006). However, it is more often the case that researchers select intervention targets without linking the selection of targets to individualized assessment (Barry et al., 2003; Bauminger, 2002; Eikeseth et al., 2002; Lovaas, 1987; Thiemann & Goldstein, 2004). Because children with ASD have social delays and impairments, intervention that directly targets social impairment is necessary for this population of children (Bauminger, 2002; Barry et al., 2003; Delano &

Snell, 2006; Eikeseth et al., 2002; Lopata et al., 2006; Mahoney & Perales, 2003; Lovaas, 1987; Thiemann & Goldstein, 2004).

Strengths and Challenges of Field-Based Research

As field-based research, this intervention study represents an effort to bridge the research-practice gap (Chafouleas & Riley-Tillman, 2005; Horner et al, 2005; Lifter et al., 2002; Raab & Dunst, 2004; Tawney & Gast, 1984). Researchers have reported a dearth of intervention articles and decline of intervention studies in educational journals over the past decade (Bliss, Skinner, Hautau, & Carroll, 2008). This observed decline is likely due to many factors including: ease of implementation; ability to implement intervention as planned; and the uncertainty of intervention effectiveness (Bliss et al., 2008). In order to bridge this gap, it was necessary to develop a partnership between the researcher and teachers in which there was an ongoing flow of communication. By developing this partnership, it was possible to conduct this intervention study.

Field-based research that examines the effectiveness of social intervention represents an area of particular need in the literature, given practitioners' interest in administering interventions that have been studied empirically (Bliss et al., 2008). Given that social interaction is an area of challenge for children with ASD, intervention that addresses this area of challenge is likely to have practical value to practitioners (Chafouleas & Riley-Tillman, 2005; Horner et al, 2005; Tawney & Gast, 1984).

Strengths of school-based intervention. Conducting this intervention at a school allowed children to remain in their natural environment with familiar materials and persons (Kashinath, Woods, & Goldstein, 2006; Lifter, 2002; Mancil, Conroy, & Nakao, 2006; Raab & Dunst, 2004; Steege, Mace, Perry, & Longenecker, 2007; Woods &

Wetherby, 2003). The typically developing peers were familiar to the participating children; the relationships between the typically developing peers and the participating children had been established prior to the initiation of intervention. By providing intervention in the children's school setting, the participating children were familiar with the setting and the toys.

The teachers' employment at the field site demonstrated their commitment to providing intervention and educating children on the autism spectrum. The teachers administering the intervention had taught the participating children for over one year. Because of their familiarity with the children's social behaviors, the teachers were able to provide information regarding the appropriateness of the selected social targets. These teachers collaborated in building a partnership with the researcher.

Challenges of school-based intervention. Because of the field-based setting, accommodations to the research program had to be made for the children's educational needs and for scheduling. At the field site, the children's educational needs took priority over the intervention, as did the teacher's staffing needs (Ahern, Clark, & MacDonald, 2007; Kashinath, Woods, & Goldstein, 2006), which is appropriate. The children's educational needs were prioritized over the research intervention on days when staff's availability was different (due to school-wide staffing demands) or when there was a half-day of school. On these days, it was more difficult to conduct intervention sessions because the children's Individualized Education Plans (IEPs) dictated that they received specific education and intervention daily.

Additionally, because the intervention was conducted at a school, there were limitations and constrictions on scheduling (Ahern, Clark, & MacDonald, 2007;

Kashinath, Woods, & Goldstein, 2006). Both the number of sessions per week and the total number of sessions were limited in order to accommodate teachers' and children's availability. The teachers demonstrated remarkable dedication to the research and were reasonably flexible and accommodating with scheduling intervention sessions. Finally, changes to the teachers' and participating children's availability in the intervention classroom foreclosed opportunities for participation in continued intervention and generalization (Ahern, Clark, & MacDonald, 2007; Kashinath, Woods, & Goldstein, 2006).

Limitations

Limitations to the study include constraints placed by field-based research, imperfection of the implementation of the single subject design, and difficulties determining if altering the play activities impacted children's response to intervention.

Field-based research. At the field-site, the children's behavior and needs and the children and staff's availability influenced intervention implementation. Because the research study was completed in a specialized school, the children's educational needs took priority over this intervention. Due to the children's time spent in educational programming, intervention sessions could only be held three times per week. There were constraints on the availability of trained staff to offer intervention, particularly when there were other demands on their resources and time. Trained staff were unable to move among classrooms in a manner that would have supported additional Generalization probes. Finally, the children's and staff's ability to participate in longer-term intervention was influenced by transitional changes occurring at the field-site. Two children were

unable to continue to participate in the study after six months because they were transitioning classrooms.

Design implementation. The study is further limited due to three difficulties implementing single subject design. First, there were instances in which children were transitioned between phases at inappropriate times; this was true for two of the four participating children. Second, although all four participating children's target goals were social goals, the pairings of the children included children with different specific target social behaviors. Third, this study represents a sequential treatments design, which influences determining conclusions; the difficulties with the sequential treatments design will be discussed in the next section.

Because decisions were made in real time and based on complex data sets, children transitioned between phases at times that may have been counter-indicated for transition, as stated by Gay and Airasian (2003), Horner and colleagues (2005), and Tawney and Gast (1984). Horner and colleagues (2005) stated that the when implementing a single subject design, the dependent variable (i.e., response to intervention) should be observed in the baseline and intervention phases until a consistent response pattern has been established. The establishment of a consistent response pattern allows for prediction of future responding (Horner et al., 2005; Tawney & Gast, 1984). Therefore, transitions that occur when the response pattern is changing (i.e., rising) confound interpretation of the data, making it difficult to determine conclusions regarding the efficacy of the intervention.

In the present study, Tyler transitioned between Phases 1 and 2 of intervention when there was a rising trendline in his independent occurrence of the target behavior and

in his total independent looks. Jane and Lucas transitioned between Phases 1 and 2 of intervention when rising trendlines were present in the independent labeling of action words for Jane and in the total independent looks for Lucas. Alternatively, Jane and Joshua transitioned at appropriate times according to single subject design implementation (Gay & Airasian, 2003; Horner et al., 2005; Tawney & Gast, 1984).

Some children did not achieve acquisition criteria before the intervention was discontinued. Namely, Lucas did not achieve acquisition criteria to transition between Phases 1 and 2 of intervention and Tyler did not achieve acquisition criteria for the discontinuation of intervention. Notably, Lucas and Tyler were the participants who began intervention second and there was not adequate time available to complete the intervention as planned. Finally, although Jane achieved acquisition criteria for transition to Phase 2 and for discontinuation of the intervention, her discontinuation of intervention occurred a time when there was a rising trendline in the independent occurrence of the target behavior and a decreasing trendline in the teaching of the target behavior.

In addition to instances in which children transitioned between phases at times that may have been counter-indicated for transition, the requirement of making decisions in real time and based on constraints of the field site resulted in pairings of children who had different specific target goals from one another, although they were all social goals. Although it would have been ideal to pair Jane with Joshua and Steven with Lucas because the children in each pair would have had the same specific target behavior, that was not possible. In order to implement the intervention efficiently and in a timely manner, it was necessary to have the multiple-baselines be staggered based on intervention targets such that the teachers were first learning the intervention procedures

for one goal (i.e., labeling an action word and looking, as was the case for Jane and Joshua) and then learning the intervention procedures for another goal (i.e., responding to initiations of joint attention, as was the case for Tyler and Lucas).

Determination of conclusions. The final limitation of the presented research study includes the utility of the research design in making conclusions regarding the impact of the individually determined play activities. Although changes were observed between Phases 1 and 2 for Jane, Tyler, and Lucas, it cannot be said that these changes were based on the alteration in play alone. It could be that the changes between Phases 1 and 2 are a function of the number of sessions each child had participated in prior to Phase 2 (i.e., the children may have begun to learn the targeted social behaviors in Phase 1).

A more appropriate research design to isolate the impact of play on children's acquisition of the target social behaviors would include randomly assigning two children to receive intervention in the context of specified play activities during Phase 1 and then removing specified play activities in Phase 2 for these children. Although an alternating treatments design was considered for this study, it was determined that it would not be possible to accomplish given the structure of the intervention as it occurred at the field site. Specifically, the teachers providing intervention rotated through intervention groups and offered intervention when scheduling allowed them to be free. Therefore, should the teachers have been introduced to the specified play activities, their knowledge of these play activities may have influenced the phases in which specified play activities were not required. That is, teachers may have used the specified play activities during the Phase in which the specified play activities were not to be used had they been introduced to the activities.

Future Directions

Future research could address the refinement of intervention procedures for social interventions that aim to link assessment to intervention. Given the value of conducting field-based research and the need for additional intervention studies in the literature (Bliss et al., 2008; Chafouleas & Riley-Tillman, 2005), it would be beneficial for research to continue to be conducted in school settings. In order to avoid some of the constraints of this study, researchers seeking to conduct social intervention studies in the schools may look to develop long-term (rather than time-limited) partnerships with schools. Inclusion of the children's target social objectives for intervention in children's Individualized Education Plans may support the implementation of interventions in the school setting. The support of long-term partnerships and inclusion of intervention goals in IEPs may lessen constraints on intervention and also allow for adherence to the principles of single-subject design (Gay & Airasian, 2003; Horner et al., 2005; Tawney & Gast, 1984).

Finally, in order to determine the effectiveness of specified play activities (and/or other unique features of intervention), it will be important for researchers to coordinate and structure staffing such that it is possible for those implementing the intervention to remain blind to changes in the intervention between phases. It may be necessary to have interventionists administer only one phase of intervention to all children in order to accomplish this in a field-based setting.

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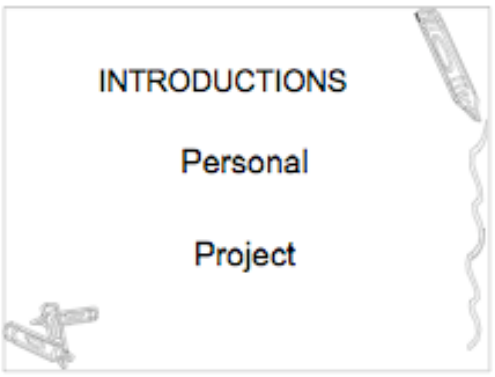
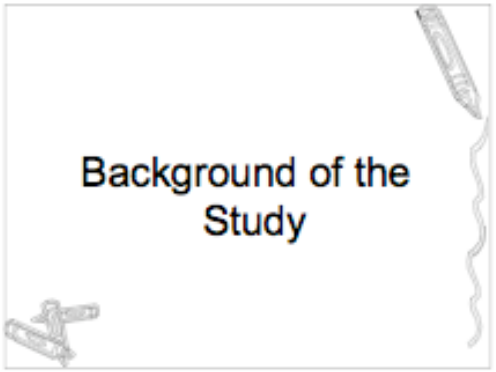
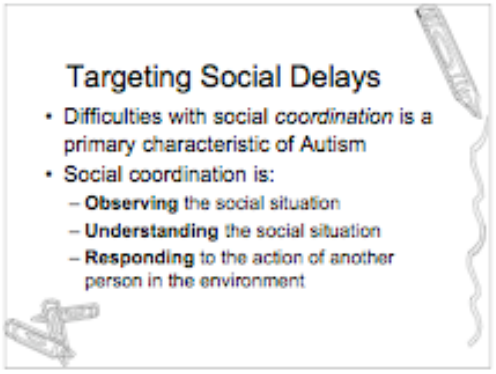
Appendix A

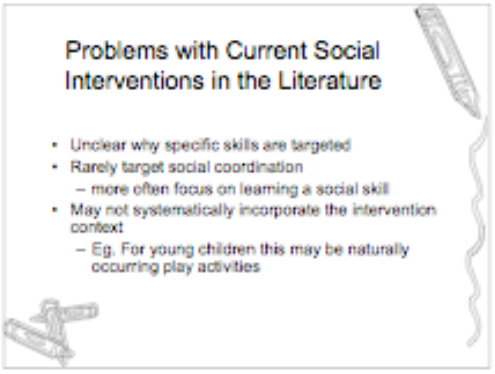
Teacher Training Materials

Teacher Handout: Introduction









Our Intervention

- Aims to address these problems with research by:
  - Focusing on social coordination
  - Attending to play activities

Hearing from You!

- The work you've done is really important
- We want to hear *what* you've done and *how* you've done it
  - This intervention aims to build upon what you're already doing

Interventions You Do

- What social activities have you targeted?
- What prompts do you use?
  - Have you used a prompting hierarchy?
- How have you you set-up intervention sessions?

Questions?

Next Time

- Review this week
- Continue to discuss intervention strategies used
- Introduce intervention set-up and strategies

Teacher Handout: Social Activity Categories

Solitary Behavior

- child sits, plays or engages self in some type of activity
- child gazes at the toys in front of him/her or away from the play area without looking at or interacting with others
- this is the only nonsocial activity

Examples:

- looking around room searching for something to do
- looking to door/bookshelf/corner of room for dress-up clothes

Onlooking Behavior

- child gazes at another person or at a person's actions
- the child is an observer, not a participant

Examples:

- watching a peer build a Lego tower
- watching a peer drop marbles down the chute

Uncoordinated Social Behavior

- child's verbal and nonverbal behaviors are socially-focused
  - eg: talking, sharing objects, eye contact, physical contact
- *but* the behavior is not coordinated with the verbal and nonverbal behaviors of others

Examples:

- requesting
- "look"

Coordinated Social Behavior

- child's verbal and nonverbal behaviors are socially-focused
  - eg: talking, sharing objects, making eye contact or physical contact
- the behavior is coordinated with the verbal and nonverbal behaviors of others
  - the child coordinates his or her focus of attention and timing of language or actions with the focus of attention and timing of language or action with others

Examples:

- requesting
- hiding toy from peer who is looking for it
- responding to a peer's command

Teacher Handout: Results of SocBS

Jane Social Behaviors
Most to Least Frequently Occurring

Frequency	**Behavior**	**Category**
14	watches peers play/looks at peer's toys	Onlooking
13	watches teacher/teacher and peer interaction	Onlooking
8	looks at teacher, makes *request* (will sometimes look back to teacher to follow up with request)	CS
5	*requesting* (dress up or Marissa's room) of teacher when teacher is not attending/understanding	US
3	looks at peer &/or encourages peer to continue physical contact when peer stops contact	CS
3	takes object extended to her by peer or teacher	CS
2	follows peer's command to "look"	CS
2	leans into person or encourages when person touches back/arm	CS
1	comments on play activity, looks at teacher	CS
1	looks at peer after completed interaction	CS
1	responds to peer's initiation ("Abby, do u want this?")	CS
1	orients to peer after peer initiates with physical touch	CS
1	eye contact after peer initiation	CS
1	pulls peer's hand to face	CS
1	verbalizes to peer	CS
1	hugging peer	CS
1	answers teacher's question	CS
1	tickles peer after teacher prompts to "tickle nicely"	CS
1	follows teacher's command	CS
1	answers teacher's question	US
1	touches peer's trunk aggressively after peer lets go of hug	US
1	put's person on couch after prompted to per person on chair	US (prompt)
1	watches as person comes across line of sight	Onlooking

Teacher Handout: Results of SocBS

Joshua Social Behaviors
Most to Least Frequently Occurring

Frequency	Behavior	Category
12	watches peer(s)	Onlooking
8	commenting on objects/events to people who are not there, or without securing attention	US
7	follows gestural/verbal prompt to engage with toys or to "look/watch"	CS (prompted)
6	follows peer	CS
6	orients to peer after initiation ("Jayson" or question) & attends to peer/responds	CS
5	joint attention to toy either visually or through action (looking at the same toy, packing up the bus together, driving the bus together)	CS
4	visually attends to toys while talking/listening during an interaction	US
3	comments on objects he's playing with, points, & looks to teacher	CS
3	re-orients to peer (looks @ peer) following a completed interaction	CS
3	responds to peers command	CS
3	reaches for/grabs peer's toys	US
3	imitates peer's verbalization/body movement	US
2	looks at teacher after tower falls to reference/see her reaction	CS
2	answers peer's questions	CS
2	answers factual question	CS (prompted)
2	takes toy offered to him	CS (prompted)
2	looks at teacher, verbalizes unintelligibly	US
2	orients to peer but does not answer question asked	US
2	answers factual question	US (prompted)
2	watches 2 people interact	Onlooking
2	watches teacher set up his toys	O (prompted)
1	asks teacher "why"	CS
1	makes verbalization to peer	CS
1	wrestles with peer for toys, says "let me have some," waits for peer to hand him one	CS
1	references (looks at) teacher after being loud	CS
1	requests help	CS
1	comments on/adds to play ("I want food" as Callie is packing car)	CS
1	looks back & forth between teacher and toys	CS

1	looks at toy, repeats peer, points	CS
1	looks at peer after he grabbed her toys, waits, she offers them, he smiles	CS
1	hides objects behind back when peer is looking for them	CS
1	says, “it’s what I waaant” after peer grabs toy back	CS
1	orients to object after teacher says “look,” asks “what?,” rpts teacher	CS
1	looks at teacher and smiles after teacher offers “nice job”	CS
1	sings along w/ song, smiles	CS (prompt)
1	follows teachers prompt to “sit”	CS (prompt)
1	says “hi” after SD	CS (prompt)
1	orients to teacher after she touches him	CS (prompt)
1	gives toys back to peer after teacher prompts	CS (prompt)
1	requests toys (‘can I have some?’) & waits for peer to give toys	CS (prompt)
1	makes face at teacher	US
1	laughs to self, looks around	US
1	tells teacher to “stop” w/o eye contact	US
1	grabs for toy as teacher puts it together	US
1	keeps playing w/ toy after peer indicates time to move to another play activity	US
1	rpts teacher (“I want something”) after teacher says “if u want something u have to ask”	US (prompt)
1	let’s go of toys when teacher directs him to share	US (prompt)
1	asks for toys using “Can I have?” & reaches before peer responds	US (prompt)
1	watches teacher set up toys	Onlooking

Teacher Handout: Results of SocBS

Lucas Social Behaviors
Most to Least Frequently Occurring

Frequency	**Behavior**	**Category**
24	watching peers on carpet area	Onlooking
20	watches peer (interactant) play/looks at peer	Onlooking
14	references teacher (Kelly)	Onlooking
9	watches teacher (Kelly)	Onlooking
1	smiles & bops, looks up	US
1	responds to physical sensation with verbalization & smile	US (prompted)

Teacher Handout: Results of SocBS

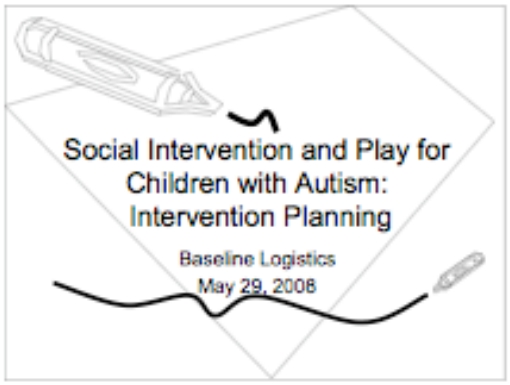
Tyler Social Behaviors
Most to Least Frequently Occurring

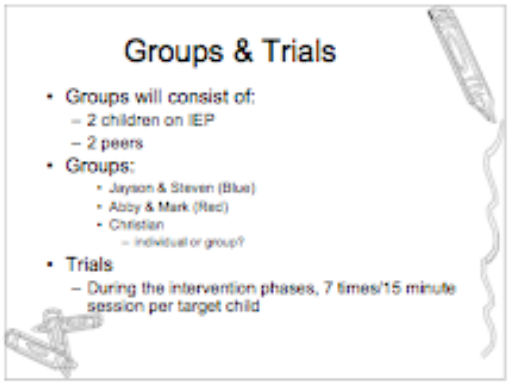
Frequency	**Behavior**	**Category**
4	looks at peer's toys after prompted to task	Onlooking (prompted)
2	watches person after person makes loud noise or while person is engaged in a gross motor action	Onlooking
2	looks at/tracks person who comes across his line of sight	onlooking
2	answering "wh" questions	US (prompted)
1	looks at peer while being loud	US
1	smiles when someone says "hi"	CS
1	orients in response to name	CS
1	answers "wh" question	CS (prompted)
1	responds to preference question (do you want a toy?)	US (prompted)
1	says "thank you"	US (prompted)

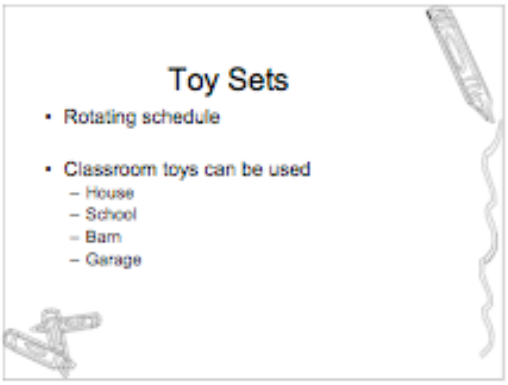
Teacher Handout: Proposed Social Goals by Child

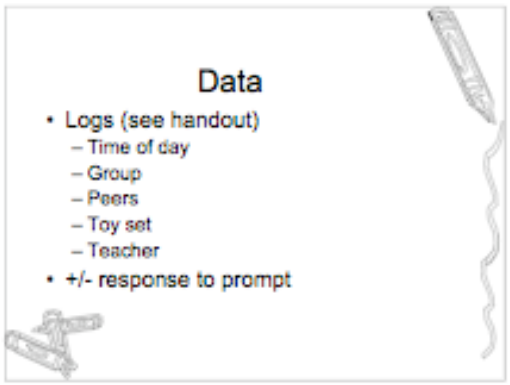
Child	**Goal**	**Operationalized**
Jane	commenting	Jane will label his play activity *then* look at the teacher
Joshua	commenting	Joshua will label his play activity *then* look at the teacher
Lucas	joint attention	Lucas will coordinate eye gaze in response to the statement, "look what I'm doing"
Tyler	joint attention	Tyler will coordinate eye gaze in response to the statement, "look what I'm doing"

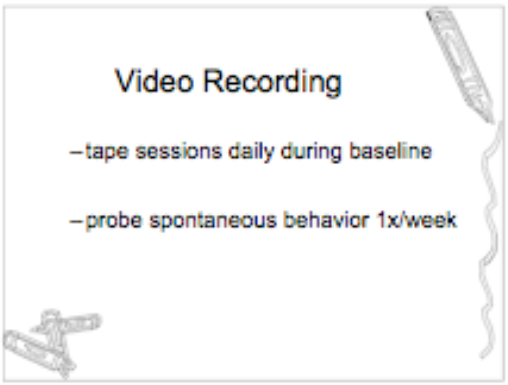
Teacher Handout: Intervention Planning



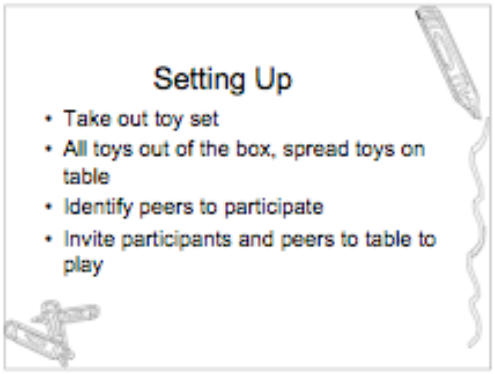




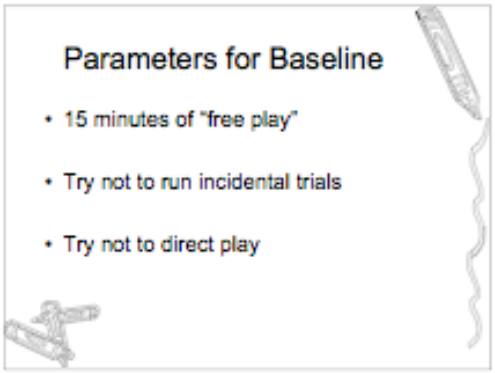


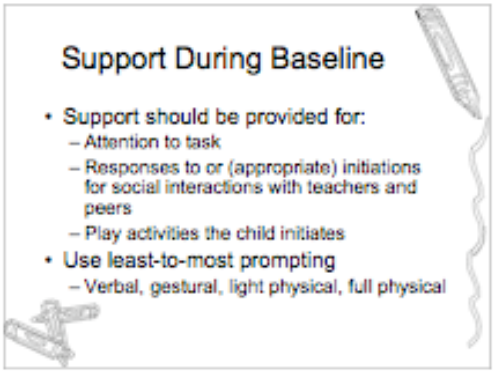



BASELINE SESSIONS


Setting Up
• Take out toy set
• All toys out of the box, spread toys on table
• Identify peers to participate
• Invite participants and peers to table to play


Mental Checklist
• Toy set
• Toys on table
• Participating children
• Peers
• (Goal sheet for target children in group)
– During baseline, will not have this


Parameters for Baseline
• 15 minutes of "free play"
• Try not to run incidental trials
• Try not to direct play


Support During Baseline
• Support should be provided for:
– Attention to task
– Responses to or (appropriate) initiations for social interactions with teachers and peers
– Play activities the child initiates
• Use least-to-most prompting
– Verbal, gestural, light physical, full physical

Teacher Handout: Intervention Planning 2

Setting Up

- Take out designated toy set
- All toys out of the box, spread out on table
- Invite children to play or have children come to classroom
- Invite 2-3 peers to play

Mental Checklist

- Designated toy set (rotation)
- Toys spread out on table
- 2-3 typically developing peers
- Goal sheet for target children in the group
    - during baseline, will not have this

Parameters for Baseline

- 15 minutes of "free play"
- try not to run incidental trials
- support attention to task
- support responses to or (appropriate) initiations for social interaction
- try not to direct play

Appendix B

Toy Set Descriptions

Train Toy Set

- 47 pieces of track
- 1 tunnel
- 1 bridge support
- 5 bridge pieces
- 3 short, round people figures without joints
- 3 figures dressed as construction men with joints
- 2 plastic train cars
- 8 magnetic wooden train pieces

Barn Toy Set

- 2 barns (1 wooden, 1 plastic)
- 1 windmill
- 1 tractor
- 1 trailer for tractor
- 1 truck
- 4 pieces of fence
- 6 cows (4 with bendable legs, 2 without bendable legs)
- 2 sheep
- 1 pig
- 7 horses (1 with bendable legs, 6 without)
- 1 bale of hay
- 4 figures (farmer, woman, child, construction figure; 2 with bendable joints, 2 without)

School Toy Set

- 1 see-saw
- 1 wooden table
- 1 blackboard (2 pieces- blackboard and stand)
- 1 piano
- 1 table
- 3 slides
- 2 red doors
- 4 chairs
- 5 figures (4 girls, 1 boy all with bendable joints)
- 1 wagon
- 2 tables
- 1 playground toy

Dollhouse Toy Set

- 2 dogs
- 1 wooden bed
- 4 wooden chairs (dining room)
- 1 wooden TV
- 3 plastic couches
- 1 vanity
- 1 toilet
- 2 sinks (1 wooden, 1 plastic)
- 1 entertainment system
- 2 plastic chairs
- 1 plastic piano
- 1 plastic table
- 1 crib
- 1 skateboard
- 1 plastic dresser
- 1 dog food and water dish
- 1 wooden lamp
- 1 slide
- 1 wooden sofa
- 1 wooden chair
- 28 figures (14 with bendable legs and arms, 14 without bendable legs and arms)

Appendix C

Sample STO

<table>
<tr><td colspan="2"><u>Student</u>: Jane</td><td colspan="2"><u>Target Skill:</u> label an action and look at another</td></tr>
<tr><td colspan="4"><u>IEP Objective</u>: Jane will say an action word and look at the speaker when asked “what are you doing with the…?”</td></tr>
<tr><td colspan="4"><u>Massachusetts Curriculum Frameworks Strand; Standard</u>: put the standard from the IEP</td></tr>
<tr><td colspan="2"><u>Required Materials</u>:
Program materials: toy sets (barn, house, train, school), peers
Student specific reinforcers: enthusiastic praise, tickle</td><td colspan="2"><u>Data Collection</u>:</td></tr>
<tr><td colspan="2"><u>Discriminative Stimulus S^D</u>:</td><td>+</td><td>Correct, independent</td></tr>
<tr><td colspan="2">1. “what are you doing with the _____?”
2. “look at me”</td><td>$+^p$</td><td>Correct, with prompt</td></tr>
<tr><td colspan="2"><u>Response Definitions</u>:</td><td>-</td><td>incorrect</td></tr>
<tr><td colspan="2" rowspan="2">1. Jane will respond to “what are you doing with the _____?” with a one action word answer (i.e., playing, rolling, building, etc.).
2. Jane look at the speaker.</td><td>S</td><td>Spontaneous (without S^D)</td></tr>
<tr><td>NR</td><td>No response w/in 5 seconds of S^D</td></tr>
<tr><td colspan="4"><u>Performance Criteria</u>:</td></tr>
<tr><td colspan="4">Correction procedure:
Labeling the action:
1. If Jane responds incorrectly or does not respond within 3 seconds of the S^D, provide least-to-most prompting and record as $+^p$
2. At conclusion, provide a neutral comment, such as “you’re playing”

Looking at the speaker:
1. If Jane does not respond to the SD “look at me” within 3 seconds, guide her to look at you and record as $+^p$
2. When Jane is looking at the speaker, provide a positive comment, such as “you’re playing!” with enthusiasm</td></tr>
<tr><td colspan="4"><u>Procedures</u>:</td></tr>
<tr><td colspan="4"><u>Training (T)</u>:
Labeling the Action:
1. Place Jane at a table with the designated toy set and peers
2. Present Jane with the first SD, “what are you doing with the _____?”
3. When Jane responds, provide a neutral comment (i.e., “you’re playing,” “you’re rolling,” etc. y
4. If Jane responds incorrectly, or is not responding, prompt from least-to-most.
Prompting Steps:
- provide initial phonetic cue (rolling→ “r”)
- continue to provide additional phonetic cues until Jane responds or you are saying the full word (rolling→ “r,” “ro,” “roll,” “rolling”)
5. When Jane responds, provide a neutral comment (‘you’re rolling’) and provide next SD (below)

Looking
1. Immediately following Jane’s independent or prompted response to the initial SD, provide her with the second SD “look at me”
2. When Jane responds, provide an enthusiastic comment (i.e., “you’re playing!,” “you’re rolling!”)
3. If Jane responds incorrectly or is not responding, provide guidance for her to look at you.
4. When Jane responds, provide an enthusiastic comment (i.e., “you’re playing!,” “you’re rolling!”)</td></tr>
<tr><td colspan="4"><u>Inter-observer Agreement (IOA)</u>: NU Research Assistants will assess IOA.</td></tr>
</table>

Appendix D

Data Coding Sheets

JANE/JOSHUA INTERVENTION- NU STUDY
PHASE 1

SD	RESPONSE DEF	TCHR:	SD	RESPONSE	TCHR	REWARD
Notice Jane/Joshua playing. Say: **"what are you doing with the** (object in child's hand)?"	"I'm _____" *or* 1 action word answer *Least-to-most prompt	**"you're_____"** *with neutral affect*	*if she does not or has not looked, say* **"Jane/Joshua look at me"** * Guide her to look at you	Looks at teacher	**"you're _____!"** *with positive affect*	Smile, hug, tickle

Goal: label an action + look

DATE: _____ (Trains)

DATE: _____ (School)

DATE: _____ (House)

DATE: _____ (Barn)

DATE: _____ (Trains)

DATE: _____ (School)

LUCAS/TYLER INTERVENTION- NU STUDY
Phase 1

STEP 1				STEP 2			STEP 3
TCHR	SD1	Response Def	TCHR	SD2	Response Def	TCHR	SD3
Plays with toys (Lucas/Tyler has toys within reach)	"**Lucas/Tyler, look what I'm doing**"	Lucas/Tyler looks at the toys in the teacher's hand * Guide if NR after 2 sec	**"I'm playing with the toys!"** (positive affect)	**"Lucas/Tyler, look at my eyes."**	Lucas/Tyler looks at teacher's eyes * Guide if NR x2 sec	**"You're looking at me"** (positive affect)	**"Lucas/Tyler, look what I'm doing"** **REPEAT STEP 1**

Date: _____ (School)

Date: _____ (House)

Date: _____ (Barn)

Date: _____ (Trains)

JANE/JOSHUA INTERVENTION- NU STUDY
PHASE 2

1. Prompt for play activity
   "Jane/Joshua, show me…" *then* repeat when child does it (+ affect!)

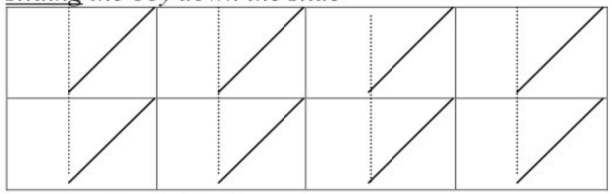
2. Inquire about activity
   "Jane/Joshua, what are you doing?" then repeat when child answers

3. Secure eye contact
   "Jane/Joshua, look at me" then repeat (+ affect!)

* least-to-most prompting used throughout if no response to verbal command/question

Date: _____ **SCHOOL**

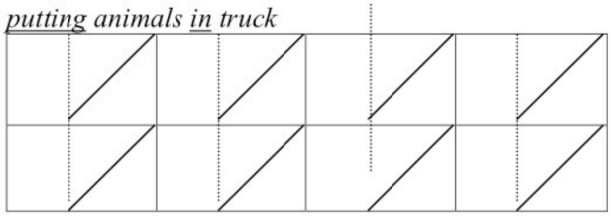
sliding the boy down the slide



pushing the girl in the cart

Date: _____ **BARN**

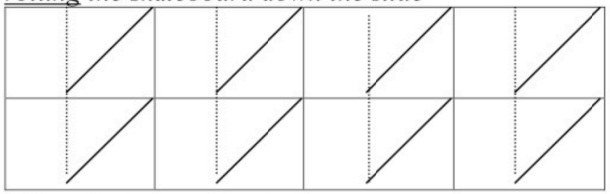
putting animals in truck



connecting trailer to tractor

Date: _____ **HOUSE**

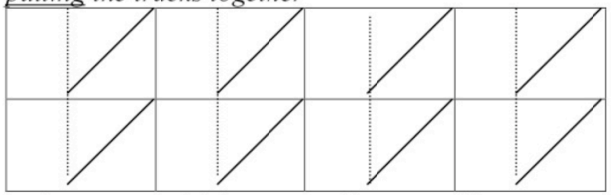
rolling the skateboard down the slide



sitting the boy on the chair

Date: _____ **TRAINS**

putting the tracks together



making a tunnel (places tunnel over track)

LUCAS/TYLER INTERVENTION- NU STUDY

Phase 2

STEP 1				STEP 2			STEP 3
TCHR	SD1	Response Def	TCHR	SD2	Response Def	TCHR	SD3
Plays with toys as described (Lucas/Tyler has toys within reach)	"**Lucas/Tyler, look what I'm doing**"	Lucas/Tyler looks at the toys in the teacher's hand * Guide if NR after 2 sec	**"I'm** *(say the play action you are doing)* **!"** (positive affect)	**"Lucas/Tyler, look at my eyes."**	Lucas/Tyler looks at teacher's eyes * Guide if NR x2 sec	**"You're looking at me"** (positive affect)	**"Lucas/Tyler, look what I'm doing"** **REPEAT STEP 1**

Date: _____ (School)

slide the boy (girl) down the slide

push the girl (boy) in the cart

Date: _____ (House)

roll the skateboard down the slide

sit the boy (girl) in the chair

Date: _____ (Barn)

put animals **in** the truck

connect the truck to the trailer

Date: _____ (Trains)

put the tracks **together**

make a tunnel