The Effects of Social Listener Reinforcement and Video Modeling on the Emergence of Social Verbal Operants in Preschoolers Diagnosed with Autism and Language Delays

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ABSTRACT

The Effects of Social Listener Reinforcement and Video Modeling on the Emergence of Social Verbal Operants in Preschoolers Diagnosed with Autism and Language Delays

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I conducted a study comparing the effects of a Social Listener Reinforcement protocol and a video modeling protocol on the number of social verbal operants emitted by preschoolers diagnosed with Autism Spectrum Disorder, and speech and language delays. The purpose of this study was to examine whether teaching the verbal operants directly would produce different outcomes than conditioning the reinforcers for social verbal exchanges. A combined experimental-control group design with two "nested" non-concurrent multiple probes across participants was used to provide two within-group single case designs simultaneously with the experimental-control group design. The dependent variables were the number of social verbal operants emitted during non-instructional sessions and the number of missed social verbal opportunities. The social verbal operants measured were vocal and non-vocal: (a) sequelics, (b) conversational units, and c) tacts. The independent variables were a Social Listener Reinforcement protocol and a video modeling protocol. Twelve participants, 5 females and 7 males, between the ages of 3-4 were selected to participate in the study. Participants were placed in matched pairs based on their verbal behavior repertoires and pre-experimental probe data. One participant from each pair was assigned to the Social Listener Reinforcement condition and one to the video modeling condition. Results are reported across both individuals and groups. Results showed that participants in both conditions increased the number of social verbal operants they emitted with peers in non-instructional settings. Participants in the Social Listener Reinforcement condition had greater gains in the total number of social verbal operants they

emitted and the number of conversational units and sequelics they initiated in non-instructional settings. However, participants in the video modeling condition emitted higher rates of social verbal operants prior to the intervention procedure than participants did in the Social Listener Reinforcement condition. Results are discussed in terms of differences in potential conditioned reinforcers that result from the two social learning procedures.

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All my love,

~ Katie

DEDICATION

This research is for all parents who dream of their child having a friend. It is inspired by my students, both past and present, who provide me with endless motivation to further my education.

"Friendship is unnecessary, like philosophy, like art... It has no survival value; rather it is one of those things which give value to survival."

- C.S. Lewis ~

Chapter I

INTRODUCTION AND REVIEW OF LITERATURE

Students with developmental disabilities can have social impairments, which can prevent them from engaging in normal social interactions (Nikopoulos & Keenan, 2006). A lack of social skills can lead to poor social relationships and rejection by peers, which can impact an individual's emotional well-being (Morgan & Jenson, 1988). Many researchers (Morgan & Jenson, 1988; Nikopoulos & Keenan; Scruggs, Mastropieri, & McDuffie, 2007) agree that teaching social skills is necessary to help students with developmental delays improve their academic performance and manage social relationships with their teachers and peers. Throughout literature the definition of "social skills" is varied, due in part to the diverse areas of discipline and theoretical orientations of researchers and clinicians in the field (Mastson & Ollendick, 1988; Matson & Wilkins, 2007). For the purposes of this paper, social skills are defined as verbal exchanges that allow an individual to come into contact with the social environment through verbal communication.

Regardless of professional discipline or theoretical orientation, the general consensus among researchers and educators alike is that social skills should be a primary goal in education and treatment for students with developmental disabilities (Torres, Cardelle-Elawar, Mena & Sanchez, 2003; Trianes & Fernandez-Figares, 2001). In recent years there has been a call for more empirical research investigating what makes social skills training successful (Golemen, 2006). In order for instructors to develop more effective social skill curriculums researchers must first identify measurable behaviors that foster successful social skills (Scruggs, et al., 2007). As research in the field of social skills develops it appears that two camps have emerged; one that believes social skills need to be directly taught and one that believes the development of

social skills should be fostered as an emergent behavior. In order to understand the differing philosophies behind social skill development one must first understand the different perspectives on language development.

REVIEW OF THE LITERATURE

Language Development

Before students can improve their social skills, they must develop a fluent language repertoire. Individuals have a fluent language repertoire when they can assume the roles of a speaker and listener in the social environment. There are many component skills that make up a fluent language repertoire and theorists from different fields have varying perspectives on how these subcomponents are developed. The importance of understanding, identifying, and teaching the different aspects of language had led to a wide range of studies and theories within the field of linguistics; all of which have a common primary focus on a structural analysis of language (Chomsky, 1959; Crystal, 2005; Hoh, 2005; McLeod, Doorn, & Reed, 2001; Paul, Looney, & Dahm, 1991; Pinker, 1999).

In 1995, Hart and Risley published a longitudinal study showing that children who begin school with a fluent vocabulary are more likely to succeed than their counterparts who lack such a repertoire. This influential book added support to the theory that early childhood is one of the most crucial times for language development (Benedict, 1977; Crystal, 2005; Fenson, Dale, Reznick, Bates, Thal & Pethick, 1994; Rheingold, Gewirtz & Ross, 1959). Researchers (Gleason, 1993; Horne & Lowe, 1996; Novak & Pelaez, 2004) have shown that children are able to vocally identify objects at around 18-months of age. Many linguists argue that children learn to discriminate words and sounds, increase their vocabulary, understand word meanings and grammatical relationships, and discern the cultural and social rules of language through

phonological, semantic, syntactic, morphological, and pragmatic development (Crystal, 2005; McGuinness, 2004; Pinker, 1994; 1999). Linguists argue that all these aspects of language contribute to children's understanding of words and how the words are used in vocal and written language.

Verbal behavior theorists have a different perspective than linguists, arguing that the key to language instruction is to teach the function of verbal behavior. They view teaching the form as a sub-objective (Greer & Ross, 2008). Greer and Ross explain, "verbal functions are verbal operants or learned relationships between antecedents and consequences that speakers emit to affect a listener" (p. 27). Although verbal behavior theorists recognize that a comprehensive analysis of the structure or form of language is necessary, without a behavioral analysis of the function of language a complete understanding of language is not possible (Greer, 2008). Teaching the function of language allows individuals to learn to use speech to gain control of and make changes in their environments by affecting the listening audience (Greer & Keohane, 2005).

Verbal Behavior Theory. B. F. Skinner introduced a new theory on language development in 1957, in which he defined verbal behavior as "behavior reinforced through the mediation of other persons needs" (p. 2). Unlike popular psycholinguistic theorists, Skinner focused on the function of language, not the structure of language. Skinner viewed language as a behavior, which, like other behaviors, could be defined by the relationship between an organism and the environment (1957). The difference between non-verbal and verbal behaviors is that verbal behavior does not operate directly on the environment, but rather it operates on the environment through the behavior of an audience. As Michael explains in his introduction to Skinner's *Verbal Behavior*, verbal behavior is "the behavior of an individual which achieves its

effect on the world through someone else's behavior" (p. viii). Skinner argued that one could not understand the "meaning" of an individual's words simply by hearing them, but instead one must examine the effect the vocal verbal behavior has on the verbal community. Although Skinner's theory of verbal development focuses primarily on the speaker, recent research has shown the significance of the listener (Hayes, Barnes-Holmes, & Roche, 2001; Greer & Ross, 2008). It is important to understand the role of the listener in order to get a complete picture of verbal behavior (Greer, Chavez-Brown, Nirgudkar, Stolfi, & Rivera-Valdes, 2005; Greer & Ross, 2008; Hayes, Barnes-Holmes, & Roche, 2001).

Skinner's (1957) *Verbal Behavior* focuses on the verbal operants that provide the framework for speaker behavior, or behavior that governs the behavior of another person. According to Skinner, the different types of verbal operants are distinct in two important ways: (a) how they are evoked and (b) how they are reinforced. There are three primary social verbal operants: tacts, sequelics, and conversational units (Greer & Ross, 2008; Skinner). These operants are categorized as social because they require interaction between a speaker and a listener (Greer and Du, in press).

Skinner defined the tact as a "verbal operant in which a response of a given form is evoked by a particular object or event or property of an object or event" (1957, p. 81-82). The stimulus control for the tact is in the discriminative stimulus, which is established when responses in the presence of one stimulus are consistently reinforced with generalized reinforcers within the verbal community. The generalized reinforcer used for tact instruction is uniquely social, in that the speaker receives reinforcement from the listener in the form of social attention and approval (Eby, 2010; Greer, Singer-Dudek, Longano, & Zrinzo, 2008). Social approvals are a common form of reinforcement used to create an individual's complex social verbal behavior

repertoire. Social approvals consist of non-vocal and vocal behavior including: eye contact, laughter, hugs, playful physical touches, high fives, smiles and approving statements.

Both sequelics and conversational units are social verbal operants that are derived from Skinner's (1957) theory of a verbal episode. According to Skinner, verbal episodes are interlocking verbal operants in which the behavior of one person mediates the behavior of another person. These verbal episodes have now been divided into two component operants (sequelics and conversational units) based on the reinforcement contingencies the listener comes into contact with. Vargas (1982) defines sequelics as "verbal stimuli and verbal responses (that) do not correspond in any consistent manner" (p. 6). A sequelic occurs when a speaker responds to the presence of a listener by emitting a speaker operant that is then reinforced by the listener. In order for a sequelic to be emitted an individual must respond to verbal stimuli as both a listener and a speaker, however the verbal behavior they emit does not have to be related in point-to-point order or even match in form (Vargas).

Conversational units are interlocking three-term contingencies between a listener and speaker, which can be used as a functional unit of measurement of complex verbal behavior (Becker, 1989; Chu, 1998; Donley & Greer, 1993; Lodhi & Greer, 1989). Whereas a sequelic consists of one exchange between a speaker and a listener, a conversational unit consists of a verbal episode that involves the rotation of initiating exchanges between speakers and listeners. During conversational units, individuals are automatically reinforced for both speaker and listener behavior (Greer & Ross, 2008).

Verbal Behavior Developmental Theory. Building off Skinner's 1957, *Verbal Behavior*, basic and applied research has been conducted to identify critical learning cusps and capabilities that make acquiring language possible (Greer & Longano, 2010; Greer & Ross,

2008; Greer & Speckman, 2009). Verbal Behavior Developmental Theory is a Skinnerian-based account of verbal behavior development (Greer & Ross). Researchers have found ways to experimentally manipulate children's instructional histories so that they can come into contact with the environment in new ways (cusps) and learn in ways they could not before (capabilities) (Rosales-Ruiz & Baer, 1996). The identification of verbal behavior developmental cusps and capabilities has helped refocus the field of verbal behavior on the acquisition of incidental language and complex social behavior. The theory of verbal behavior development refers to an individual's "experientially acquired capabilities to learn and be taught new relations, to learn multiple responses and multiple stimulus control from a single experience, to learn at a faster pace, and to learn in ways they could not prior to the attainment of verbal developmental capabilities" (Greer & Speckman, p. 2). Through the body of research compiled by verbal behavior developmental theorists, a behavioral account of language development has been established (Greer & Ross).

The behavioral account of language development examines the "identification of experiences that establish verbal developmental milestones and how to establish those milestones in children when they are missing" (Greer & Du, in press, p. 3). Researchers behind the verbal behavior developmental theory argue that in order to learn language one must learn the different functions of language by establishing the reinforcing properties of each verbal operant. As Greer and Du explain, "different types of learned reinforcers determine different language functions for the listener and the speaker. An instance of listener or speaker behavior is selected out by [the] history of consequences for emitting or responding to verbal behavior" (p. 2). Verbal behavior developmental theorists pose that complex social behaviors do not need to be directly taught. Rather, simply changing or expanding an individual's social reinforcement conditioning history

and repertoire may be the key to the development of language and social skills (Greer & Du; Greer & Longano, 2010).

Relational Frame Theory. Relational Frame Theory (RFT) is a contemporary behavioral theory that draws from a number of well-established behavioral principles to explain human language and cognition (Hayes, Barnes-Holmes, & Roche, 2001). Like verbal behavior development theorists, relational frame theorists do not think that language and complex social behaviors need to be directly taught; instead RFT argues that complex human behavior emerges as a result of derived relational responding (Hayes, et al.; Rehfeldt, Barnes-Holmes, & Hayes, 2009). Derived from Skinner's selection by consequence, RFT suggests that reinforcement processes are essential to the development of complex human language (Barnes-Holmes, Barnes-Homes, & Cullinan, 2001; Barnes-Holmes, Hayes, Barnes-Holmes, & Roche, 2001). RFT contends that the reinforcing functions of a stimulus are a result of its participation in relational frames. According to RFT, words and nonverbal stimuli are related to each other in an interactive relationship (Hayes, et al.). As a result of reinforcement for such bidirectional responding, humans relate words to nonverbal stimuli, the appropriate nonverbal stimuli to words and words to other words. This bidirectional training results in a "frame of coordination" and the formation of generalized, overarching response classes (Hayes, et al.). RFT explains how language can be learned, without the explicit teaching of every word, phrase or sentence (Hayes, et al.).

Social-Pragmatic Theory. Social-Pragmatic Theory purports that the origins of human communication are collaborative in nature and built on shared intentionality (Bratman, 1992; Gilbert, 1989; Searle, 1995). Social-Pragmatic theorists argue that this shared intentionality allows humans to engage in unique cooperative communication, characterized by learning,

flexibility and attention to the audience (Tomasello, 2008). It alleges that shared intentions and attention were paired with gestural communication and then arbitrary linguistic conventions, which together allowed language to develop as part of the evolutionary process (Tomasello). Social-Pragmatic theorists contend that collaboration appears to have been key to the survival of humans and may be the source for the development of culture.

Tomasello (2008) refers to "joint intentions and joint intentionality" as the infrastructure for language. Joint intentionality is defined as collaboration. It is argued that collaboration is a description of what transpires when two or more individuals are subjected to the same motivating conditions and the obtainment of reinforcement requires individuals to work together similarly to the way a team of oxen does when they are yoked together (Tomasello). The reinforcement is yoked to collaborative efforts, creating the need for the two individuals to emit verbal behavior in order to communicate. In examining "joint intentions and joint intentionality" it appears that early forms of verbal behavior would result from the attainment of mutual reinforcement.

Social Skills and Social Competence

The remediation of social deficits that occur in individuals with developmental delays is a massive undertaking for researchers and educators, as it requires them to encompass the broad nature of each individual's social development (Nikopoulos & Keenan, 2006). Some research has shown that social skills can be taught in isolation, however, children often fail to apply these behaviors to their social interactions (Matson, Matson, & Rivet, 2007). Without being directly taught the behaviors needed to address these social deficits, children remain dependent on explicit cues in order to participate in social interactions (Nikopoulos & Keenan).

The integration of independently taught social skills during social interactions is referred to as social competence (Greshman & Elliot, 2008). When an individual is socially competent

he or she is able to use social skills and adaptive behavior to be successful in novel social settings (Riggiio, 1986). Gustein and Whitney (2002) expand upon the definition, stating that social competence encompassed the skills and strategies that allow individuals to have meaningful friendships and collaborate with groups productively. These definitions suggest that acquiring basic social skills does not lead to socially competent behavior. It can be argued that for an individual to apply acquired social skills across multiple environments, allowing him/her to form and maintain relationships, the reinforcement for emitting complex social behaviors must be in place.

Researchers reported that individuals with developmental delays can be taught how to respond to basic social behavior (Krantz & McClannahan, 1998; McDonald & Hemmes, 2003; Odom, Hoyson, Jamieson, & Strain, 1985; Pierece & Schreibman, 1995; Richer, 1976). However, despite numerous intervention methods researchers have had less success with teaching complex social behaviors such as conversational units and the initiation of play, especially when preferred items or activities are not involved (Krantz & McClannahan, McDonald & Hemmes, Odom et al., Pierece & Schreibman, 1995; Richer, 1976). According to the theory of verbal behavior development, in order for individuals to learn these complex social behaviors, reinforcing principles must be in place during social interactions and the audience must function as a discriminative stimulus for the production of verbal behavior (Skinner, 1957). Since all verbal behavior is mediated by a listener, the listener either punishes or reinforces a speaker's behavior thus shaping the production of future verbal operants (Skinner, 1957). The verbal behavior developmental theory purports that individuals must be reinforced by verbal behavior in order to emit verbal behavior. Individuals emit social verbal behavior or conversational units, if the speaker is reinforced both by social attention and the sustained

exchange of social verbal operants. During a conversational unit the initial reinforcement a speaker receives is social attention from the listener; the speaker receives a second opportunity for reinforcement when they have the chance to be a listener in the same verbal exchange. This social effect becomes a learned operant, which is influenced by the individual's history of receiving reinforcement from his or her audience.

Teaching Complex Social Behavior Through Direct Instruction

Historically, interventions in the field of applied research that have been used to teach social skills have utilized operant, social learning, and cognitive-behavioral approaches (Elliot & Greshman, 1993). The most commonly used social skill interventions focus on a variety of direct teaching methods, utilizing procedures such as tactile prompts, scripts, social stories, and video modeling. Research has shown direct teaching methods have been used to increase the frequency of gaining an individual's attention, initiating comments, initiating questions and contingent responding (Matson, Matson, & Rivet, 2007). There is no research that shows that these popular methods identify or induce the controlling variables that are responsible for increasing verbal operants or complex social behavior.

Tactile prompts such as the Gentle Reminder were found to have increased vocalizations pertaining to play activities (Davidson, 1995). Although tactile prompts may temporarily increase vocalizations by the participants, researchers found that the prompts do not identify or induce the specific controlling variables that are directly related to changing the participants' behavior; thus the stimulus control is not generalized to other environments (Taylor & Levin, 1998). Response prompts in the form of textual or visual cues have also been implemented to try to increase the frequency of initiations made by children with Autism (Thiemann & Goldstein, 2001).

Scripts and social stories have been directly taught to children with developmental delays in order to increase their social operants and improve their complex social behavior (Chad & O'Reilly, 2008; Goldstein & Cisar, 1992; Sarokoff, Taylor, & Poulson, 2001). These methods teach the structural components of speaker-listener exchanges, which may increase social interactions. However, scripts and social stories do not provide students with access to the reinforcement typically developing individuals receive from social behavior; therefore students do not emit these behaviors under the naturally occurring contingencies found in novel environments. Both scripts and social stories share a common limitation: the emission of verbal behavior is contingent upon the presence of the targeted stimuli and establishing operations are not incorporated, therefore the function of the verbal behavior being emitted is not considered.

Video Modeling. Video modeling (VM) is a well-substantiated intervention documented in the behavioral literature (Corbett & Abdullah, 2005; Dorwick & Jesdale, 1991). Video modeling is a protocol that uses videos of an individual engaging in a target behavior for the observer to practice and imitate (LeBlanc, Coates, Daneshvar, Charlop-Christy, & Morris, 2003). Various behaviors can be targeted through video modeling including: social and play skills (D'Ateno, Mangiapanello, & Taylor, 2003: Taylor, Levin, & Jasper, 1999; Wert & Neisworth, 2003), increasing vocalization and communication (Charlop & Milstein, 1989; Charlop & Walsh, 1986), perspective taking (Charlop-Christy & Danseshvar, 2002; LeBlanc et al., 2003), emotional processing (Corbett, 2003), adaptive behavior (Shipley-Benamou, Lutzker, & Taubman, 2002), and academics (Kinney, Vedora, & Strome, 2003).

Video modeling is based on Bandura's Social Learning Theory (1977) and observational learning. Bandura's (1977) Social Learning Theory proposes that human behavior is primarily learned by observing others and imitating the observed behaviors. According to Bandura (1986),

observational learning refers to the cognitive and behavioral change that occurs as a result of observing others engage in similar actions. Bandura (1986) argued, "providing a model of thought and action is one of the most effective ways to convey information about the rules for producing new behavior" (p. 51). Bandura theorized that in order for an individual to learn from observing their environment, four components must be present at the time of instruction: 1) attention, 2) retention, 3) production, and 4) motivation. Proponents of VM contend that all four of Bandura's components are easily addressed by this method of instruction (Corbett & Abdullah, 2005). Practitioners of video modeling maintain that attention is addressed because VM provides visual cues that help individuals select and focus on the relevant stimuli (Dowrick & Jesdale, 1991; Charlop-Christy & Daneshvar, 2002; Charlop-Christy, Le, & Freeman, 2000; Shipley-Benamous et al., 2002). Advocates of video modeling assert the instructional method facilitates retention because the topography of the video permits the repetition of the same model and precise procedures (Dowrick & Jesdale; Thelen, Fry, Fethenbach, & Frautsch, 1979). Practitioners believe that the essential production component is met during VM because during the interventions, the participant is allowed the opportunity to independently produce / practice the observed behavior (Nikopoulos & Keenan, 2003; Taylor et al., 1999). Finally, supporters contend that video modeling is inherently motivating and naturally reinforcing because the activity of watching a video is typically associated with recreation (Charlop-Christy & Daneshvar; Charlop-Christy et al.; Corbett, 2003; D'Ateno et al., 2003; Wert & Neisworth, 2003).

Numerous studies have examined the efficacy of video modeling on the social-communication skills of individuals diagnosed with Autism and other developmental delays (Bellini & Akullian, 2007). A series of studies conducted by Nikopoulos and Keenan (2003,

2004(a), 2004(b), & 2007) investigated the effects of video modeling on promoting social initiations in children diagnosed with Autism. The video interventions showed typically developing peers engaging in social interactive play with an experimenter and a toy. Nikopoulos and Keenan measured the latency prior to the participant initiating a social interaction and the duration of time they engaged in either appropriate toy play or reciprocal play. The results showed that after viewing the videos the majority of participants showed an increase in the number of social initiations they made and their reciprocal play skills.

Researchers (Charlop & Milstein, 1989; Charlop & Walsh, 1986; MacDonald et al., 2009; Sherer et al., 2001) examined the efficacy of video modeling on more complex social verbal behavior. Charlop and Walsh (1986) examined the effects of video modeling instruction on statements of affection emitted by children with Autism. The results showed an increase in spontaneous verbalizations of affection in response to familiar people. Charlop and Milstein (1989) investigated the effects of video modeling instruction on the conversational units emitted by children with Autism. After the participants met performance criterion experimental probes were conducted across various settings and individuals to test for generalization and maintenance. The results showed that following the video modeling procedure, the participants acquired basic conversational speech and the stimulus control was generalized to novel environments. MacDonald and colleagues (2009) examined the effects of video modeling on individuals' reciprocal pretend play and verbal interactions. Results showed that both individuals in the study acquired the scripted conversations. In addition results also demonstrated that the participants increased their emission of unscripted verbal operants, reciprocal verbal interactions and cooperative play. Sherer and colleagues (2001) conducted a study examining the effects of video modeling (with both "self" and "other" models) on conversational units in

children with Autism. Results showed that three out of five students increased the number of conversational units they emitted in postintervention probes.

The increase in social behavior following video modeling interventions may be a function of participants learning the structural components of social interactive play. However, participants increase in complex social verbal behavior may also be a result of observing the social contingencies present in the video model. Although many studies have used video modeling to increase language, play, and complex social behaviors there has been limited research examining how or if these taught operants are generalized to novel environments and peers.

Teaching Complex Social Behavior Through Social Reinforcement

Skinner argues that verbal behavior is social behavior. Therefore by definition, both a speaker and a listener must be involved in any incidence of verbal behavior (Greer & Du, in press). In order to address the acquisition of complex social behavior from a verbal behavior developmental perspective, the function and reinforcement of the social verbal operants present in verbal episodes must be examined. Greer and Ross (2008) theorized that in order for conversational units and complex social behavior to be truly present, individuals must acquire the listener reinforcement component of social exchanges. As Sterkin (2012) explained, "the basic component of being social is coming under the contingencies of reinforcement related to the exchange of speaker and listener roles" (p. 20). Early researchers explored the effects of deprivation and satiation of social reinforcers on the emission of verbal operants and found that behaviors classified as "questions," "comments," and "attention-seeking" responses decreased under conditions of social satiation and increased under conditions of social deprivation. This

research can be used to support the theory that the emission of social verbal operants is affected by social reinforcement (Gewirtz & Baer, 1958a, 1958b; Gewirtz, Baer, & Roth, 1958).

Although social reinforcement in the form of attention, affection, or approvals is a type of generalized reinforcement (Skinner, 1957), research has shown that not all individuals naturally find these behaviors reinforcing (Bijou & Ghezzi, 1999; Greer, Singer-Dudek, Longano, & Zrinzo, 2008). When individuals do not have social reinforcement in repertoire it must be conditioned as a reinforcer.

Generalized Conditioned Reinforcement. In 1953 Skinner identified three types of generalized conditioned reinforcers: money, educational reinforcers (tokens) and social reinforcers. Conditioned reinforcers are positive or negative reinforcers that are learned or acquired as a result of an environmental history of being paired with unconditioned reinforcers (Catania, 2007; Cooper, Heron, & Heward, 2007; Donahoe & Palmer, 2004; Greer, 2002; Greer & Ross, 2008). Skinner (1953) explained that generalized reinforcers in all forms can become firmly established and will eventually become highly effective in the absence of the primary reinforcer.

Skinner (1953) explained that social reinforcement in the form of approval, attention, or affection can be hard to define, observe, and measure. He stated that it can be difficult for the individual who is receiving reinforcement to discriminate the reinforcement contingencies. However, social attention can become a generalized conditioned reinforcer such that "we get attention or approval for it's own sake" (Skinner, 1953, p. 81).

The Discriminative Stimulus Hypothesis. Skinner (1938) theorized that conditioned reinforcement can be explained by analyzing chains of discriminated operants. Skinner (1938) explained that the discriminative stimulus functions to both occasion subsequent operants and act

as a conditioned reinforcer for the operant that just occurred. In 1950, Keller and Schonenfled formalized the discriminative stimulus hypothesis, which states that conditioned reinforcers are always discriminative stimuli and discriminative stimuli are conditioned reinforcers. Cooper, Heron, and Heward (2007) further explained that a discriminative stimulus is, "a stimulus in the presence of which responses of some type have been reinforced and in the absence of which the same type of responses have occurred and not been reinforced" (p. 694). This means in the presence of the discriminative stimulus, the target response is more likely to occur as that response has been reinforced in the past. For example, after an individual has been reinforced for pointing to a triangle in the presence of a triangle and other shapes, when shown a triangle and a circle the individual will be more likely to point to the triangle upon hearing the antecedent "triangle." If an individual is receiving social reinforcement, which he or she finds hard to define, observe, and measure, then he or she struggles to discriminate the reinforcement contingencies. If this occurs, the social reinforcement that was given fails to function as reinforcement or a discriminative stimulus.

Stimulus-Stimulus Pairing Hypothesis. New or previously neutral stimuli can also become conditioned to function as reinforcers. A stimulus-stimulus pairing procedure is frequently used to condition previously neutral stimuli. This procedure consists of the response-dependent presentation of a stimulus for a brief period of time in the presence of unconditioned or other conditioned reinforcers (i.e. pairing). This stimulus-stimulus pairing procedure occasions the previously neutral stimulus becoming a conditioned reinforcer. Williams (1994) refers to this as conditioned value, the reinforcing value of a primary or previously established reinforcer is transferred to the new stimuli through habituation.

Zimmerman conducted a series of experiments between 1959 and 1976 that provided evidence in support of the stimulus-stimulus pairing hypothesis. Zimmerman found that behavior was maintained continuously in a similar manner using both schedules of conditioned reinforcement and schedules of primary reinforcement (Zimmerman, Hanford, & Brown, 1967). The empirical research supports the effectiveness of conditioned reinforcers; however there is still great debate over how conditioned reinforcers are established (Williams, 1994).

Expanding Repertoires of Reinforcement via Conditioned Reinforcement. Research by Baer and colleagues found that some environments are "natural communities of reinforcement" meaning that they automatically function to reinforce and maintain certain behaviors. When novel behaviors are taught in the context of the natural environment, the existing communities of reinforcement will operate on the behavior and render additional sources of reinforcement redundant (Baer & Wolf, 1970; Stokes & Baer, 1977; Stokes, Fowler & Baer, 1978). When natural communities of reinforcement do not exist, then an individual's repertoires of reinforcement need to be expanded via conditioned reinforcement. Greer and colleagues have conducted numerous studies to develop a large body of research on expanding communities of reinforcement in educationally and socially significant applications (Greer et al., 1985; Greer et al., 1973; Greer et al., 1974; Greer et al., 1973; Nuzzolo-Gomez et al., 2002; Tsai & Greer, 2006). Through a stimulus-stimulus pairing procedure Greer and colleagues have conditioned a variety of activities such as puzzles, play-do®, coloring and looking at books, to function as reinforcers, while simultaneously reducing passivity and stereotypy (Greer et al., 1985; Longano & Greer, 2006; Nuzzolo-Gomez et al., 2002; Tsai & Greer, 2006).

Traditional stimulus-stimulus pairing procedures can have powerful effects on the emergence of verbal behavior (Greer, 2000; Sundberg, Michael, Partington, & Sundberg, 1996).

Sundberg and colleagues (1996) used a stimulus-stimulus pairing procedure to systematically pair a conditioned reinforcer with vocal sounds. When the participant emitted vocalizations he or she was reinforced by the experimenter interacting with them in a playful social manner (tickling or playful physical touch). The results showed that through stimulus-stimulus pairing the act of emitting vocalizations was reinforced and the participant emitted a greater frequency of vocal sounds.

Conditioning Social Reinforcers To Teach Verbal Behavior. In looking at complex social behavior from a verbal behavior developmental perspective, it is clear that complex social verbal behavior is created by an individual's history of conditioned social reinforcers. It is this history that creates motivating conditions and antecedent control for the verbal operant an individual will emit to produce the desired function (Greer & Du, in press). In order to develop complex social behavior new conditioned social reinforcers must be established for social contact, social attention, and social learning (Greer & Du; Pistoljevic & Greer, 2006; Schauffler & Greer, 2006; Schmelzkopf & Greer, 2013).

Greer and colleagues conducted a series of experiments (Eby, 2011; Delgado & Oblak, 2007; Pistoljevic & Greer, 2006; Schauffler & Greer, 2006; Schemlzkopf, 2010) looking at the effects of social praise on the spontaneous emission of social vocal verbal operants. Using a procedure called intensive tact instruction, participants were taught tacts in non-instructional settings and reinforced solely with approvals and praise. Results consistently showed that participants increased the number of all social vocal verbal operants they emitted in non-instructional settings.

Tsouri and Greer (2007) conducted an experiment to test the effects of social reinforcement on speaker behavior. Using rapid motor imitation, Tsouri and Greer (2007)

taught echoic-to-tact responses under two different social reinforcement conditions (praise and physical interaction) to two preschoolers with developmental disabilities. The results showed a functional relation between contingent social reinforcement and the correct number of echoics participants emitted.

Schmelzkopf (2010) examined the relationship between the emission of social verbal operants and praise. Using an observational conditioning protocol, approvals were conditioned as a reinforcer for preschoolers with developmental disabilities. Once approvals were conditioned as reinforcers, students increased the number of conversational units they emitted. Expanding upon these findings, Eby (2011) tested the effects of contingent social reinforcement versus contingent tokens on preschoolers' emission of verbal operants. The results demonstrated that with contingent social attention participants emitted tacts more frequently. A secondary finding showed that when adult attention was withheld peer-to-peer conversational units were emitted at a higher rate.

Sterkin (2012) tested the effects of the Social Listener Reinforcement protocol on the acquisition of audience control in four developmentally delayed preschoolers. Prior to the intervention typically developing peers did not function to reinforce participants' listener and speaker exchanges. Following the SLR protocol, the participants in Sterkin's (2012) study demonstrated increased social interaction with their typically developing peers. Sterkin (2012) found that by conditioning social reinforcement for the audience, the participants were able to contact audience reinforcement or punishment.

The findings of this collection of research (Delgado & Oblak, 2007; Eby, 2011; Pistoljevic & Greer, 2006; Schauffler & Greer, 2006; Schmelzkopf, 2010; Sterkin, 2012; Tsouri & Greer, 2007) show that when social reinforcement is missing, individuals do not emit social

verbal operants or display complex social behaviors. As Greer and Du (in press) explain "it appears that the onset of social stimuli as reinforcers is key to the cultural or ontogenic development of language function" (p. 18).

Social Listener Reinforcement (SLR). The social listener reinforcement component of conversational exchanges can be induced in children when it is absent (Greer & Ross, 2008). This is done by providing the individual with opportunities to contact reinforcement, in a yoked contingency, dependent upon listening to a peer's responses (Reilly-Lawson & Walsh, 2007). The term yoked contingency was developed in behavior analytic research in the early fifties and refers to the arrangement of contingencies that require two individuals to collaborate (Greer & Du, in press). In the SLR protocol, the individuals in a yoked contingency must work together to provide correct responses and acquire new operants, in order to receive access to reinforcement (Greer & Ross).

Reilly-Lawson and Walsh (2007) tested the effects of observational training in social listener reinforcement activities, on the frequency of social verbal operants emitted by middle school students in non-instructional settings. The researchers implemented a protocol with a series of games that included: "I Spy," 20 questions as tact and textual responses, peer tutoring, and group instruction. The games were played using a peer-yoked contingency game board. During the observational training games the participants needed to listen to their partner respond in order to emit the correct answer and advance in the game. The results of this study demonstrated an increase in conversational units and attention to peers across participants following the SLR protocol. Reilly-Lawson and Walsh (2007) discovered a method to induce the listener reinforcement component of the conversational unit. In the second experiment Reilly-Lawson and Walsh (2007) added an empathy component to the SLR game package.

Using multiple exemplar instruction students were taught to respond to the following questions about pictures and real life scenarios: "What happened?" "How do you think he feels?" and "What would you do to help?" Following this protocol, Reilly-Lawson and Walsh (2007) observed students' increased attention to their peers, as well as appropriate responses regarding their peers' feelings. The researchers also found that all students emitted increased numbers social vocal operants with their peers and were more integrated into the typical classroom environment.

Summary and Rationale

Researchers, educators and clinicians have all acknowledged the need to increase the frequency of complex social behavior and conversational units emitted by students with developmental delays. These students often lack joint attention and joint intentionality (Tomasello, 2008), which results in them appearing uninterested in the presence or spoken words of other individuals. Although the problem has been identified, researchers are still conflicted on the best method to develop the key components that join language with its social function.

The Verbal Behavior Development Theory argues that researchers need to recognize critical social reinforcers and how the acquisition of these social reinforcers affect an individual's development. Verbal behavior development theorists propose that children with developmental delays are often missing the social reinforcement that results when two individuals maintain prolonged verbal exchanges and inducing this conditioned reinforcer will lead to an increase in an individual's complex social behavior (Greer & Du, in press). According to this theory, the structural components of social verbal operants should not be taught directly but rather the social reinforcement for the behavior should be conditioned (Greer & Du; Greer & Speckman, 2009). In current behavioral research, the most prevalent methods for teaching

complex social behaviors are based in direct instruction. One of the most popular practices is to use video modeling protocols to teach missing social and communication repertoires (Shukla-Mehta, Miller, & Callahan, 2010). Proponents of this method believe that directly teaching social skills ensures the individuals have them in repertoire and results in generalized stimulus control in novel settings.

The experiments reported herein set out initially to compare the effects of a social listener reinforcement protocol and a video modeling protocol on the emission of social verbal operants, in order to determine what contingencies of reinforcement control these behaviors. The purpose of this study was to examine whether teaching the verbal operants directly would produce different outcomes than conditioning the reinforcers for social verbal exchanges.

Chapter II

METHOD

Participants

The 12 participants in this study were preschoolers with developmental delays who ranged in age from 3-4 years at the start of the study. They were selected from a publically funded privately run preschool for students with and without developmental delays located in a suburb of a large metropolitan area. The preschool operated under the Comprehensive Application of Behavior Analysis to Schooling (CABAS®), which used a behavior analytic approach to teaching, language development, classroom management, curriculum development, staff training, and parent education (Greer, 1996). Students were referred to the school by the committee for preschool special education (CPSE) in students' local school districts.

All responses to instruction in the school were measured and presented as student responses to learn units. All long term and short term objectives were measured and chosen based on an assessment completed using the CABAS® *International Curriculum and Inventory of Repertoires for Children from Pre-School Through Kindergarten* (C-PIRK©) and the student's individual education plan (IEP) goals (Greer 2013; Waddington & Reed, 2009). The C-PIRK© is a criterion-referenced assessment used to identify over 300 skills a student has in repertoire across 6 major developmental areas: listener, social, academic, communicative, community of reinforcers and verbal repertoires. Psychologists and therapists from the local school districts assessed the students either before they started or while at school using standardized tests including the Preschool Language Scale-4©, Stanford-Binet Intelligence Scale 5th Edition©, and the Learning Accomplishment Profile – Diagnostic Edition© (Lap-D). The Preschool Language Scale© is a comprehensive developmental language assessment that

measures repertoires spanning pre-verbal to early literacy. The Stanford-Binet Intelligence Scale© is a standardized test that measures cognitive abilities and intelligence. The LAP-D© is a norm-referenced assessment that assesses individual skill development across four domains: gross motor, fine motor, cognition, and language. All participants' educational diagnoses were determined by their respective school districts through the use of educational evaluations, psychological testing, teacher reports, individual education plan (IEP) progress, classroom observations, counseling reports, adaptive behavior scales, and social history inventories. Despite medical diagnoses of Autism Spectrum Disorder and Speech and Language Delays, the educational diagnosis for all preschool students was listed as "preschooler with a developmental delay." Each participant's level of verbal behavior, standardized test scores, and academic repertoires are reported in Tables 1-5. These tables show the participants' level of functioning at the onset of the experiment, which lasted for approximately four months.

As part of the CABAS® system of instruction, participants were systematically tested for the presence or absence of verbal behavior developmental cusps and capabilities throughout each academic year. The Verbal Behavior Developmental Assessment© (VBDA©) is used to assess a child's verbal developmental cusps and capabilities consisting of a hierarchical set of repertoires that are considered necessary for academic and language advancement (Greer & Ross, 2008). If a child demonstrated that he or she was missing a verbal developmental cusp, empirically tested protocols were implemented in order to induce the missing repertoire.

Parental consent for participation was obtained and participants were selected if they had certain prerequisites in repertoire, including: fluent listener repertoire, speaker responses; including some, but infrequent, sequelics and conversational units, an echoic-tact repertoire; and pure and intraverbal tact repertoires. Selection procedures included a brief interview with the

potential participants' teachers and/or parents, observation of the child in his/ her classroom environment, C-PIRK©, and VBDA© assessments. If the potential participant demonstrated the required selection criteria he or she was recruited to participate in pre-experimental probe sessions.

During the preexperimental probe sessions potential participants were observed with a typically developing peer in a non-instructional setting for 5-mins. Experimenters recorded the number of vocal operants emitted, and/or the number of missed opportunities to respond to peers' social vocal verbal operants. If the preexperimental probe data showed potential participants lacked conditioned reinforcement for social interactions with their peers, as well as low numbers of vocal operants emitted and high numbers of missed opportunities to respond to peer interactions, they were then selected to participate in the study.

Table 1 shows a description of participants by age, gender, level of verbal behavior development and standardized test scores (see Appendix 1 for raw standardize test scores). Table 2 contains a list of participants' cusps and capabilities present and/or induced at the onset of the study. Table 3 shows participants' level of academic performance at the onset of the study.

Table 1

Description of Participants by Age, Gender, Level of Verbal Behavior, and Test Scores at the Onset of the Experiment

Participant	Age	Gender	Diagnosis	Level of Verbal Behavior	Lap-D (z –scores)	Preschool Language Score	Stanford – Binet Intelligence scale 5th eds.
A	4	Female	Speech & Language Delay	Speaker/Listener Emergent Reader Emergent Writer	**Language Comprehension** Average **Language Naming** Borderline deficit	**Auditory** Slightly Above Average **Expressive** Slightly Above Average **Total** Slightly Above Average	Average
B	4.8	Male	Autism Spectrum Disorder	Speaker/Listener Emergent Reader Emergent Writer	No Score	**Auditory** Mild Delay **Expressive** Mild Delay	No Score
C	4.10	Male	Speech & Language Delay	Speaker/Listener	**Language Comprehension** Average **Language Naming** Significant deficit	**Auditory** Moderate Delay **Expressive** Moderate Delay	No Score
D	4.8	Male	Speech & Language Delay	Speaker/Listener	No Score	**Auditory** Mild Delay **Expressive** Mild Delay	No Score
E	4.7	Male	Speech & Language Delay	Speaker/Listener	**Language Comprehension** Significant deficit **Language Naming** Significant deficit	**Auditory** Moderate Delay **Expressive** Moderate Delay	No Score
F	3.11	Male	Autism Spectrum Disorder	Speaker/Listener	**Language Comprehension** Average **Language Naming** Average	**Auditory** Mild Delay **Expressive** Moderate Delay	Average
G	4.2	Female	Speech & Language Delay	Speaker/Listener Reader/Writer	**Language Comprehension** Significant deficit	**Auditory** Average **Expressive** Average	No Score

					Language Naming Average		
H	4.2	Female	Speech & Language Delay	Speaker/Listener Emergent Reader Emergent Writer	No Score	**Auditory** Average **Expressive** Average	Borderline delayed
I	4.5	Female	Autism Spectrum Disorder	Speaker/Listener	**Language Comprehension** Significant deficit **Language Naming** Average	**Auditory** Mild Delay **Expressive** Mild Delay	No Score
J	4.9	Female	Speech & Language Delay	Speaker/Listener Emergent Reader Emergent Writer	No Score	**Auditory** Average **Expressive** Average	Borderline delayed
K	3.8	Male	Autism Spectrum Disorder	Speaker/Listener	**Language Comprehension** Significant deficit **Language Naming** Significant deficit	**Auditory** Mild Delay **Expressive** Mild Delay	Average
L	4.11	Male	Autism Spectrum Disorder	Speaker/Listener Emergent Reader Emergent Writer	No Score	**Auditory** Average **Expressive** Average	Average

Note. Standardized testing was conducted prior to the participants' preschool placement by independent examiners. The presence of levels of verbal behavior was determined by the Verbal Behavior Development Assessment (VBDA©) (Greer, 2008).

Table 2

Description of the Participants' Cusps and Capabilities Present at the Onset of the Study

Participant	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
Generalized Imitation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Listener Literacy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Generalized Matching	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Independent Mands	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Independent Tacts	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Listener Half of Naming	✓	✓		✓		✓	✓	✓			✓	
Speaker Half of Naming	✓	✓				✓	✓	✓			✓	
Observational Learning				✓								

Note. The presence of levels of verbal behavior was determined by the Verbal Behavior Development Assessment (VBDA©) (Greer, 2008).

Table 3

Description of the Participants' Level of Academic Performance at the Onset of the Study

Participant	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
Looks for hidden item	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓
States name when asked	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Answers yes and no for mands & tacts		✓	✓	✓	✓		✓	✓	✓		✓	✓
Answers "why do" questions												
Answers "what do you do when" questions											✓	
Verbally identifies when doesn't know a correct response		✓		✓					✓		✓	✓
Sits still	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓
Follows verbal directions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Emits echoics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Emits 100 independent tacts	✓	✓			✓		✓			✓		✓
Mands: for help, to play, to see something a peer has	✓				✓							
Emits greeting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Emits farewell	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Responds to how are you			✓					✓	✓	✓		
Emits sequelics with peers & adults		✓			✓		✓	✓	✓	✓		
Conveys message		✓										
Emits conversational units with adults		✓										
Emits appropriate self-talk										✓		

Note. Due to space limitations a (✓) denotes that the participants had the skill in repertoire and a blank space denotes that the participant did not have the skill in repertoire. The presence of these academic behaviors was assessed by a preschool teacher using the CABAS® International Curriculum and Inventory of Repertoires for Children from Pre-School through Kindergarten (C-PIRK©) (Greer, 2013). The C-PIRK is a criterion-referenced assessment of student curricular objectives, which assesses repertoires across the domains of academic literacy, communication, community of reinforcers, self-management and physical development.

Setting

All experimental probe and intervention sessions took place at the preschool from which the participants were selected.

Experimental Probe Setting. Experimental probe sessions were conducted in a non-instructional setting, where the participants engaged in three different non-instructional activities (free play, snack and play-doh® at the table). All probe sessions took place in a 2.44-m by 2.13-m rectangular free play area inside the classroom that was cordoned-off by 1.219-m high partitions. The area contained three small shelves holding toys, a beanbag chair, a child-sized easel, a play rug, a child-sized table and two child-sized chairs. The preschool age appropriate toys included but were not limited to blocks, puzzles, toy vehicles, toy animals, dolls, books, and cause-effect toys (refer to Table 4 for a complete list of items located in the study area). The walls of the area were decorated with 32 pieces from Trend Enterprises® Buggy for Books© bulletin board set. Two small (7.62-cm by 2.54-cm) Logitech® web cameras were mounted discreetly on opposite walls of the area at a height of 1.37-m, for data collection purposes. The web cameras were connected to two different 38-cm MacBook Pro® computers which were located outside of the area. Appendix 2 contains pictures of the probe setting.

Table 4

Complete List of Toys in Pre- and Postintervention Experimental Probe Area

Toys Located in Experimental Probe Area		
Little People Farm	53 board books	Stuffed Animal - Dragon
Little People Doll House	Pop-Up Pirate	Stuffed Animal - Dog
Little People Car Wash	Ball	Stuffed Animal - Fox
Little People Car Garage	Match box® cars	Stuffed Animal - Puppy
Little People Pirate Ship	2 Princess Barbies ®	Toy Garbage Truck
Little People Dump Truck	12 Melissa and Doug Puzzles	Magna Doodle
Little People Train	7 plastic dinosaurs	63 plastic food items
Little People Bus	60 Duplo® blocks	Toy microwave
Little People Tug Boat	Little People Figures	2 Dolls
Melissa & Doug Wooden pizza	Stuffed Animal – Cookie Monster	Melissa & Doug Wooden Alphabet Blocks

Social Listener Reinforcement Setting. The treatment sessions for the SLR condition were conducted in a quiet area in the back of the participants' classroom. All sessions were conducted at a rectangular-shaped table measuring 1.22-m by 0.52-m. During phases 1 and 4 the experimenter sat at the end of the table facing the participants who sat side-by-side. During phases 2 and 3 the experimenter sat in between the participants, with one participant sitting at the end of the table thus creating an "L" formation. The independent observer, when present, sat off to the side behind the participants. Mounted on the wall across from the participants was the game board. Learn units continued to be presented to other students in the classroom during all treatment sessions.

Video Modeling Setting. The treatment sessions for the video modeling condition were conducted in both the probe area and the classroom. The participants sat in a quiet classroom with the experimenter to view the videos. The experimenter sat in an adult-sized chair while the participant sat in a child-sized chair. The videos were played on a MacBook Pro© which was placed on the desk in front of the participant. The desk was located in a quiet corner of the room and faced a white wall. The independent observer, when present, sat off to the side behind the

participant. After viewing the videos the participant entered the probe area, which had been arranged to replicate the environment where the video was filmed. Learn units continued to be presented to other students in the classroom during all treatment sessions.

Materials

Probe Session Materials. There were several materials used in this study. During probe sessions the materials used consisted of: data sheets, timer, two Logitech® web cameras and two 38-cm MacBook Pros®. The probe area was furnished with a large selection of toys (consult Table 4 for a complete list of toys available). During the tabletop activity an assortment of play-doh® colors and tools were presented. Table 5 contains a complete list of play-doh® materials available. A variety of food was also used in the snack condition of the experiment. Refer to Table 6 for a complete list of edibles available.

Table 5

List of Play-doh® Materials in Pre- and Postintervention Table Top Play Conditions

Play-doh® Materials		
6 colors of play-doh®	6 colors of play-doh®	6 colors of play-doh®
1 rolling hand-held cutter	1 rolling hand-held cutter	1 rolling hand-held cutter
3 machine accessories	3 machine accessories	3 machine accessories
bucket	plate	shovel

Table 6

List of Edibles Available in Pre- and Postintervention Snack Conditions

Edibles		
Mini Oreos®	Doritos®	Lays® Potato Chips
Goldfish®	Pretzels	Skittles®
Chocolate Chip Cookies	Welches Fruit Snacks®	M & M's®

Video Modeling Materials. The materials used in the video modeling condition consisted of a web-camera, MacBook Pro®, data sheets, pen, timer, and I-pad®. Each of the five video conditions used three different toys. Table 7 comprises a complete list of materials.

Table 7

Complete List of Materials Used in Phases 1-4 of the VM Protocol

Phase 1	**Phase 2**	**Phase 3**	**Phase 4**
Melissa & Doug® Wooden Pizza	Little People® Bus	Little People® Car Wash	Mini Mr. Potato Heads®
Melissa & Doug® Wooden Blocks	Little People® Train	Little People® Farm	2 cans of play-doh® scissors & rolling pin
Little People® Train	Rubber Ball	Melissa & Doug® Wooden Pizza	Easel with Dry Erase Markers

Social Listener Reinforcement Materials. The materials used in the SLR condition differed with each phase. There were five phases in the SLR condition: (a) I Spy, (b) Bingo, (c) Collaborative Construction, (d) Peer Tutoring, and (e) Empathy Instruction. During each phase a different data form was used with a pen to record the data. During the first four phases a game board was used (Appendix 3). The game board had two vertical paths; one for the participants and one for the experimenter. Each path had nine spaces with a shared winner's space at the top, resulting in a total of ten spaces each. At the beginning of each session the participants and the experimenter selected their game pieces. Each game piece had Velcro© on the back to attach to and move up the game board. The game board had a large tree with a picture of Curious George© holding a bunch of balloons stuck in the branches at the top. The words "Catch Curious George" were printed at the top. Game pieces were different characters from the Curious George© book series (Appendix 4). During phases 1-4 of the SLR protocol back-up reinforcers could be earned for saving Curious George®. The back-up reinforcers were kept in a bejeweled treasure box that was 30-cm by 15-cm by 15-cm. The participants were able to select

their preferred reinforcers which included but were not limited to: mini Oreos®, Skittles®, bouncy balls, small airplanes, stamps, plastic jewelry, small animals and stickers.

I Spy. During the "I spy" phase, a mask was used to cover the participants' eyes and 3D items from the classroom were used as target stimuli. Examples of some of the items used were: paint brush, toy vehicles, toy food, and toy animals. Table 8 contains a complete list of items used.

Table 8

Complete List of Materials Used in the "I Spy" Phase of the SLR Protocol

Items Used In "I Spy"				
Glue Stick	Crayon	Paper Shapes	Plastic Food	Blocks
Tape Dispenser	Pen	Scissors	Transportation Toys	Book
Paint Brush	Pencil	Clothing	Animals Figures	Flowers

Bingo. During bingo a 20.32-cm by 27.94-cm white paper was used as a bingo board. The bingo board was separated by thick black lines into three rows and four columns for a total of 12 squares. The letters of the alphabet were randomly assigned to different squares on each bingo board. A large plastic bucket contained 2.54 cm square tiles with a capital letter printed each. Twenty-four letters were present in the bucket. The participants were also given a pile of 24 pennies to use as Bingo markers.

Collaborative Construction. During the collaborative construction condition six sets of non-interlocking puzzles were used. Each puzzle consisted of five different pieces and a laminated mat. Each puzzle had a laminated 20.32-cm by 27.94-cm paper mat outline that showed where the different pieces should be placed and secured with Velcro®. Examples of the puzzles include: a) flower with pot, stem, petals, center and leaves b) butterfly with wings, body, big spots, little spots and face. Each piece was presented in three different colors on a 30.48-cm

by 45.72-cm baking sheet. A laminated card 12.7-cm by 17.78-cm showed the peer what the completed puzzle should look like; there were five different completed options for each puzzle. Table 11 contains a complete list of stimuli. Appendix 5 shows examples of the interlocking puzzles.

Table 9

Complete List of Puzzle Stimuli Used During the Collaborative Construction Phase of the SLR Protocol

Happy Face	**Flower Pot**	**Cupcake**	**Butterfly**	**Boat**	**Teddy Bear**
Nose	Pot	Bottom	Butterfly	Boat	Body
Eyes	Stem	Cake	Big Spots	Mast	Head
Mouth	Leaves	Flower	Little Spots	Sail	Arms
Ears	Flower	Candle	Body	Anchor	Legs
Hat	Center	Flame	Face	Windows	Bow Tie

Peer Tutoring. During peer tutoring the stimuli sets were determined based on pre-experimental screening of tacts in participants' repertoires. The categories of tacts were selected because they contained items that were age-appropriate and commonly unknown to preschoolers. Each stimulus that was taught to the participant was already in his or her partner's tact repertoire; therefore two sets of pictures were used, Set 1 consisted of tacts Participant A had in repertoire and Participant B did not and Set 2 consisted of tacts Participant B had in repertoire and Participant A did not. Each set consisted of four stimuli and was displayed using the PowerPoint® application on a MacBook Pro®. The images were selected from the website www.images.google.com. Refer to Table 10 for a complete list of stimuli.

Table 10

Complete List of Stimuli Used During the Peer Tutoring Phase of the SLR Protocol

Set A	Set B
Blue Jay	Orca
Swan	Seal
Robin	Walrus
Cardinal	Octopus

Empathy. During the empathy condition the PowerPoint® application on a MacBook Pro® was used to show a slideshow of still images and videos. Five different scenarios were presented: falling down, playing with friends, getting sick / hurt, spilling an item, and having a disagreement with peers. Each scenario was presented four times each with two different video vignettes and two different pictures of the action. The images were selected from the website www.images.google.com and the videos were selected from the website www.youtube.com. Table 11 contains a complete list of stimuli. During the empathy condition the participants were given a 20-piece token board. Participants earned tokens for correct responses and/or appropriate behavior, and if the participants earned all their tokens in the session they were able to trade in for access to the back-up reinforcers.

Table 11

Complete List of Stimuli Used for the Empathy Condition of the SLR Protocol

Falling	Playing with Friends	Sick - Hurt	Spilling	Disagreements with Friends
Image – fallen off bike	Image – family carrying birthday cake	Image – boy at doctor	Image – boy spills cookies	Image – girl left out of group
Image – lady falls down stairs	Image – boy & girl building castle	Image – boy holding stomach	Image – boy drops eggs	Image – girl getting hair pulled
Video – boys falling off bike	Video – blowing out candles	Video – girl needs Band-Aid®	Video – boy spills juice	Video – boy and girl not sharing
Video – boy falls off bike	Video – girls playing on playground	Video – boy in bed with thermometer	Video – girl spills soup	Video – two boys fighting over car

Design

A combined experimental-control group design with two "nested" non-concurrent multiple probe designs across participants (Greer, Stolfi, & Pistoljevic, 2007) was used in this study to compare the effects of two social learning methods; the Social Listener Reinforcement protocol (SLR) and video modeling (VM) on the number of social verbal operants participants emitted with peers. The use of group design in the field of behavior analysis is still relatively novel, as the majority of research in the field is conducted with single case design in order to focus on the behaviors of the individual organism (Du, 2010). However, the "nested" non-concurrent multiple probe design provides a within-group single case design simultaneously with the experimental-control group design. The combination of the two designs resulted in controls for instructional history and maturation both between and within-groups. This allowed the researcher to explore if there was a significant difference between the conditions as well as between the conditions of baseline and treatment (Crosbie, 1999). Each non-concurrent multiple

probe design effectively tested each protocol independently to measure if the protocol was effective at increasing participants' emission of social verbal operants. In this case, the implementation of the group design tested for a difference in the emission of social verbal operants between the two protocol groups, so that the effects of conditioning social reinforcement for listening versus teaching direct operants could be viewed. Both group design and single-case analysis were implemented to analyze the results generated by participants in the SLR condition and participants in the VM condition. It should be noted that the "group" design was limited to a very small sample (N=12).

Participant Matching Procedure. Participants were originally divided into treatment conditions based on the verbal behavior cusps and capabilities they had in repertoire. Three 5-min. preexperimental probe sessions were then conducted with all potential participants across three different non-instructional activities (free play, snack, and a table top activity). Participants were then placed in matched pairs based on the number of contextually appropriate conversational units they emitted during preexperimental probes. The intervention was begun before participants completed all additional pre-experimental probes. When the data from each participants additional 6-9 pre-intervention probe sessions were analyzed, it showed that the groups were not evenly matched based on the number of social verbal operants they emitted.

Once the participants were placed into two treatment groups, they were placed in dyads within treatment conditions; these dyads were the participants' assigned procedure "groups." The first four participants entered the protocols simultaneously, with two receiving the SLR protocol and two receiving the VM protocol. Each participant in the VM condition was linked with their matched partner in the SLR condition and received the same number of instructional presentations for each phase of their protocol. The participants in the SLR condition established

the number of instructional presentations received in each phase. The second set of participants did not start the protocol until the previous set had completed the first phase of the protocol to control for instructional history and maturation. Figure 1 explains the participant pairing procedure.

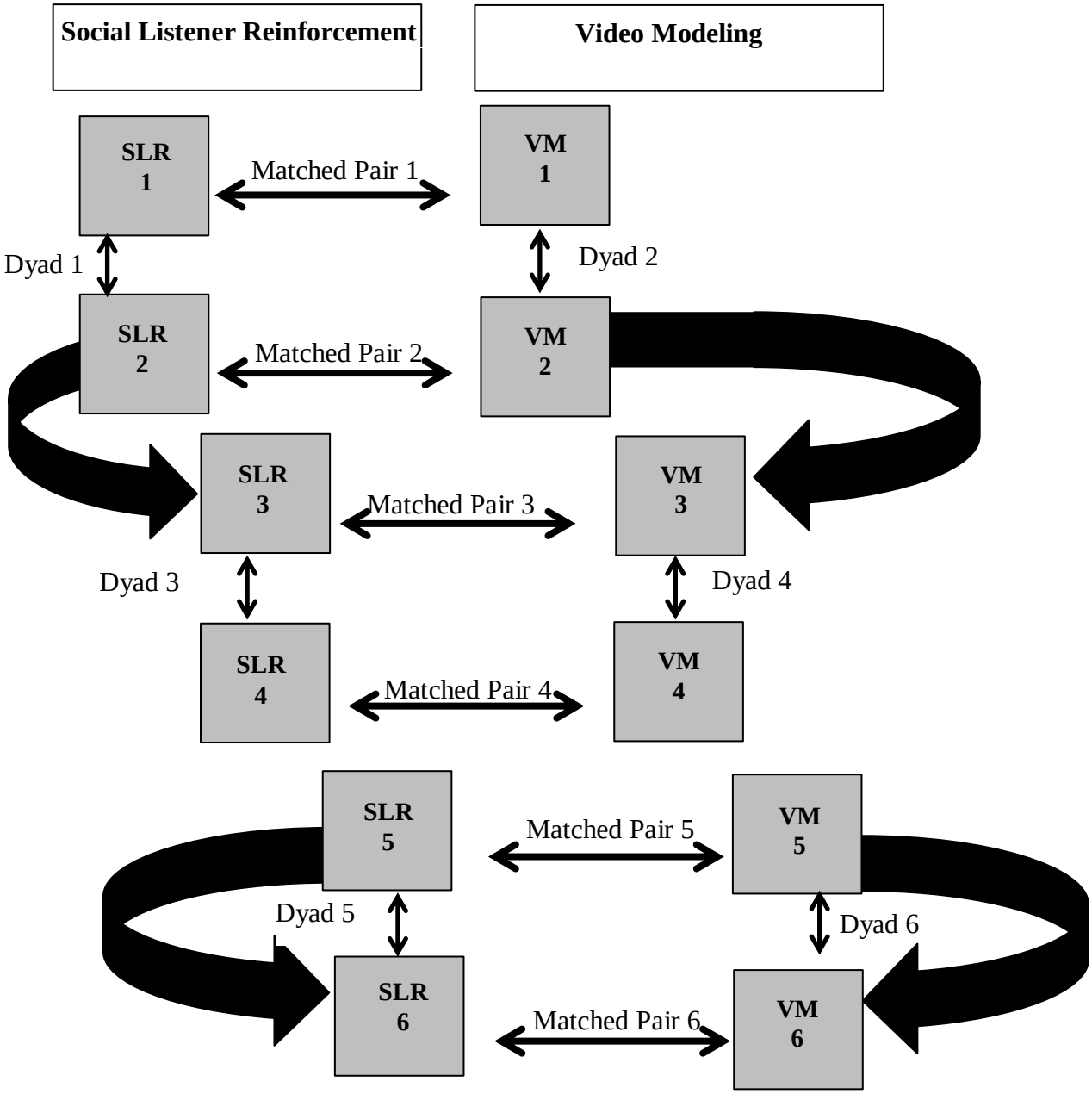


Figure 1. The Participant Matching Procedure.

Note. Due to size restrictions Figure 1 contains abbreviations. The abbreviations are explained as listed. 1) SLR is short for Social Listener Reinforcement protocol. 2) VM is short for Video Modeling. 3) The arrows show the delay sequence in which the participants entered the protocol condition.

Design Sequence. The sequence of the design was 1) Preintervention probe sessions for all participants. 2) SLR protocol for the first two participants in the experimental group. 3) VM instruction for the first two participants in the control group. 4) After the first sets of participants completed the first phase of their protocol, the next two participants in each condition were re-probed prior to entering the protocol to measure the number of social verbal operants they emitted. If the participants' preprobe data remained stable they entered their respective protocols. This pattern continued until all participants had entered the protocols. 5) Following the achievement of criterion on the SLR protocol postintervention probe sessions were conducted to measure the number of social vocal operants emitted. 6). Upon completion of the VM sequence, postintervention probe sessions were conducted to measure the number of social vocal operants emitted. Figures 2 and 3 provide a graphical representation of the design sequence.

Following all participants' completion of their protocol, data were analyzed to determine which treatment, if any, had a significant effect on the number of social verbal operants participants emitted.

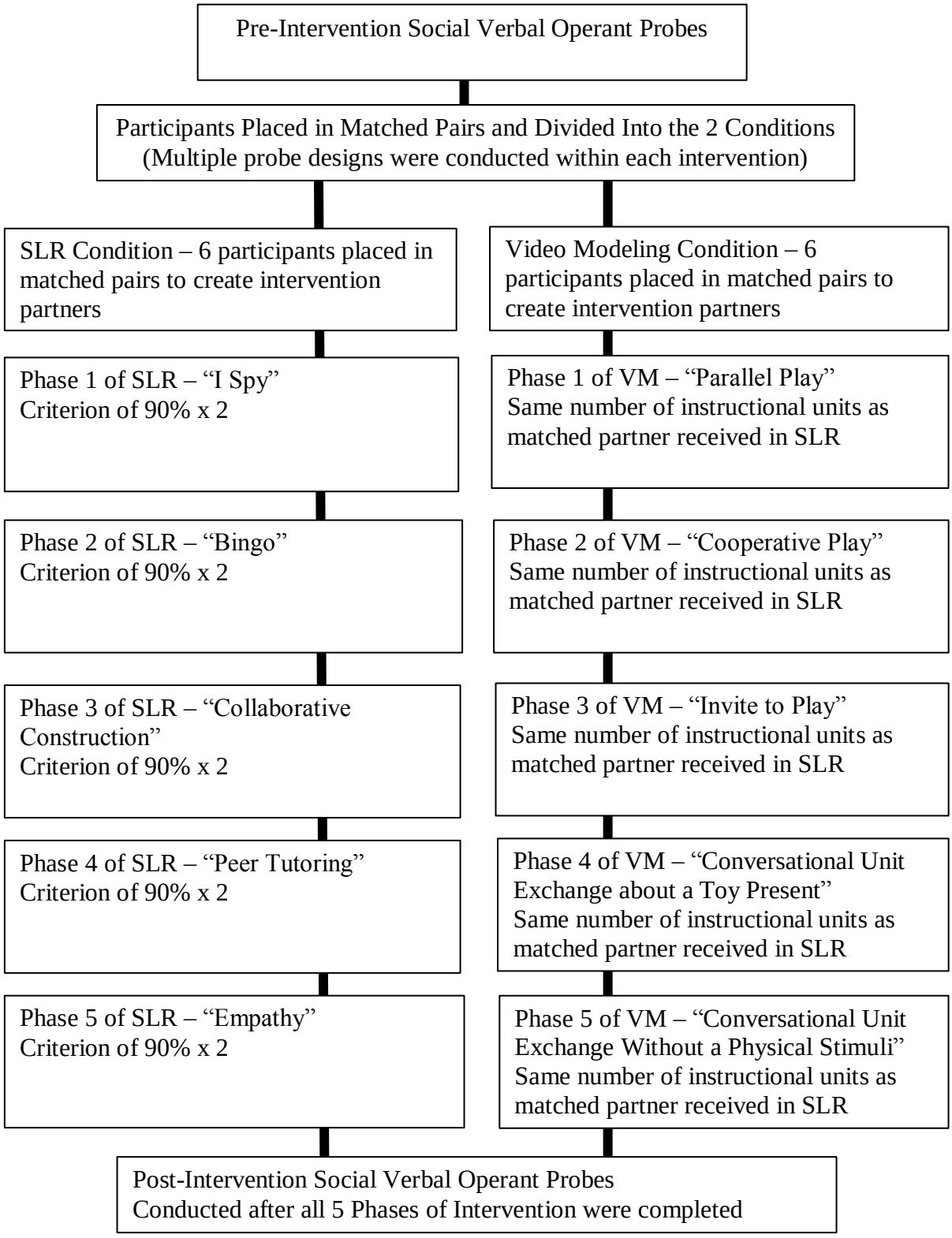


Figure 2: Progression of the Probes and Protocol Sessions for Both Social Learning Protocols

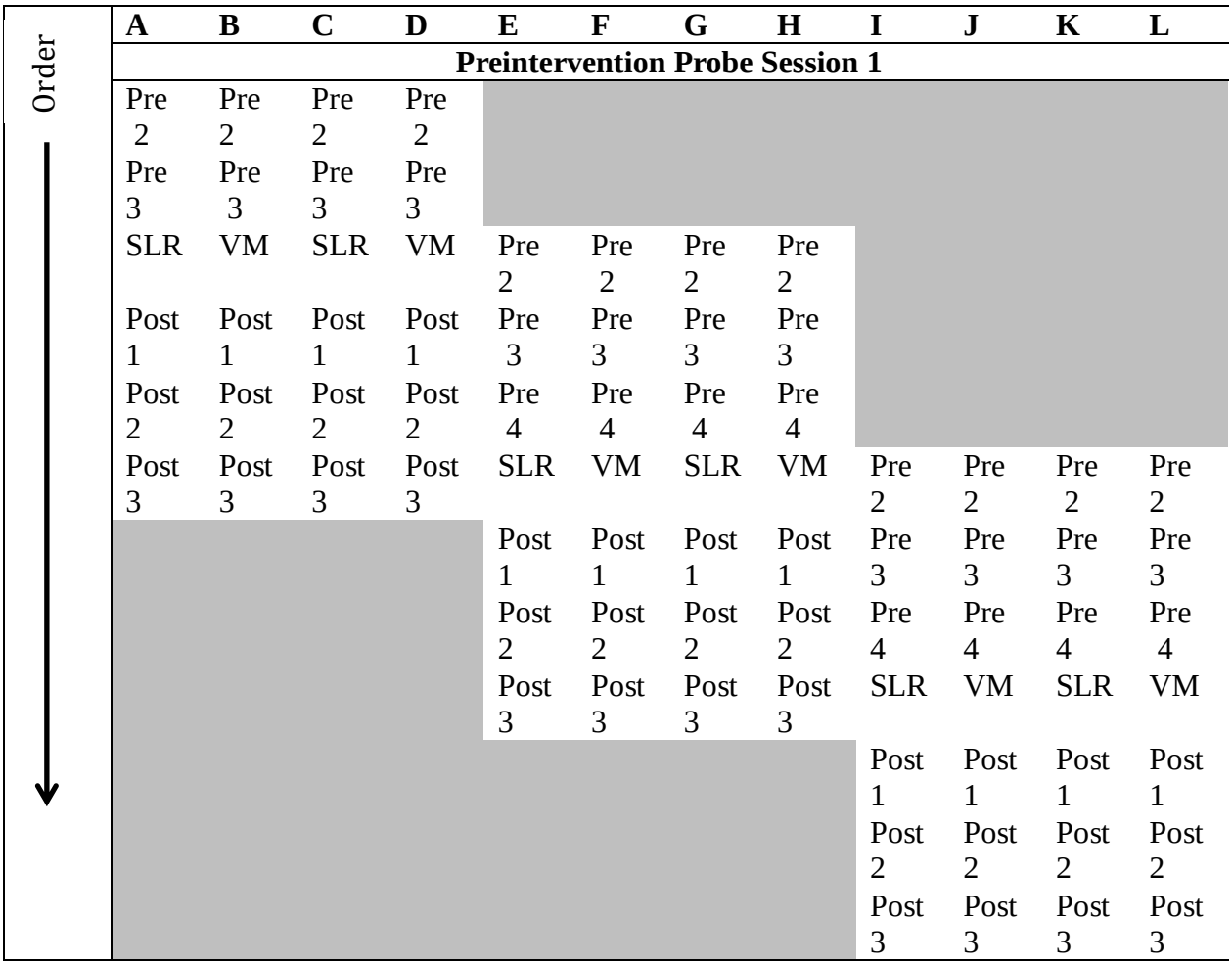


Figure 3. Sequence of experiment for all matched pairs.

Note. Due to size restrictions Figure 3 contains abbreviations. The abbreviations are explained as listed. 1) Pre is short for preexperimental probe sessions; the number lists the numeric order of the probe session. 2) SLR is short for Social Listener Reinforcement protocol. 3) VM is short for Video Modeling. 4) Post is short for Postintervention probe sessions; the number lists the numeric order of the probe session.

Dependent Variables

The dependent variables were: (a) sequelics, (b) conversational units (c) tacts and (d) missed opportunities to respond, emitted during non-instructional probe sessions. Data were also collected on whether the peer or the target student initiated the sequelic or conversational unit.

Sequelic. A sequelic is a speaker/listener exchange in which one individual emitted a verbal (either vocal or non-vocal) response, which was followed by the other individual emitting a verbal response (Vargas, 1982). The verbal episode is not continued after the listener responds as a speaker (Greer & Ross, 2008). This includes intraverbal responses between the participants such as: Participant A: "Where is the princess?" Participant B: "on the table," or Participant A: "I am hungry." Participant B: "Me too." Sequelics could also be non-vocal such as Participant A making a funny face at Participant B and Participant B responding with his or her own funny face. Data were also collected on whether the peer or the target student initiated the sequelic.

Conversational unit. A conversational unit was defined as a "verbal behavior episode between two or more individuals in which both or all parties complete a three-term contingency as both speaker and listener and the reinforcer is the verbal behavior of another" (Greer, 2002, p. 341). A conversational unit measures the reciprocity of verbal behavior between two individuals (Becker, 1989). An example of one conversational unit is: Participant A: "I want to draw." Participant B: "Me too. Where are the markers?" Participant A: "In the blue box." Participant B: "Oh, great." Data were also taken on whether the peer or the target student initiated the conversational unit.

Tacts. A tact was defined as a verbal operant in which a response is evoked by a particular event or object and the response is reinforced by social reinforcement (Eby, 2010;

Skinner, 1957). An example of a tact is: "Look I made a drawing" in the presence of his/her artwork or "It's Snow White" in the presence of the princess doll.

Missed social vocal opportunities. Missed social verbal opportunities were defined as a peer initiating a potential verbal exchange with a participant, to which the participant did not emit any verbal response (vocal or non-vocal). An example of a missed social verbal opportunity is "what's your name?" to which the peer does not respond.

Data Collection on Dependent Variables

The numbers of social verbal operants emitted by participants were measured during 5-min. probe sessions conducted in non-instructional settings with a typically developing peer. The probe sessions were held in a toy area setting and recorded by two web cameras. During all probe sessions the experimenter was unseen by the participant and peers in order to control for possible confounding variables. The presence of the experimenter may have an effect on the dependent variables in the play setting as participants could direct some of their verbal behavior in the play setting towards the experimenter (Vogt, 2008). The participants were told by the experimenter, "if you need me, I'm right outside the toy area. I will come get you in a few minutes, have fun (doing activity)." Probe sessions were conducted across three different non-instructional activities: free play, snack and a tabletop activity (play-doh®). The participants were placed in the non-instructional setting with one peer at time, however a total of three peers were used across each set of probe sessions.

Social Learning Methods: Independent Variable – Group Design

The independent variable in the group design experiment was two viable social learning methods. The two social learning methods selected for implementation in this study were: social listener reinforcement protocol (Greer & Ross, 2008; Reilly-Lawson & Walsh, 2007; Sterkin,

2012) and video modeling protocol (Charlop & Milstein, 1989; LeBlanc, 2003; MacDonald, Sacramone, Mansfield, & Wiltz, 2009; Nikopoulos & Keenan, 2004). Both conditions consisted of a protocol that had five phases; which increased in the level of complex social behavior the participant was required to emit. The phases in both conditions were matched so that participants were presented with the opportunity to emit the same number and type of social verbal operants (see Table 12). Participants were placed into matched pairs. One participant from each pair was placed in the SLR condition and one participant from each pair was placed in the VM condition. The participants in matched pairs were linked across conditions so that they each received the same number of instructional presentations for each phase of the protocols based on the number of learn units required for participants in the SLR condition to meet criterion.

Table 12

A Comparison of Social Listener Reinforcement (SLR) and Video Modeling (VM) Conditions

Phase	SLR	VM	Number of Speaker / Listener Exchanges
1	*I Spy* – yoked contingency to teach the motivational conditions of complex social behavior	*Parallel Play* – model to teach asking to join a peers play and playing along side them	1 Speaker/ Listener Exchange – Participant Initiated
2	*Bingo* – yoked contingency to condition the common reinforcement for collaboration	*Cooperative Play* – model to teach asking to join a peers play and playing with them	1 Speaker / Listener Vocal Exchange & 1 Speaker / Listener Non-Vocal Exchange
3	*Collaborative Construction* – yoked contingency condition reinforcement for using information gathered from a conversational unit exchange	*Invitation to Play* – model to teach saying hi and asking someone to come play with them (initiating an activity)	2 Speaker / Listener Exchanges (participant, peer, participant, peer) – participant is emitting a verbal conversational unit
4	*Peer Tutoring* – yoked contingency to teacher students to access reinforcement through obtaining information from peers and sharing information with them	*Conversational Unit Exchange about a Toy Present* – model to teach the emission of a conversational unit with a peer about a toy they are playing with collaboratively.	2 Speaker / Listener Exchanges (peer, participant, participant, peer) – participant emits a verbal conversation unit
5	*Empathy* – learn unit instruction on appropriate responses to situations of people expressing emotions	*Conversational Unit Exchange Without a Physical Stimuli* – model to teach the emission of a conversational unit about favorite activities with no physical stimuli	2 Speaker / Listener Exchanges (peer, participant, participant, peer) – participant emits a verbal conversation unit with no physical stimuli

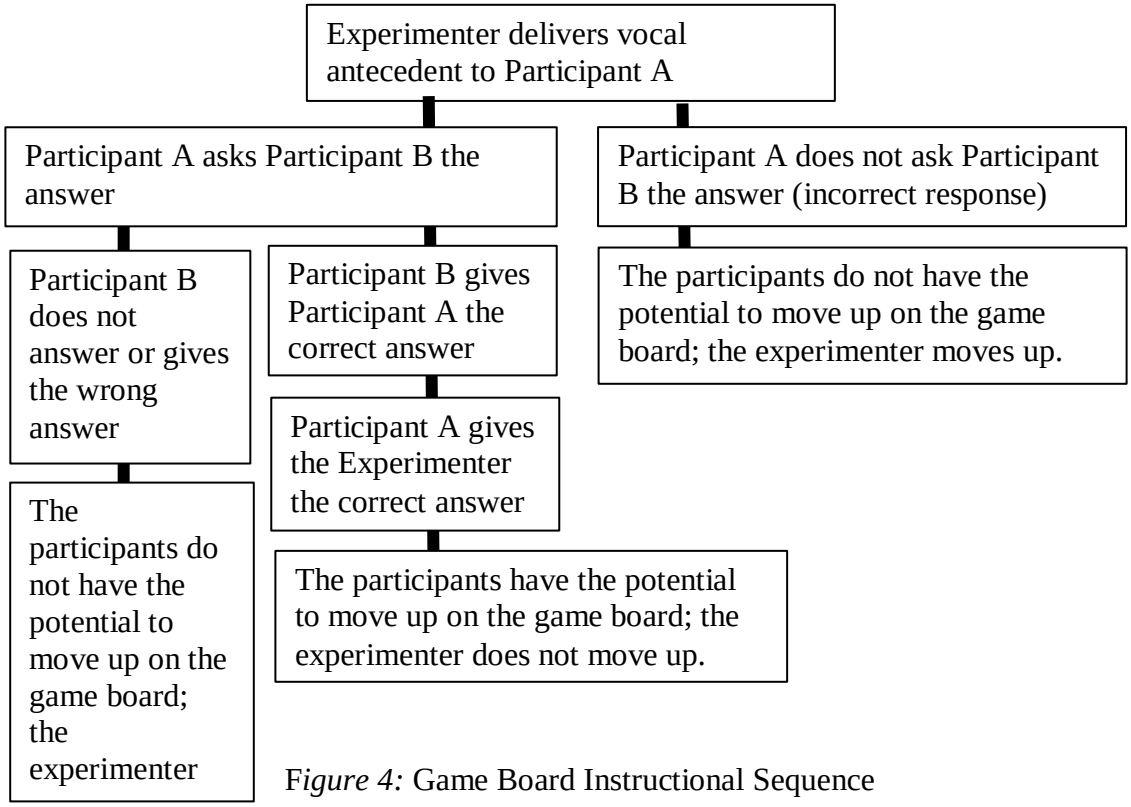
Social Listener Reinforcement Protocol: Independent Variable

One independent variable was the Social Listener Reinforcement (SLR) protocol (Greer and Ross, 2008) implemented by Reilly-Lawson and Walsh (2007) and Sterkin (2012). The 2007 and 2008 (Greer & Ross) versions of the game were for participants in an elementary setting with more exposure to group learning environments. For this study, as in Sterkin, it was modified to meet the needs of developmentally delayed preschool aged participants. Six of the twelve participants received the SLR protocol.

The SLR protocol for the present study consisted of five phases: (a) I Spy, (b) Bingo, (c) Collaborative Construction (d) Peer Tutoring, (e) Empathy Instruction. The first four games of the SLR protocol required the use of a game board. The participants were presented with a game board that had two vertical paths, of 10 spaces each, to rescue Curious George from a tree. The participants chose which character from the *Curious George* book series they wanted to be their hero and the experimenter picked her character (villain) immediately following. When a game piece reached the top of the game board and rescued Curious George from the tree that team was deemed the winner and they had access to the reinforcer treasure box. The game board was mounted on the wall or an easel so that both participants could clearly see the experimenter and the game board at all times.

Prior to each session, the experimenter presented the rules to the participants. The experimenter said, "In order to win, you and your partner need to reach the top of the game board and save George. In order to move your piece up, the person I ask a question to must answer my question using words. In order to answer to my question, you may ask your partner only one question and your partner must respond to your question. If you don't answer my question or answer my question incorrectly, I get to move my piece up on the game board." The

experimenter only accepted vocal responses emitted by the participant who was presented with the vocal antecedent; the participant who was not presented with the vocal antecedent could not respond to the experimenter but was required to respond to his or her peer. In order to move up a space on the game board participants were required to ask each other one question and together emit a speaker/listener exchange in order to emit a correct response. Only one question and one response between participants were allowed per vocal antecedent delivered by the experimenter. If the participant who was presented with the question (or vocal antecedent) emitted a correct response, the participants received vocal praise and moved their game piece up the board. If that participant emitted an incorrect response, the experimenter moved her villain game piece up one space on the game board and cheered for her villain, in order to create a stronger motivating operation. Examples of speaker/listener exchanges are provided for each phase below. Figure 4 demonstrates the Instructional Sequence for all phases using a game board.



F*igure 4:* Game Board Instructional Sequence

SLR - I Spy. The "I spy" phase was designed to teach the participants the motivational conditions for yoked reinforcement. This phase conditioned participants engaging in sequelic exchanges with their partners. During the "I spy" phase two students were seated next to another facing the experimenter, one wore a mask[1]. The participants took turns wearing a mask (i.e. a giraffe mask) that covered the student's eyes and served as a blind-fold. The experimenter then held up an item that could be viewed only by Participant A and said, "I spy (description of small 3-d object) that (Participant A) is holding" (e.g. "I spy a small red vehicle that Sam is holding"). Participant B then had to ask a question to Participant A in order to obtain the answer to the experimenter's question; this required the emission of one speaker/listener exchange between partners. After receiving the information from Participant A, Participant B answered the experimenter's question.

Experimenter to Participant B: "I spy with my little eye a long straight school supply that Participant A is holding."

Participant B to Participant A: (blindfolded) "What is it Participant A?"

Participant A to Participant B: "It's a ruler."

Participant B to experimenter: "It's a ruler!"

If Participant B emitted the correct response, the participants received verbal praise and moved their hero up one space on the game board. Incorrect responses were defined as: Participant B not asking a question, Participant B asking an inappropriate question, Participant B not listening to Participant A's response, Participant B not repeating Participant A's response, Participant A not responding to Participant B's question or Participant A giving an incorrect

[1] Some participants struggled to wear the mask appropriately in these cases a partition was used in order to prevent the targeted participant from seeing the item their partner was holding.

response to Participant B. If participants emitted an incorrect response the following correction procedure was implemented.

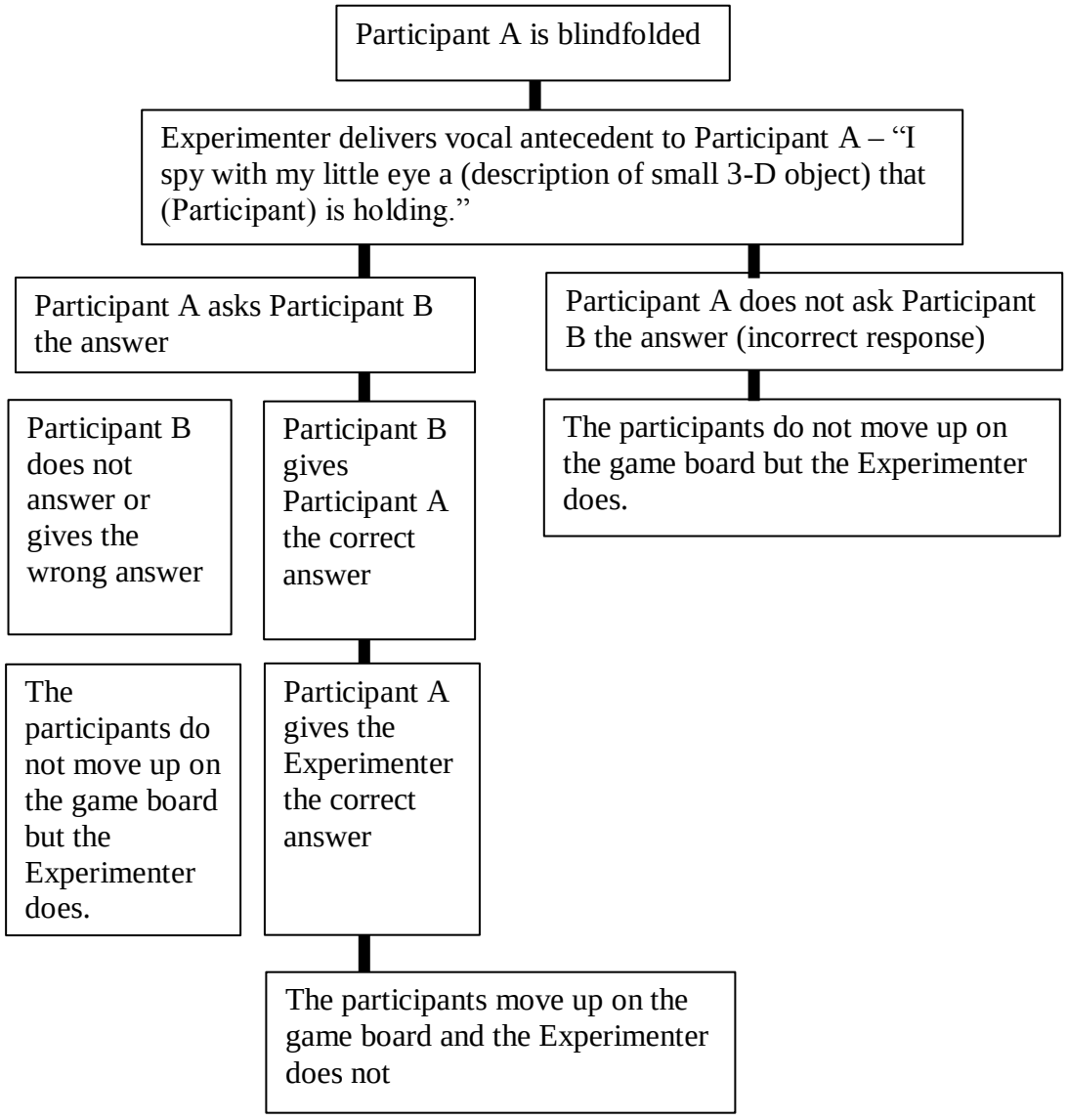
Experimenter: "It's not a (incorrect response). You need to ask Participant A what it is."

Participant B to Participant A: (blindfolded) "What is it Participant A?"

Participant A to Participant B: "It's a ruler."

Participant B to experimenter: "It's a ruler!"

The experimenter then reminded the participants they had to ask their friend for help in order to get the correct response. If Participant B did not emit any form of an incorrect response, the experimenter repeated the antecedent and provided the necessary prompts for the participants to independently complete the speaker/listener exchange. The experimenter moved her game piece up a space on the board and cheered. Figure 3 demonstrates the instructional sequence for this phase. The criterion for the "I Spy" game was 90% correct for two consecutive sessions.



F*igure 5:* The Instructional Sequence for the "I Spy" Phase of the SLR Protocol

SLR – Bingo. The contingencies of the Bingo phase of SLR can lead to "joint intentionality or joint attention" (Tomasello, 2008) because it creates shared reinforcement for collaboration. The Bingo phase was designed to teach participants the basic structure of a conversational unit. During the Bingo phase both participants had their own Bingo boards with 12 different letters on each board and a bucket of letters on the table. Each letter was presented one time in the bucket. The participants took turns drawing letters for each other, with the

experimenter stating whose turn it was. The participant who was the "picker" selected a letter, tacted the selected letter aloud and asked their partner "Do you have (letter)?" The participant who had the bingo board was required to listen and emit the correct vocal response. If they did have the game piece, they placed a penny on the game board over the matching letter.

Experimenter: "It's Participant A's turn to pick the letter."

Participant A: Selects a letter from the bucket; "Do you have a letter F?"

Participant B: Searches Bingo board "Yes, I have F."

Participant A: "Good Job, here you go." Participant A handed Participant B a penny.

If the letter is not present on Participant B's Bingo Board the response sequence is as follows:

Participant B: Searches Bingo board "No, I don't have an F."

Participant A: "Maybe next time."

If Participant B made an incorrect response (stated he/she did not or did not have the letter when the opposite was true), the Experimenter alerted Participant A to the error and Participant A delivered correction in the form of learn unit.

Participant A: "Yes, you do have a F it's right there."

Participant A: "Do you have a F:

Participant B: "yes."

Participant A: Did not give the penny marker.

Or

Participant A: "No, you do not have a F."

Participant A: "Do you have a F?"

Participant B: "no."

The students rotated the roles of speaker (in control of the bucket) and listener (playing the Bingo board) during the game. The game was yoked requiring that both participants correctly respond as the listener (e.g., "yes" or "no") and speaker (e.g., "do you have the (letter)?"), in order for the participants' hero to move up on the yoked contingency game board. If either of the participants responded incorrectly (e.g., their answer differed from their game pieces) or failed to ask their partner the question, the experimenter's character moved up on the yoked contingency game board and she cheered her success (Figure 4 shows the instructional sequence). The team to reach the top of the game board first won and selected reinforcer from the treasure box. During the game, the experimenter slightly teased the participants, saying that she would reach the top and get the reinforcer first or that she would catch up to them. The teasing was an effort to increase the participants' motivation. Data were collected separately for each participant on their speaker and listener responses, the data were then graphed in tandem. Bingo continued until each participant met criterion as a speaker and listener during the game. Criterion was set at 90% for two consecutive sessions.

Figure 6: The Instructional Sequence for Phases 2 (Bingo), 3 (Collaborative Construction) and 4 (Peer Tutoring) of the SLR Protocol.

SLR – Collaborative Construction. The contingencies of collaborative construction can lead to conversational unit exchanges with peers, and was designed to teach participants to obtain reinforcement through listening for information or delivering information as a speaker. During the collaborative construction condition each participant received a set of non-interlocking puzzles. The set contained a laminated outline of the design and five different component pieces. Each component piece was presented in three different colors. In order to make the puzzle pieces easily identifiable each participant was given a baking sheet with all of the puzzle pieces laid out. The experimenter held a color copy of each participant's completed puzzle. The participants took turns playing the role of "teacher" and "student. The participant playing the role of "teacher" had to initiate a conversational unit by telling the "student" what piece to get. The "student" the responded by finding the appropriate pieces and asking which color item was needed. The "teacher" completed their first conversational unit by tacting the necessary color. The "student" completed their first conversational unit by obtaining the appropriate color and stating they were finished. The "teacher" then provided consequation for the "student's" behavior either reinforcing a correct response or giving a correction in the form of the learn unit. Figure 4 provides a model of the instructional sequence.

Experimenter: "Participant A is the first teacher." Point to the flowerpot.

Participant A (aka the "teacher"): "get the flower pot."

Participant B (aka the "student"): "Ok. What color (item) should I get?"

Participant A (aka the "teacher"): "the orange flower pot."

Participant B (aka the "student"): "I did it."

Participant A (aka the "teacher"): "Good Job!"

Experimenter: "Now its Participant B's turn to be the teacher."

If a correction was required the following procedure was implemented.

Participant B (aka the "student"): "I did it!"

Participant A (aka the "teacher"): "I said get the orange flower pot not the green."

Participant B (aka the "student"): makes the correction.

Experimenter: "Now its Participant B's turn to be the teacher."

If both participants successfully completed their roles as "teachers" and "students" their hero moved up one space on the game board. If either participant made an error when playing either role, the experimenter moved up and cheered. When both participants met criterion of 90% correct responses for two consecutive sessions across both "teacher" and "student" roles, the phase was considered mastered.

Peer Tutoring with Game Board. The contingencies in the peer tutoring phase function to increase the emission of approvals as well as conversational units with peers. The peer tutoring with the game board teaches students to access reinforcement through emitting speaker/listener exchanges, learn new information from peers, and teach information he or she knows to his or her peer. During the peer tutoring phase participants rotated teaching each other five different stimuli. The participant who was functioning as the "tutor' presented a set of four tacts to their peer or "tutee," which the "tutor" had previously mastered. Each tutoring session consisted of the delivery of 20 learn units, in which the set of five stimuli were presented four times each (four different exemplars). The "tutor" reinforced or corrected "tutee" responses by delivering instruction in the form of learn units. Vocal praise functioned as a reinforcer for all participants and was therefore used to provide reinforcement in this phase. Corrections were delivered in the form of learn units and consisted of the "tutor" providing the correct response,

which the "tutee" was required to echo. Figure 4 provides an example of the instructional sequence. An example of a learn unit for a correct response in the peer tutoring phase follows:

Experimenter: "It's Participant A's turn to the 'tutor.'" Cues a power point image (flamingo).

Participant A: "What is it Participant B?"

Participant B: "Flamingo."

Participant A: "Good Job!"

An example of a learn unit for a incorrect response in the peer tutoring phase follows:

Participant A: "it's a flamingo."

Participant A: "What is it Participant B?"

Participant B: "Flamingo."

The participants' game piece moved up a space when the "tutee" emitted an independent correct response and the "tutor" emitted a correctly presented learn unit complete with consequation. The experimenter's game piece moved up when the "tutee emitted an incorrect response or the tutor emitted an incorrect learn unit presentation. Participants alternated between tutor and tutee roles. When the tutee and tutor met the criterion set for 90% correct responses for two sessions, the phase was considered mastered.

SLR – Empathy Instruction. The Oxford English Dictionary defines empathy as: "The ability to understand and share the feelings of another." In order to teach empathy learn unit instruction was conducted to teach the appropriate responses to situations of people expressing emotions. Five different scenarios were presented in random rotation totaling 20 presentations per session. The five different scenarios were: falling down, playing with friends, getting sick / hurt, spilling an item and having a disagreement with peers. Each scenario was presented four

times each with two different video vignettes and two different pictures of the action. Response topographies consisted of the following questions: What happened? How would you feel if you were the person? Why would you feel that way? What could you do to help? Sessions consisted of eighty learn units in which questions were rotated across the five scenarios. Each question for each picture was presented once. For example: the experimenter showed a video of a boy falling off his bike and asked, "What happened? "How would you feel if you were the boy?" "Why would you feel that way" "What would you do to help?" All correct responses were reinforced with verbal approvals and all incorrect responses were consequated as per the learn unit correction procedure. The following is an example of the learn units embedded in the question rotation for correct responses. In the case of incorrect responses the experimenter provided an echoic for the correct response and then repeated the antecedent so the participant could independently emit the correction.

Experimenter: Shows a picture of the boy falling off the bike "What happened?"

Participant A: "the boy fell of the bike."

Experimenter: "Good Job!" "How would you feel if you were the boy?"

Participant A: "Sad."

Experimenter: "Nice thinking!" "Why would you feel sad?"

Participant A: "Because I would be hurt."

Experimenter: "That's right!" "What could someone do to help you?"

Participant A: "Get my mom."

Experimenter: "What a great idea!"

When the participant met criterion of 90% correct responses for two consecutive sessions across all four responses, the phase was considered mastered.

Video Modeling: Single Case Independent Variable

The second independent variable was video modeling instruction. Six of the twelve participants received a video modeling protocol. The participant watched brief videotaped segments of complex social behavior between an adult and unknown preschool student and then experienced play sessions in the same setting, with the same stimuli and a novel adult. The number of instructional presentations were matched or yoked between the participants in the SLR condition and the VM condition to ensure that each matched pair received the same number of instructional presentations.

The videos used for this protocol were made by the experimenter but followed the current guidelines for effective videos used in video modeling found in published literature (Nikopoulos & Keenan, 2006). The videos were filmed from a spectator perspective. The models were an unknown adult and an unknown typically developing preschool student. Since the probe sessions were designed to occur in the presence of the adult, it was anticipated that the participants would imitate the comments made by the preschool student. Due to research showing that the chances of the learner performing the modeled behaviors are perhaps greater if the videotape was filmed in the same play setting, videos were filmed in the same environment where the probe sessions occurred (Sigafoos & O'Reilly, 2007). The same materials that where in the natural environment, and the environment where the probe sessions would take place were used in the videos. The "actors" in the videos behaved as natural as possible avoiding slow or exaggerated pacing (Nikopoulos & Keenan, 2006).

The video modeling protocol was based of the current VM studies found in the behavioral literature. Each video session consisted of the participant watching and attending to a short (35-60 second) video that modeled by an unknown preschool student initiating a

speaker/listener exchange with an unknown adult. At the beginning of each video modeling session, the experimenter had the student sit at the table next to her. The video screen was clearly placed on the table directly in front of the student, providing him/her with an unobstructed view. All distractions were removed from the surrounding environment. The experimenter gave the verbal antecedent "let's watch a video" and pointed to the screen. The experimenter made sure the participant's face remained orientated towards the screen; if the participant looked away for 5-sec a prompt to attend to video was given. The participant watched the video three times in rapid succession. In between each repetition of the video the instructor gave the participant reinforcement in the form of verbal praise for correct on-task behavior (e.g. "good sitting," "good watching the video") to maintain attending.

After watching the video three times the participant was led to the play area where a novel adult staff member was waiting (replicating the video set-up). The participant was left in the play area for 3-mins during which time the adult only responded to verbal operants emitted by the participant and did not provide any prompts to try to get the participant to engage with her. This study did not employ specific experimenter-implemented contingencies (reinforcement, prompting or correction procedures) (Reagon, Higbee, & Endicott, 2006; Taylor et al., 1999). The experimenter conducted the video modeling protocol no more then three times before participants were returned to regular classroom instruction. In between each VM session participants were given between 5-8 mins of free-time in the classroom. Video viewing and probe area play averaged less then 5-mins in duration indicating that this was a time effective protocol.

The participant remained in each phase for the same number of sessions as their matched partner in the experimental condition (e.g. Participant A was in "I spy" for four sessions (40

learn units) so Participant B received 12 exposures to video Set 1 (36 instructional presentations)). Each video set had three different videos demonstrating the same skill; therefore if the participant met criterion on the video (90% for two consecutive sessions) he or she could remain in the same phase while reducing the risk of satiation. Data were collected on each trial of the VM protocol. Correct behaviors were defined as the participant emitting an imitative response to all components of the vocal and non-vocal verbal behavior; however this was based on behavior feature not exact imitation. Participants did not have to emit exact point-by-point identical responses (e.g. "Can I play with you?" "May I play with you?" "Can I play too?"). The exact identical response was not required due to research that shows that behavior-feature imitation leads to greater generalization of the newly acquired skill (Grant & Evans, 1994). Incorrect responses were defined as the participant not emitting either the vocal or non-vocal portion of the modeled behavior. Participants were not given a correction or reinforcement for their modeling behaviors.

The video modeling consisted of five phases of videos in order to mirror the five components of SLR. Each video presented a novel skill and became more complex as the participant progressed through the sequence. The five component skills in the videos were: "saying hi and asking to join someone's play" (Nikopoulos & Keenan, 2007), "engaging in reciprocal play," (Nikopoulos & Keenan, 2003), "saying hi and inviting someone to play" (Nikopoulos & Keenan, 2004), "engaging in conversational units about play item" (Charlop & Milstein, 1989) and "engaging in conversational units about item not present" (Sherer et al., 2001). Table 13 contains a sequence of the skills taught in the VM condition.

Table 13

Sequence of VM Instruction

Video Phase	Skill	Stimuli 1	Stimuli 2	Stimuli 3
Video 1	Greetings & Parallel Play	Pizza	Blocks	Train
Video 2	Greetings & Cooperative Play	Bus	Train	Ball
Video 3	Greetings & Invitation to Play	Toy Garage	Toy Farm	Toy Pizza
Video 4	Conversational Unit About Toy	Mr. Potato Head	Play-doh	Coloring
Video 5	Conversational Unit Without Physical Stimuli	Favorite Toy	Favorite Food	Favorite TV Show

Data Collection

Pre- and postexperimental probe sessions measuring the frequency of social verbal operants were conducted across settings and participants to test for the audience control of social engagement. All probe sessions were conducted for 5-mins and were recorded by two video cameras. The experimenter used a conventional timer that was started following the entrance into the room. The primary observer collected data from each video using a data collection form, timer and pen. The data collection form used during these probe sessions was prepared by the experimenter prior to the start of the experiment and consisted of 10 rows and 13 columns. The rows were marked in 30-s time intervals for the duration of 5-m; the time intervals corresponded with the times burned on the video. The columns separated the different vocal operants: mands, tacts, vocal sequelics, non-vocal sequelics, vocal conversational units, non-vocal conversational units, approvals, disapprovals, and missed opportunities. The experimenter used event recording where each target behavior was recorded with a tally mark in its designated column upon the emission of an operant. When recording sequelics and conversational units a tally was placed in

one of two columns (self or peer) to indicate who initiated the speaker behavior. The data for each column are counted and recorded. Data were blocked into 15-min sessions, with each block containing a 5-min probe session from all three different non-instructional settings (free-play, table top activity and snack).

The SLR condition consisted of five different phases: (a) I Spy, (b) Bingo, (c) Collaborative Construction, (d) Peer Tutoring, and (e) Empathy Instruction. See Figure 5 for an example of the SLR sequence. The phases progressed from simple to more complex as the participants moved through the protocol. The first four phases of SLR did not always result in an even number of learn units being run each session, therefore the learn units were blocked into sets of ten. During the empathy phase a session consisted of 80 learn units. Data were collected in each phase of SLR using a pen and a data collection form. Correct responses were marked as a plus (+) and incorrect responses were marked as a minus (-). Sessions were concluded when one team reached the top of the game board during peer-yoked contingency phases.

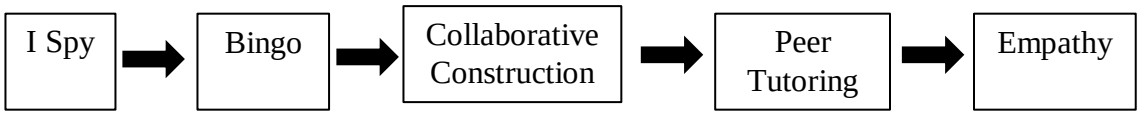


Figure 7: The Sequence of The Social Listener Reinforcement Protocol

During the SLR treatment phases data were collected as responses to learn unit presentations with data recorded by the experimenter as described previously. During treatment sessions, both the experimenter's accuracy of providing learn unit instruction for the treatment and the participant's accuracy of responses were recorded by an independent observer. In order for the experimenter to be accurate, the experimenter had to present a clear and unambiguous antecedent to the participant while the participant was attending while providing no other forms of prompts. The experimenter had to also provide the participant 3 to 5-s to respond to the

antecedent and then provide an accurate consequence to the response based on the learn unit protocol described previously, the participants' instructional history and history of reinforcement.

In addition to the experimenter collecting data on the participant's responses, an independent observer collected data on both the experimenter and participant's behaviors according to the parameters of the learn unit in order to ensure procedural fidelity. When the experimenter provided a correct antecedent to the attending participant, the independent observer recorded a check mark, and if the antecedent was incorrect, the observer notated a check mark with a circle around it. A participant's correct response was recorded as a plus and an incorrect response was recorded as a minus. The observer also recorded correct consequence of reinforcement based on the participant's response as a, "R" and a correct consequence of a correction procedure as a "C". If the reinforcement or correction procedure were conducted inaccurately, the corresponding letter was circled. Additionally, if the inter-response time between the experimenter's antecedent and participant's response was incorrect, or the experimenter inaccurately recorded the participant's behavior, the observer circled the participant's plus or the minus (Ross, Singer-Dudek & Greer, 2005).

Interobserver Agreement

Two additional observers, who were graduates of the program in Teaching as Applied Behavior Analysis and who were trained in the analysis of verbal behavior, conducted interobserver agreement for experimental probe sessions and treatment sessions. The additional observers independently viewed and transcribed the video recorded experimental probe sessions, and recorded data on the custom data sheet. Data were compared during a separate meeting. The independent observers were blind to both participants' assigned conditions, and if they were

observing a pre- or postintervention probe session. Prior to IOA being conducted on pre- and postexperimental probe sessions the independent observer received training on the definitions of verbal operants and how to collect data on verbal operants. The independent observer had to receive 100% agreement on two training videos before being allowed to independently collect data on experimental probe sessions. Additional independent observers were trained to conduct both the SLR and VM protocols and observed the primary experimenter running both conditions. Data were simultaneously but independently recorded during treatment sessions and then compared at the completion of each session.

Interobserver agreement during experimental probe sessions was calculated using point-to-point correspondence. Agreement was calculated by dividing the number of agreements by the total number of agreements plus disagreements and multiplying by 100 (Cooper et al., 2007). Tables 14 and 15 show the interobserver agreement for the percentage of preintervention and postintervention probe sessions. Some experimental probe sessions had low interobserver agreement, due to environmental limitations; these include: extraneous classroom noise on recording, children speaking in low tones and children speaking with poor articulation which made it difficult for the vocals to be transcribed accurately.

Table 14

The Percentage of Experimental Probe Sessions, Mean and Range of Interobserver Agreement for Participants in the SLR Condition

Participant	**A**	**B**	**C**	**D**	**E**	**F**
Percentage of Sessions	27%	39%	43%	38%	38%	52%
Mean Agreement	89%	89%	85%	97%	93%	100%
Range of Agreement	88% - 100%	80% - 100%	76% - 100%	92% - 100%	92% - 100%	100%

Table 15

The Percentage of Experimental Probe Sessions, Mean and Range of Interobserver Agreement for Participants in the VM Condition

Participant	**G**	**H**	**I**	**J**	**K**	**L**
Percentage of Sessions	33%	28%	29%	24%	29%	29%
Mean Agreement	89%	93%	72%	85%	77%	86%
Range of Agreement	70% - 100%	76% - 100%	65% - 100%	72% - 100%	72% - 100%	77% - 100%

In the SLR condition IOA was obtained across all five phases of the protocol. Table 16 shows the interobserver agreement for the percentage of sessions across all phases of the SLR protocol.

Table 16

The Percentage of Treatment Sessions, Mean and Range of Interobserver Agreement for Participants in the SLR Condition

Participant	**A**	**B**	**C**	**D**	**E**	**F**
I Spy Phase						
Percentage of Sessions	33%	33%	37.5%	30%	46%	40%
Mean Agreement	100%	100%	100%	100%	97.3%	87.5%
Range of Agreement	100%	100%	100%	100%	92% - 100%	85% - 91%
Bingo Phase						
Percentage of Sessions	25%	25%	50%	20%	35.7%	23.7%
Mean Agreement	100%	100%	100%	100%	98%	98%
Range of Agreement	100%	100%	100%	100%	95% - 100%	95% - 100%
Collaborative Construction Phase						
Percentage of Sessions	25%	25%	40%	33%	44.4%	50%
Mean Agreement	100%	100%	100%	100%	100%	100%
Range of Agreement	100%	100%	100%	100%	100%	100%
Peer Tutoring Phase						
Percentage of Sessions	50%	59%	14%	12%	62.5%	41.6%
Mean Agreement	100%	100%	100%	100%	100%	100%
Range of Agreement	100%	100%	100%	100%	100%	100%
Empathy Phase						
Percentage of Sessions	66%	40%	66%	50%	60%	56%
Mean Agreement	100%	99.5%	100%	100%	94%	100%
Range of Agreement	100%	90% - 100%	100%	100%	75% - 100%	100%

Interobserver agreement was conducted for all of the VM sessions. The experimenter and novel adult staff member who was present in the VM session, independently recorded occurrences of the target behavior and compared results at the completion of the session. Interobserver agreement was a 100% for 100% of all VM sessions conducted across all six video modeling participants.

Chapter III

RESULTS

Single Case Results

Self-Initiated Conversational Units and Sequelics. Figures 8 and 9 portray individual participants' pre- and postintervention data on the number of self-initiated social verbal operants they emitted during experimental probe sessions. Figure 8 shows that four participants in the SLR condition increased the number of self-initiated social verbal operants they emitted, one decreased and one remained consistent. Figure 19 illustrates that three participants in the VM conditioned increased the number of self-initiated social verbal operants they emitted and three decreased.

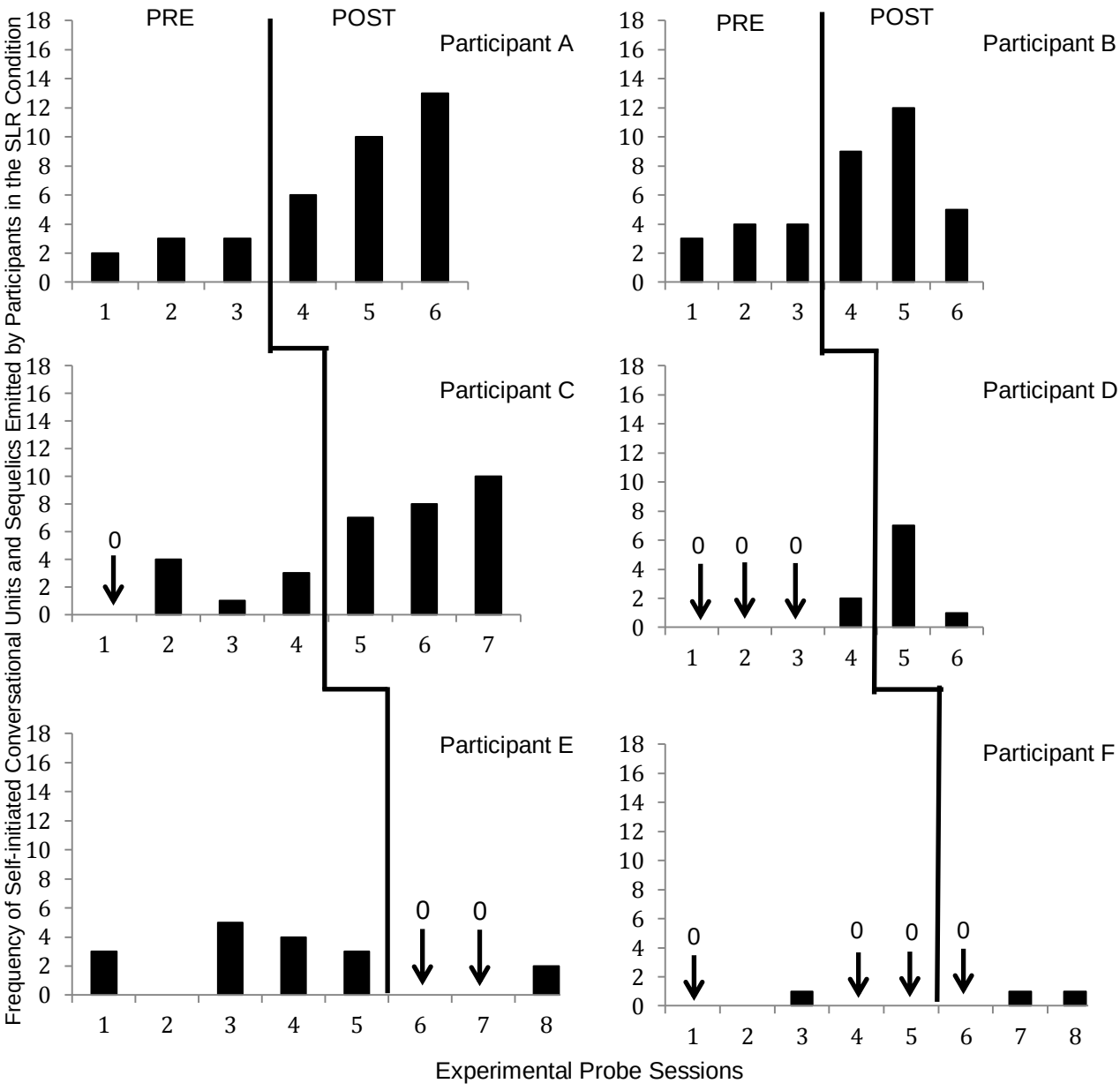


Figure 8. Frequency of self-initiated conversational units and sequelics emitted by participants in pre- and postintervention probe sessions. The solid line denotes the SLR protocol. Each data point represents 5-mins in each of the three settings, which are combined here and represented in one 15-min block.

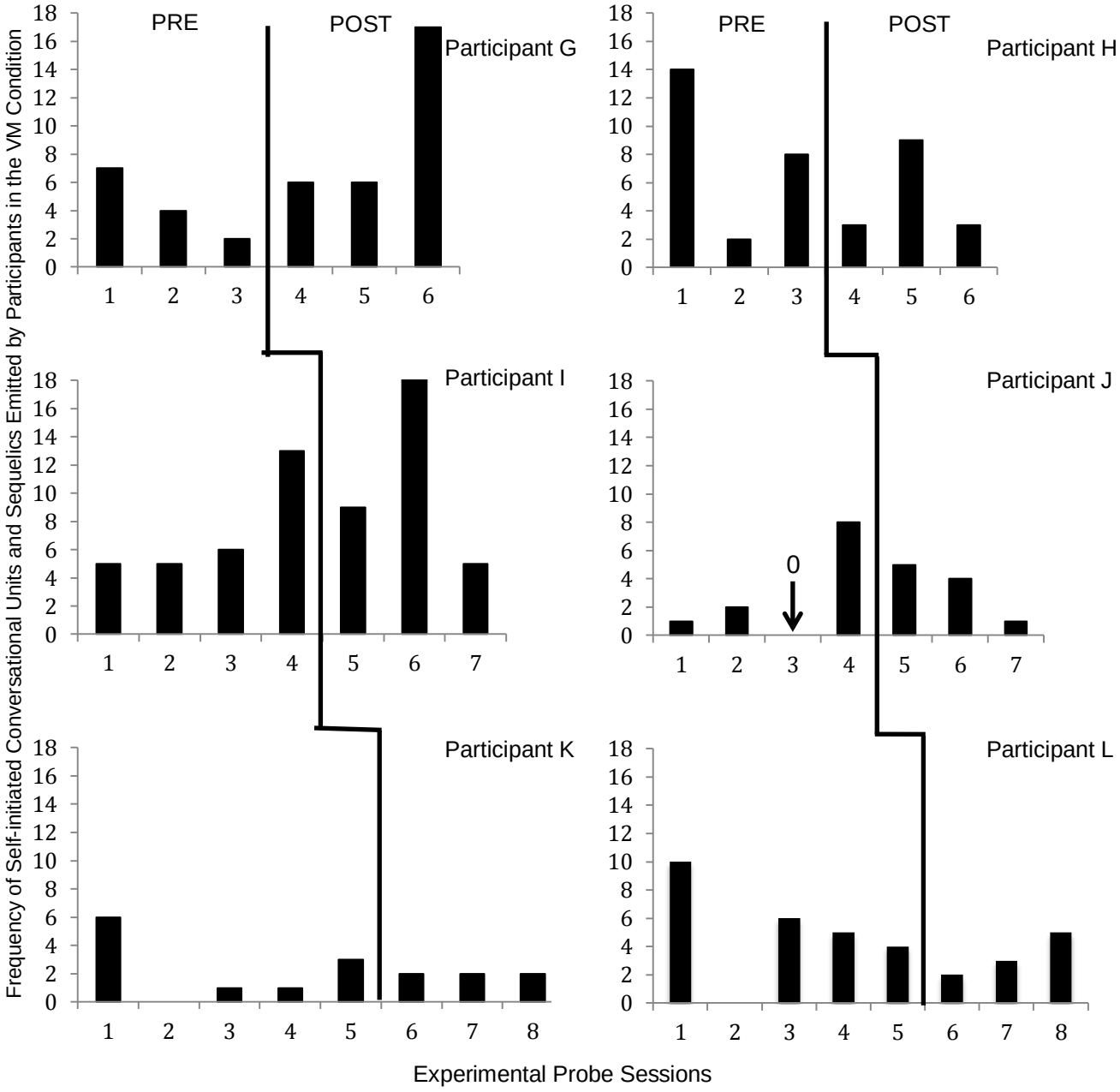


Figure 9. Frequency of self-initiated conversational units and sequelics emitted by participants in pre- and postintervention probe sessions. The solid line denotes the VM protocol. Each data point represents 5-mins in each of the three settings, which are combined here and represented in one 15-min block.

Figures 10 and 11 depict individual participants' pre- and postintervention data on the number of all social verbal operants (tacts, sequelics, and conversational units) emitted during experimental probe sessions. Figure 10 shows that four participants in the SLR condition increased the total number of social verbal operants they emitted, one remained the same and one decreased. All four participants in the SLR condition showed large increases. Figure 11 shows that three participants in the VM condition increased the total number of social verbal operants they emitted and three decreased. Two participants in the VM condition demonstrated large increases and one showed smaller gains.

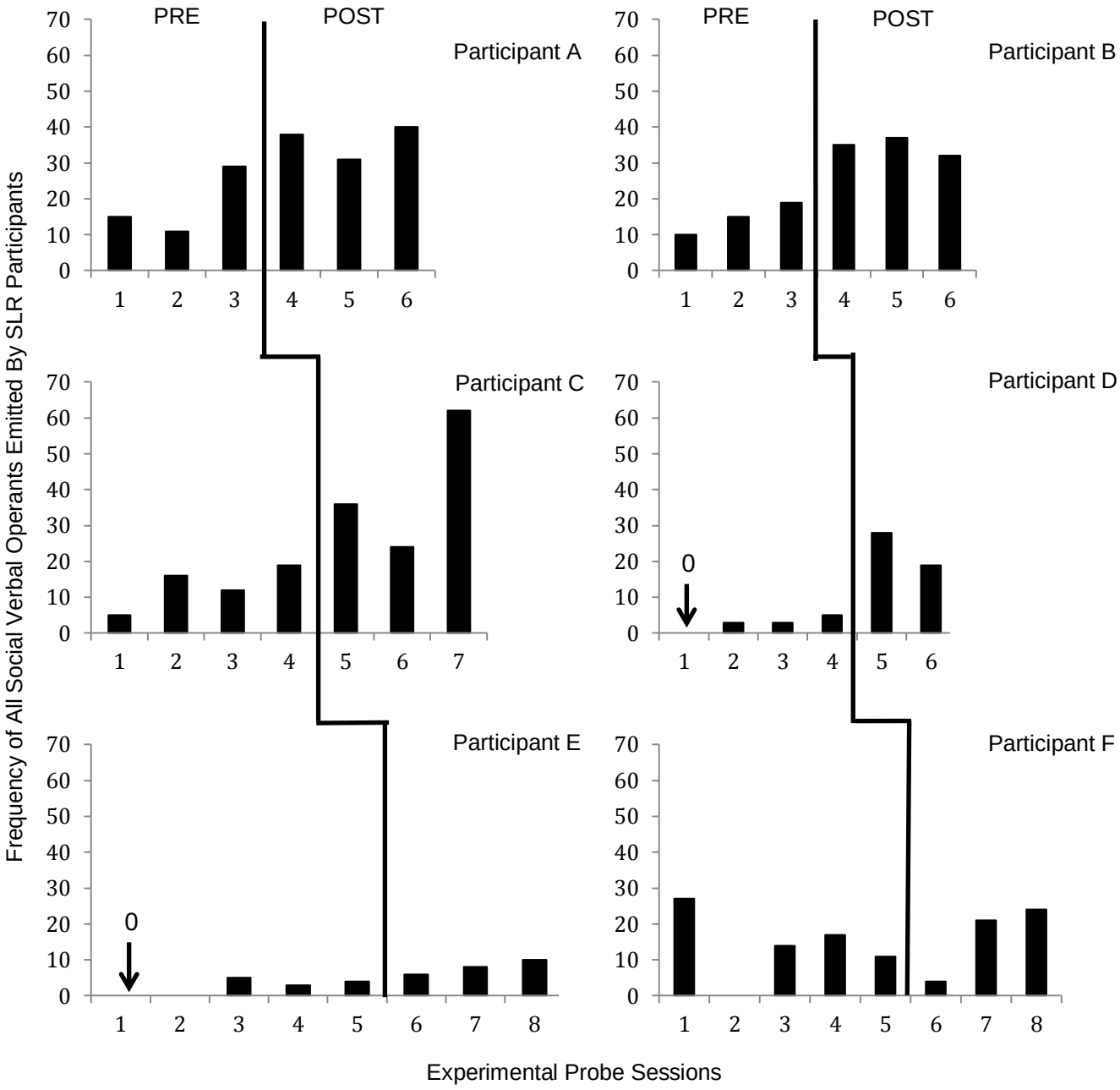


Figure 10. Frequency of all social verbal operants (tacts, sequelics and conversational units) emitted by participants in pre- and postintervention probe sessions. The solid line denotes the SLR protocol. Each data point represents 5-mins in each of the three settings, which are combined here and represented in one 15-min block.

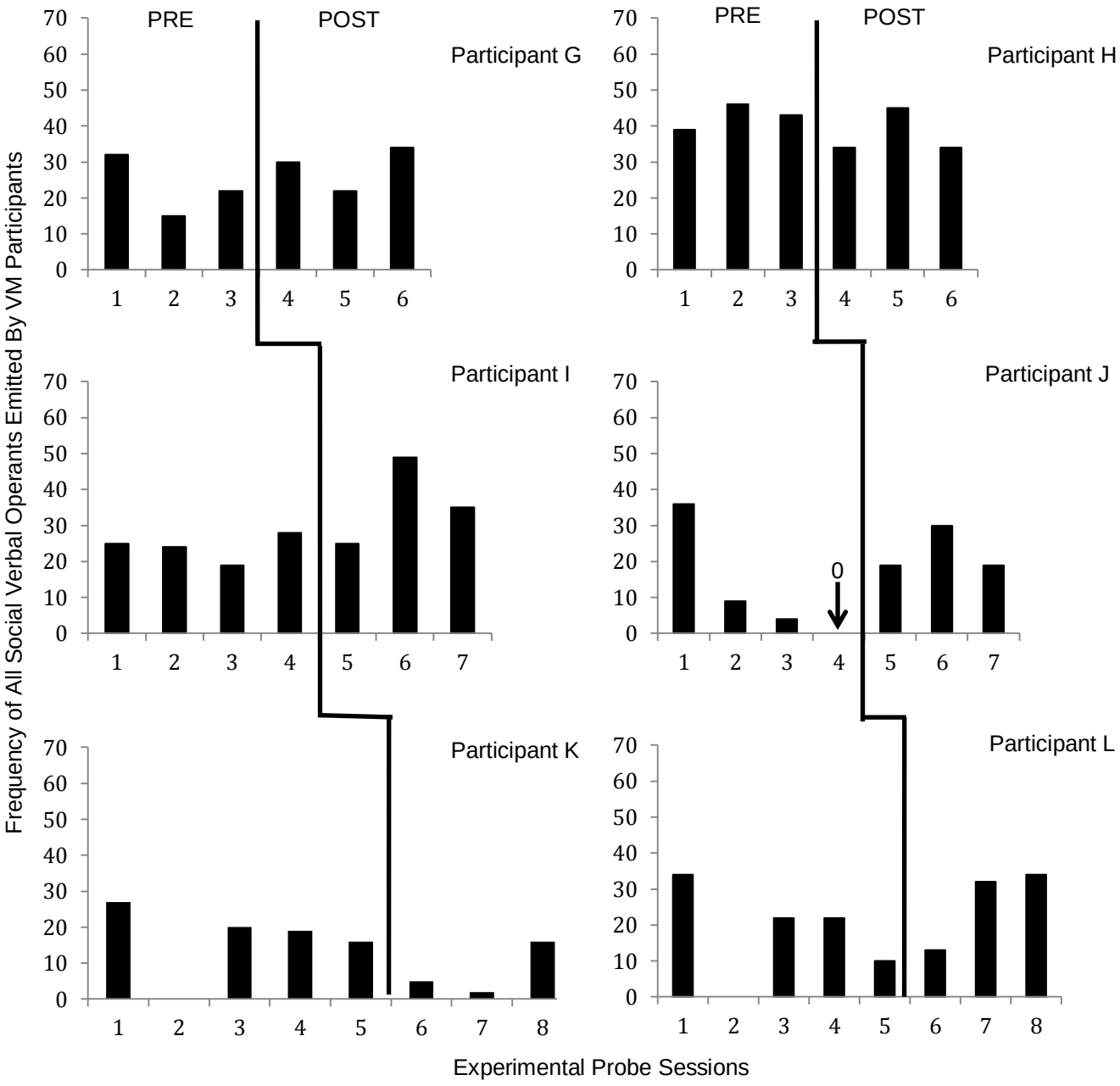


Figure 11. Frequency of all social verbal operants (tacts, sequelics and conversational units) emitted by participants in pre- and postintervention probe sessions. The solid line denotes the VM protocol. Each data point represents 5-mins in each of the three settings, which are combined here and represented in one 15-min block.

Figures 12 and 13 illustrate pre- and postintervention data on the percentage of peer-initiated social verbal operants participants responded to during experimental probe sessions. Figure 12 shows that all six participants in the SLR condition increased. Figure 13 demonstrates two participants in the VM condition increased and four decreased.

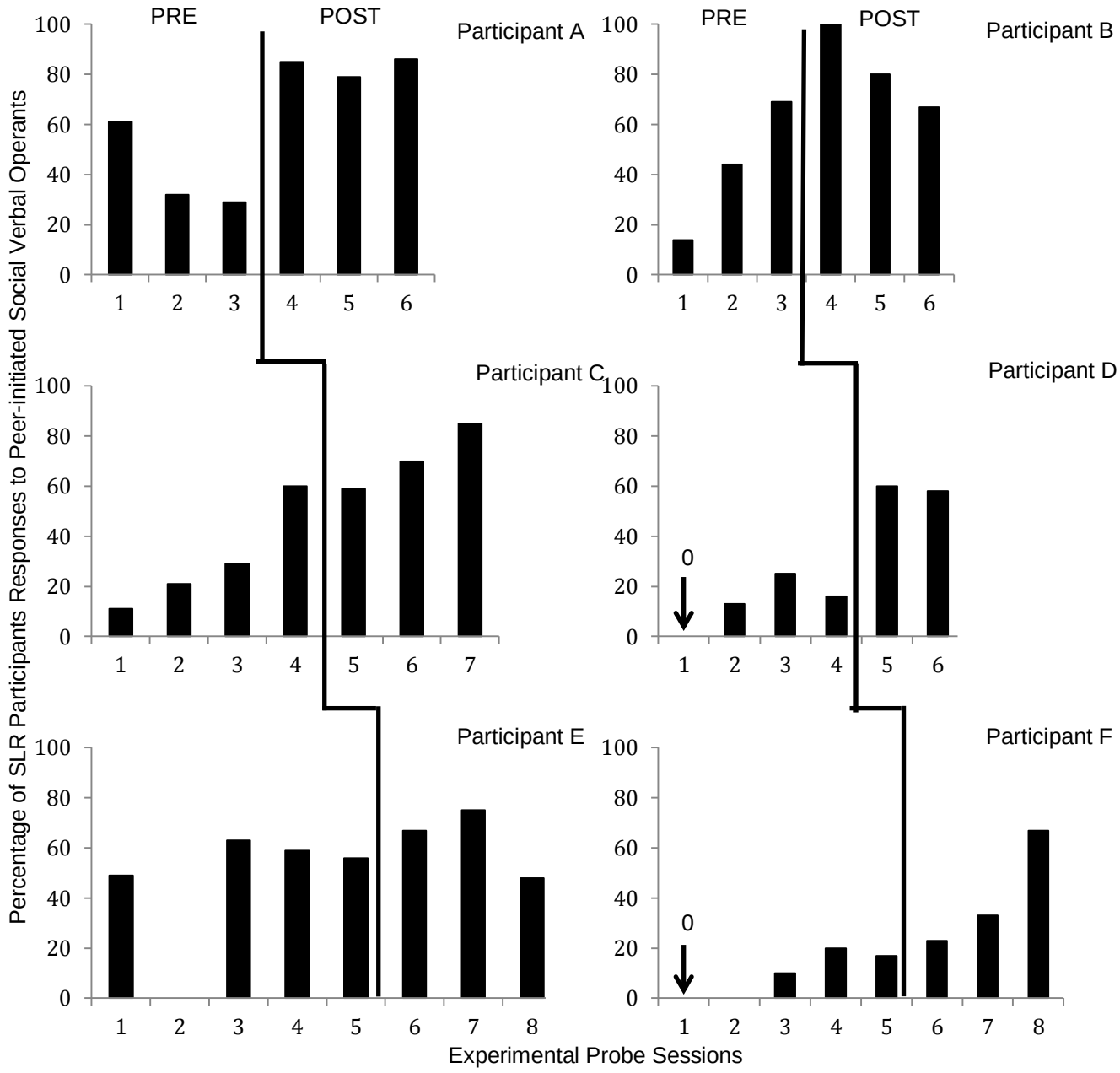


Figure 12. Percentage of peer-initiated social verbal operants participants responded to in pre- and postintervention probe sessions. The solid line denotes the SLR protocol. Each data point represents 5-mins in each of the three settings, which are combined here and represented in one 15-min block.

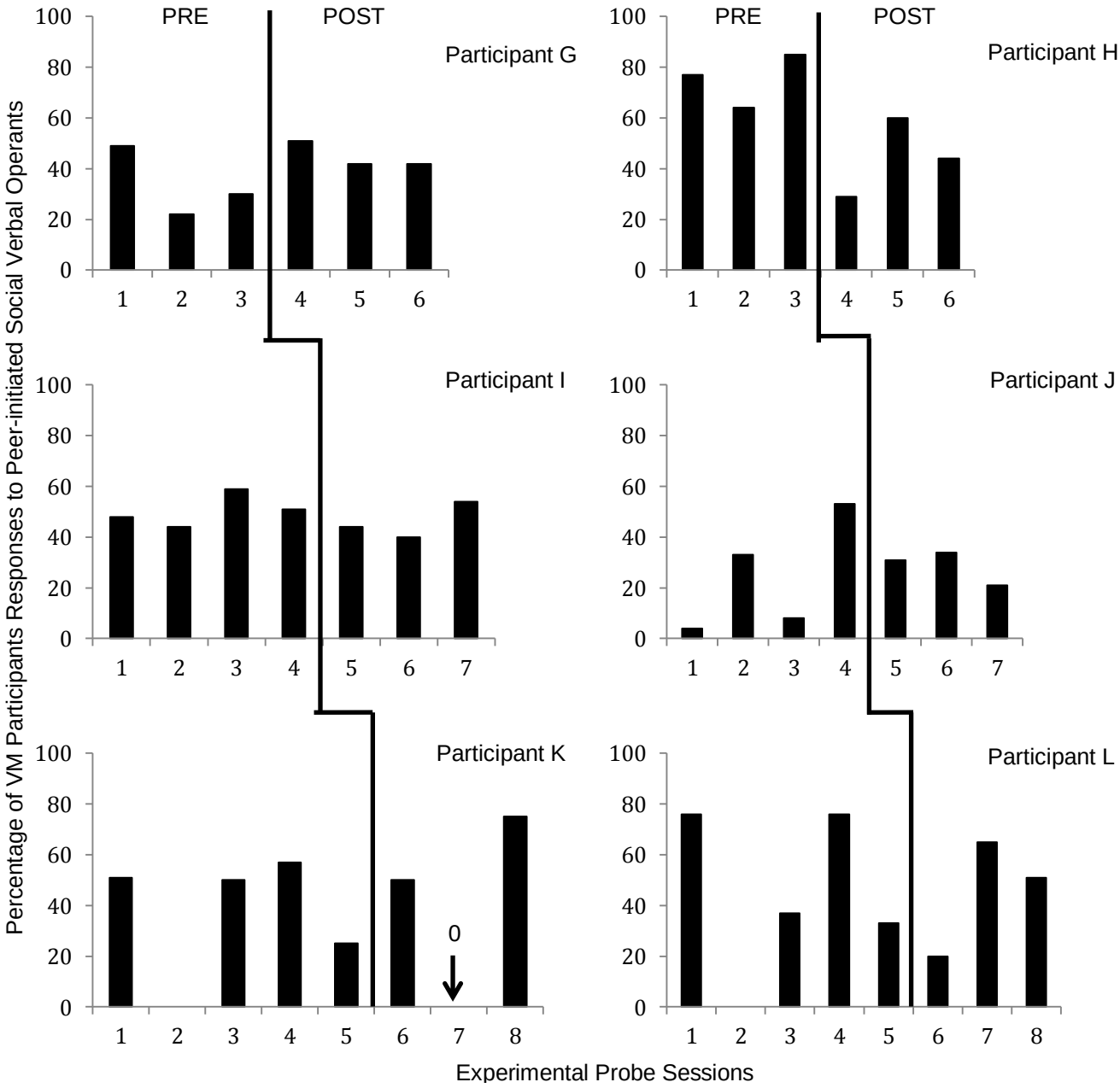


Figure 13. Percentage of peer-initiated social verbal operants participants responded to in pre- and postintervention probe sessions. The solid line denotes the VM protocol. Each data point represents 5-mins in each of the three settings, which are combined here and represented in one 15-min block.

Figures 14 and 15 display participants' number of missed opportunities to respond to peer-initiated social verbal operants during pre- and postintervention experimental probe

sessions. Figure 14 shows that five participants in the SLR condition showed an overall decrease in the number of peer's verbal operants they failed to respond to and one participant had a minor gain. Figure 15 shows five participants in the VM condition increased the number of peers' social verbal operants they missed opportunities to respond to and one decreased.

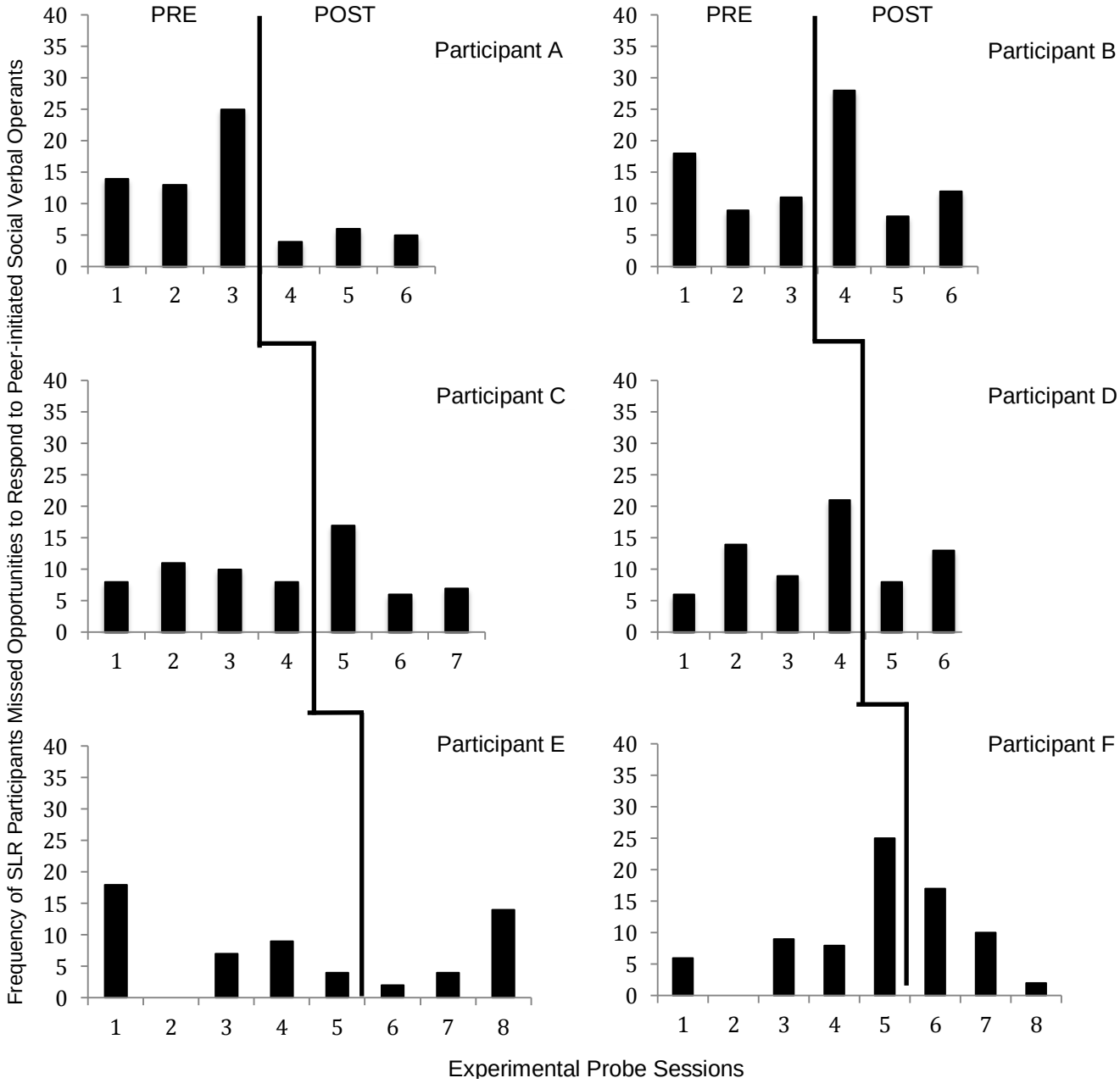


Figure 14. Frequency of missed opportunities to respond to peer-initiated social verbal operants in pre- and postintervention probe sessions. The solid line denotes the SLR protocol. Each data point represents 5-mins in each of the three settings, which are combined here and represented in one 15-min block.

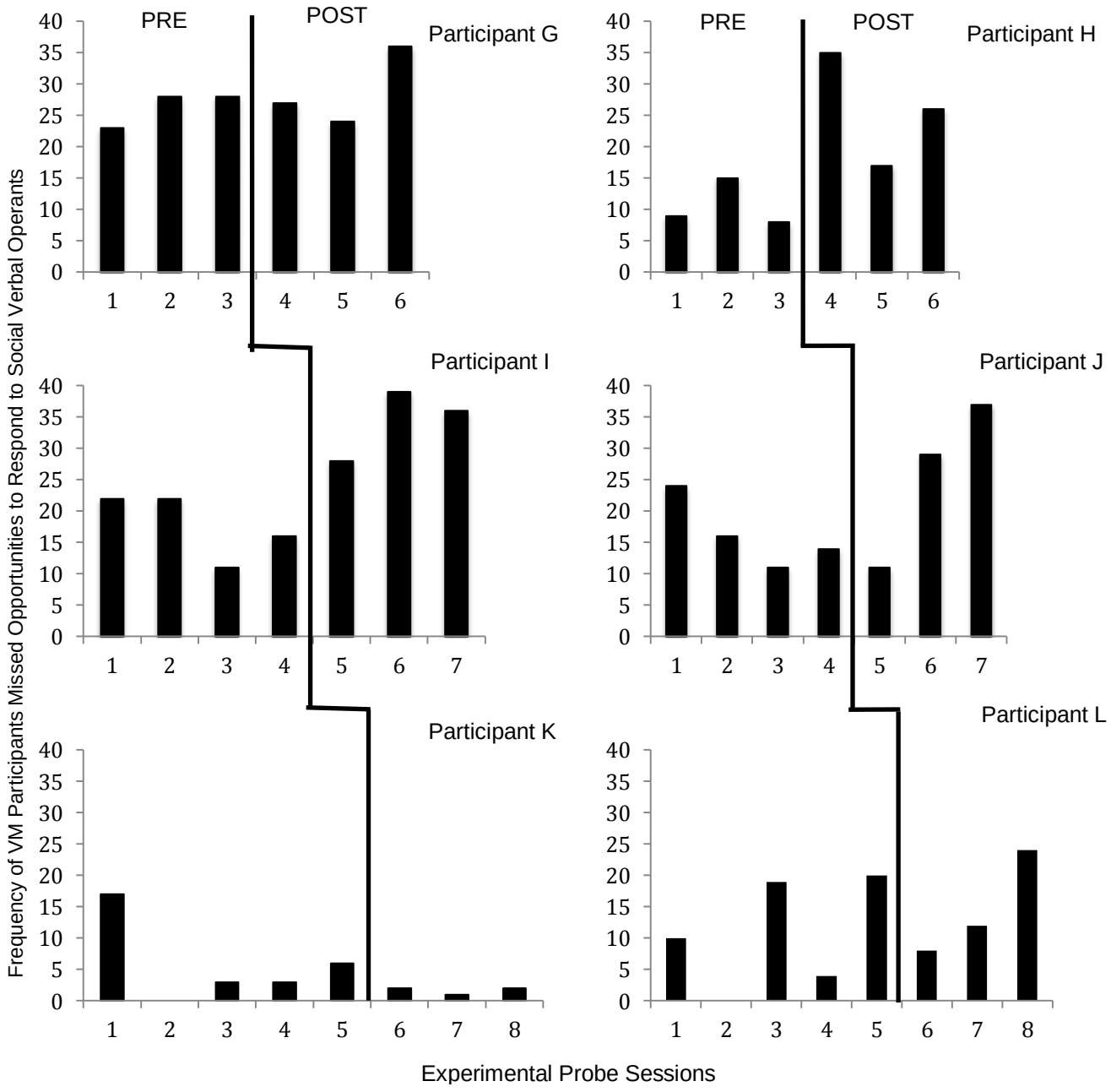


Figure 15. Frequency of missed opportunities to respond to peer-initiated social verbal operants in pre- and postintervention probe sessions. The solid line denotes the VM protocol. Each data point represents 5-mins in each of the three settings, which are combined here and represented in one 15-min block.

Figures 16 and 17 show the difference between the mean number of dependent variables (self-initiated conversational units and sequelics, total social verbal operants, missed opportunities to respond to peer initiated social verbal operants and the percentage of peer

initiated social verbal operants participants responded to) participants emitted across pre- and postintervention experimental probe sessions. Figure 16 shows the difference in means of dependent variables emitted by participants in the SLR condition. Figure 17 demonstrates the difference in means of dependent variables emitted by participants in the SLR condition. These results can also be seen in table format in Appendix 6 and 7.

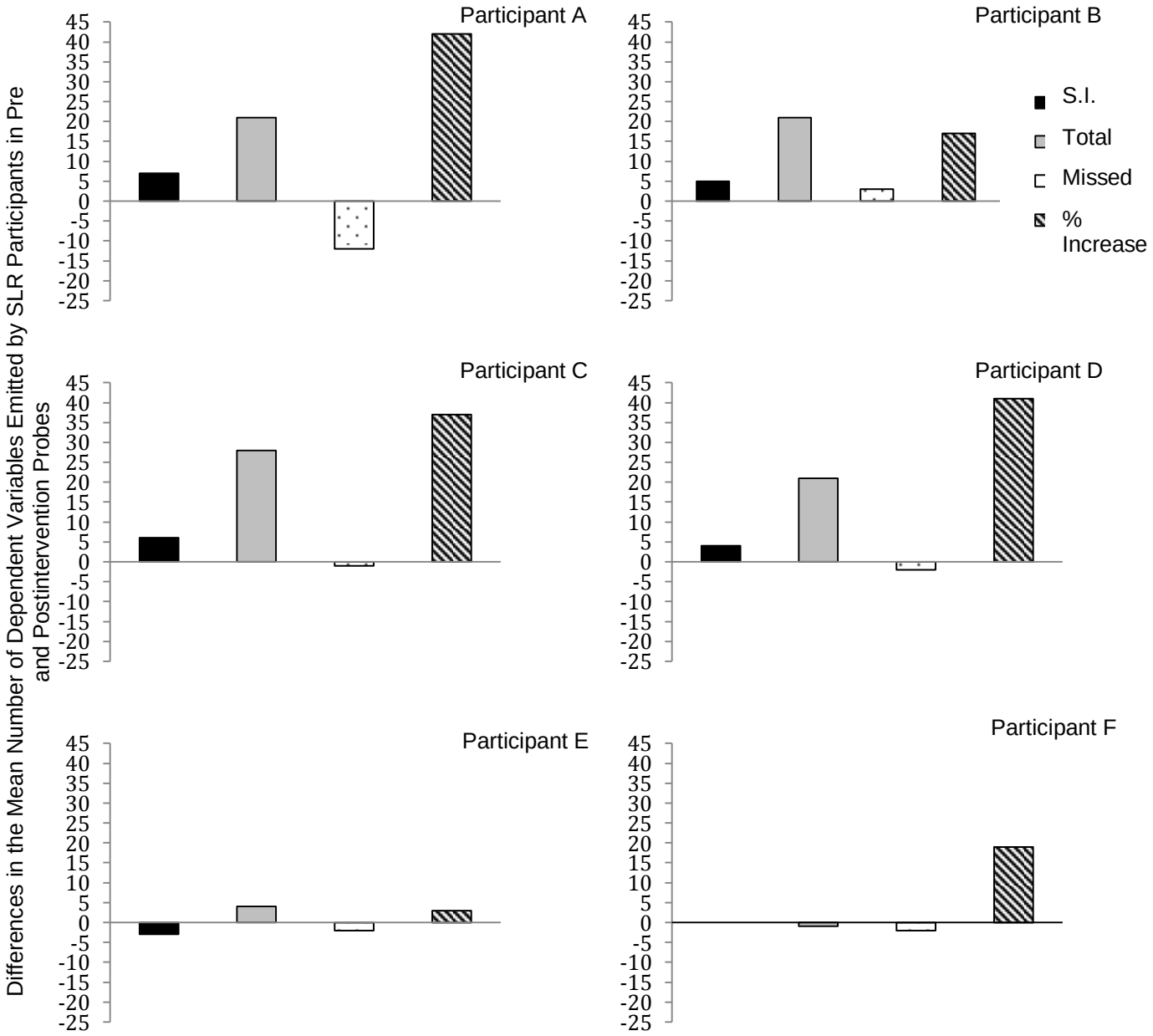


Figure 16. The differences, for the SLR participants, across pre and postintervention probes of the mean number of: self-initiated conversational units and sequelics, total social verbal operants, missed opportunities to respond to peer initiated social verbal operants and the percentage of peer initiated social verbal operants to which participants responded.

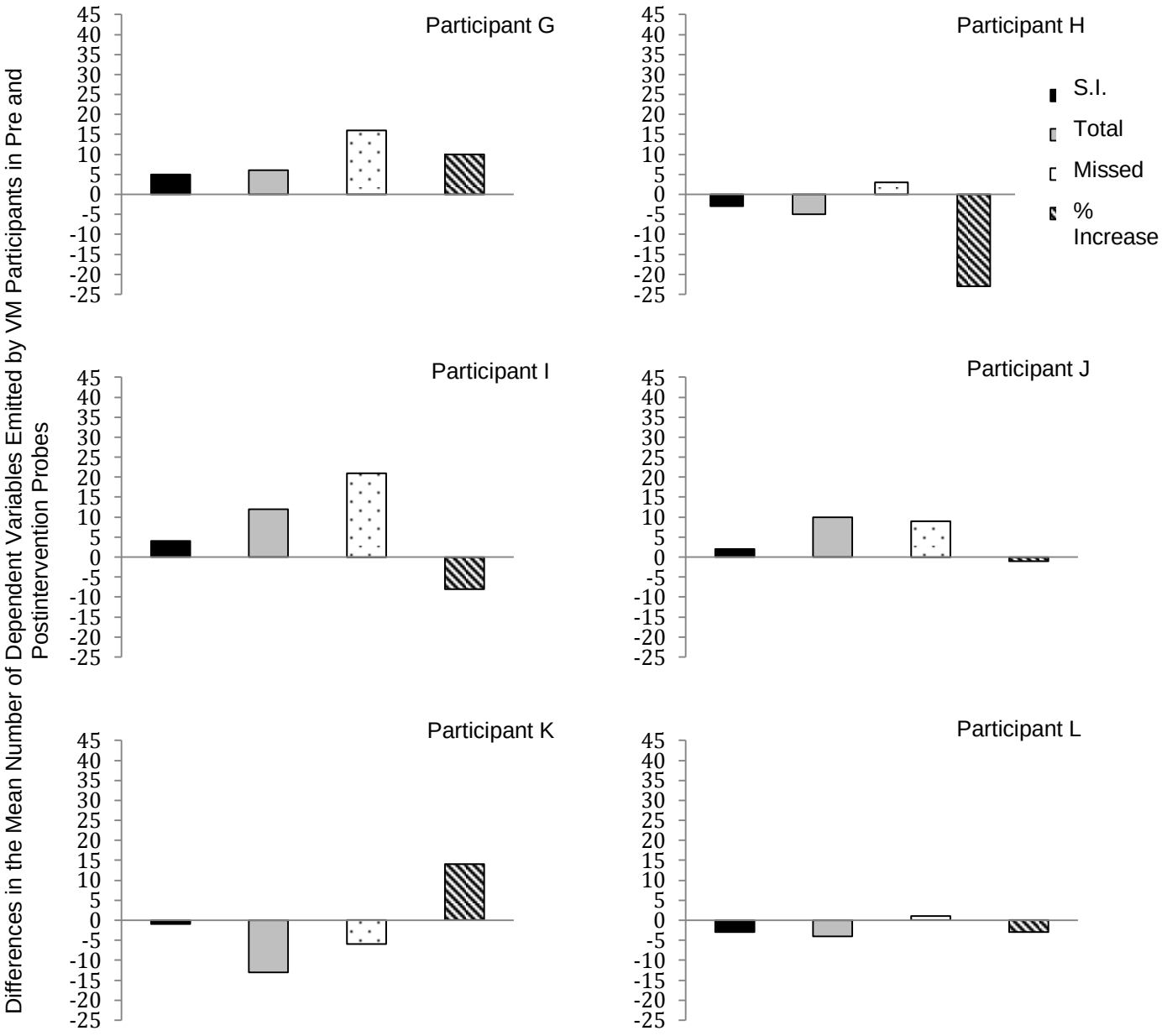


Figure 17. The differences, for the VM participants, across pre and postintervention probes of the mean number of: self-initiated conversational units and sequelics, total social verbal operants, missed opportunities to respond to peer initiated social verbal operants and the percentage of peer initiated social verbal operants to which participants responded.

Individual Cases Compared to Group Data

Figure 18 displays the difference in the participants' individual means of the number of self-initiated verbal operants emitted across pre- and postintervention experimental probe sessions. The data show that four of the participants in the SLR condition made large gains, one of the participants made no change and one of the participants decreased the number of self-initiated social verbal operants she/he emitted. In the VM condition three participants made large increases and three participants decreased the number of self-initiated social verbal operants they emitted.

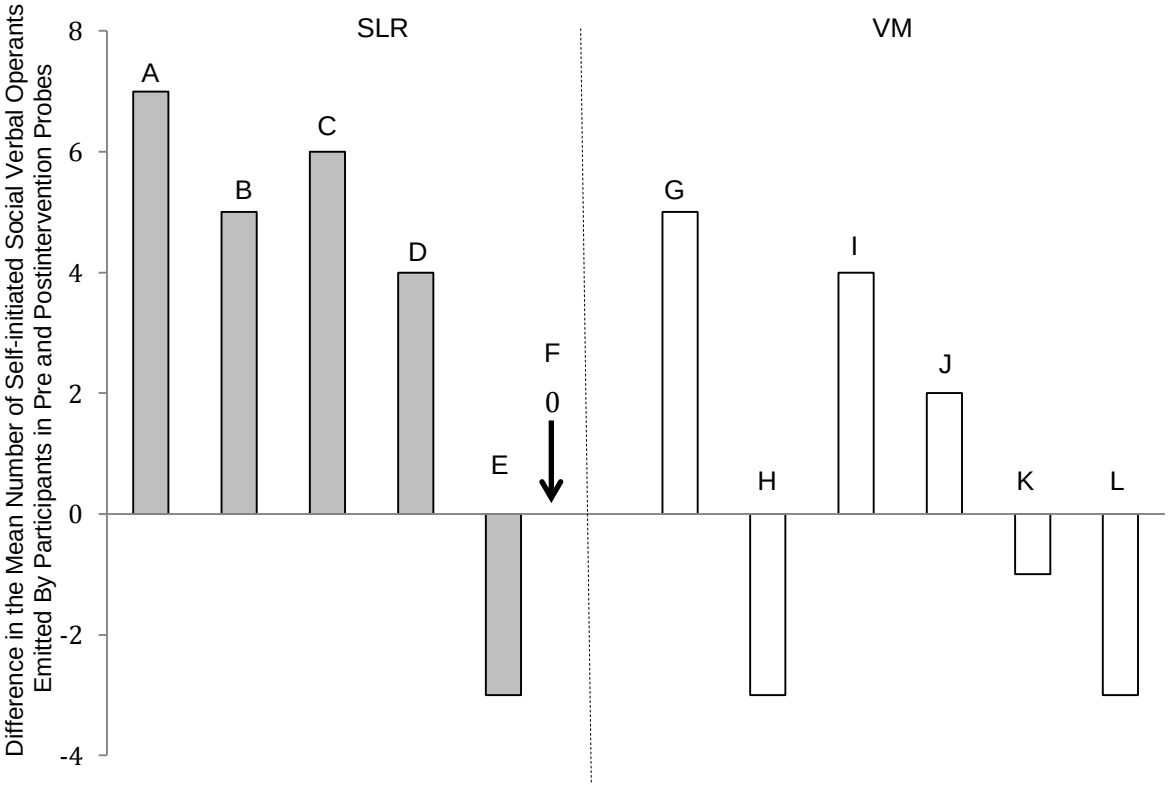


Figure 18. The difference in the participants' individual means of the number of self-initiated verbal operants emitted across pre- and postintervention probe sessions. The dashed line separates participants in the SLR condition from participants in the VM condition.

Figure 19 depicts the difference in the participants' individual means of the number of all social verbal operants (tacts, sequelics, and conversational units) emitted across pre- and postintervention experimental probe sessions. The data show that five participants in the SLR condition increased the number of total social verbal operants emitted (four of them by large amounts) and one participant slightly decreased (mean of one social verbal operant). Data also show that three participants in the VM condition increased the total number of social verbal operants emitted and three participants decreased.

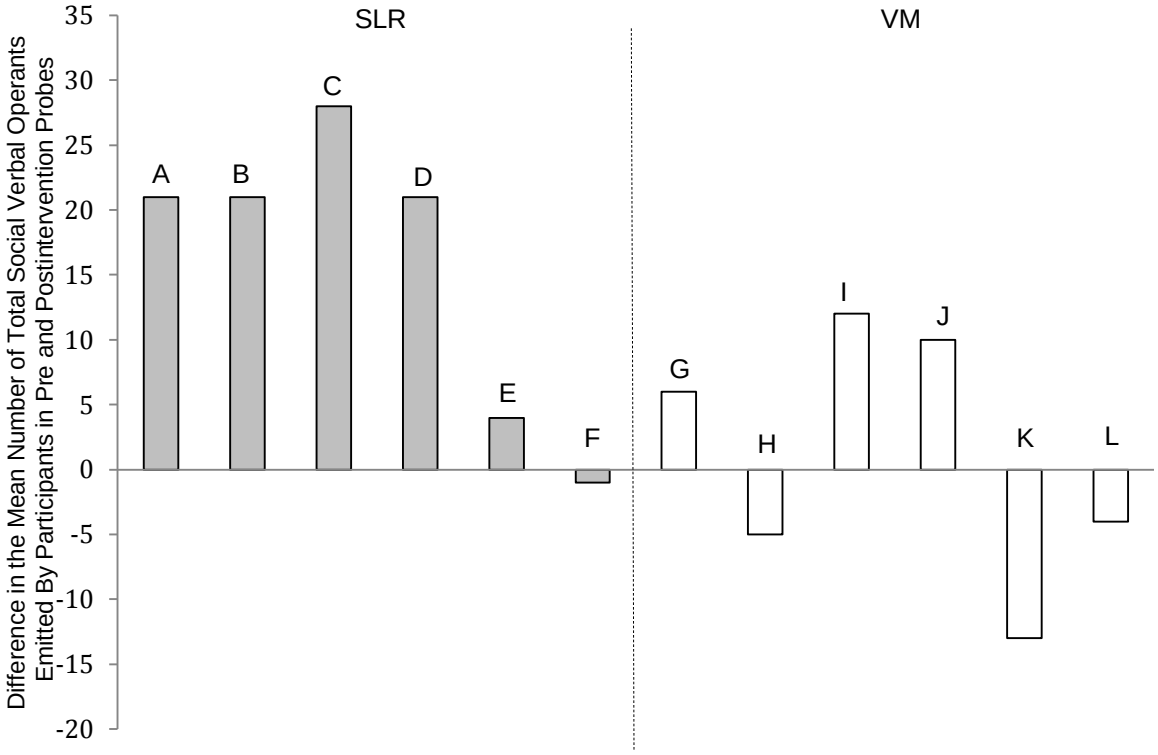


Figure 19. The difference in the participants' individual means of the number of total social verbal operants (tacts, sequelics and conversational units) emitted across pre- and postintervention probe sessions. The dashed line separates participants in the SLR condition from participants in the VM condition.

Figure 20 illustrates the difference in the participants' individual means of the number of missed opportunities to respond to peer-initiated verbal operants across pre- and postintervention

experimental probe sessions. The data show that five of the participants in the SLR condition decreased the number of opportunities they missed responding to peers and one increased. Five participants in the VM condition increased the number of opportunities they missed responding to while one decreased.

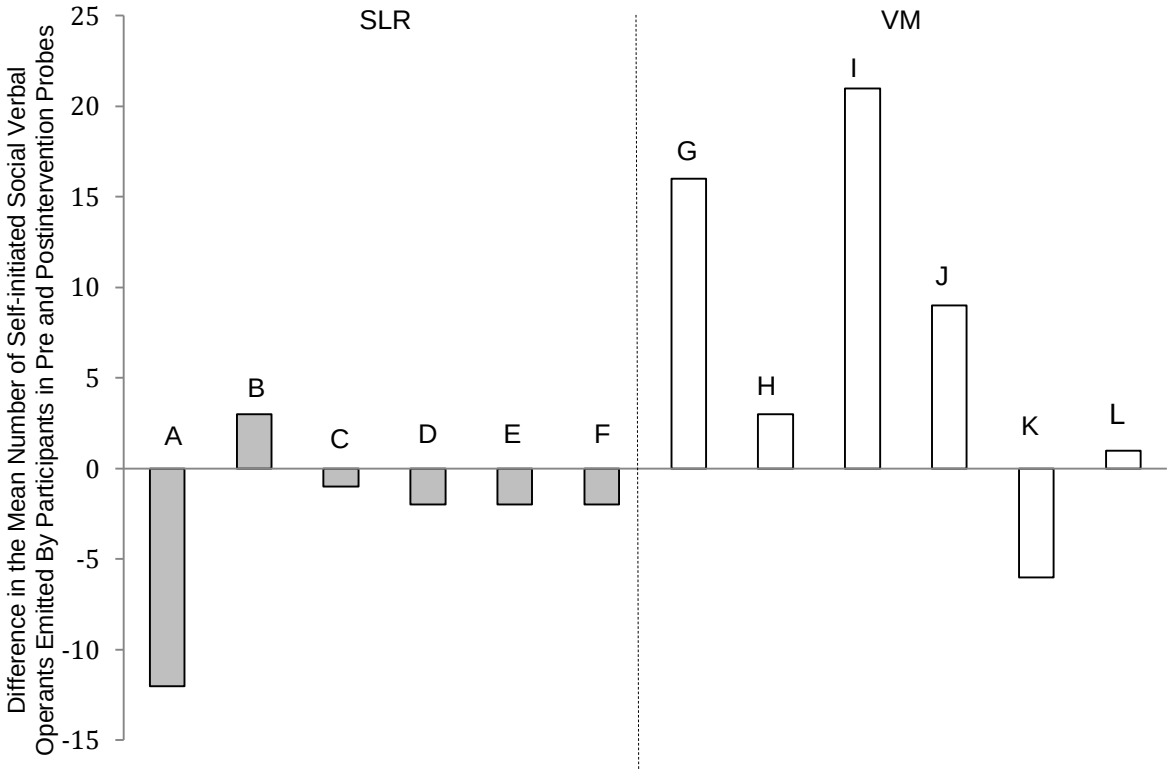


Figure 20. The difference in the participants' individual means of the number of participants missed opportunities to respond to peer-initiated social verbal operants across pre- and postintervention probe sessions. The dashed line separates participants in the SLR condition from participants in the VM condition.

Figure 21 illustrates the individual differences in the percentage of peer-initiated social verbal operants participants responded to across pre- and postintervention experimental probe sessions. The data show that all six participants in the SLR condition increased the percentage of peer-initiated social verbal operants they responded to. Two participants from the VM condition increased the percentage of peer-initiated social verbal operants they responded to while four participants decreased.

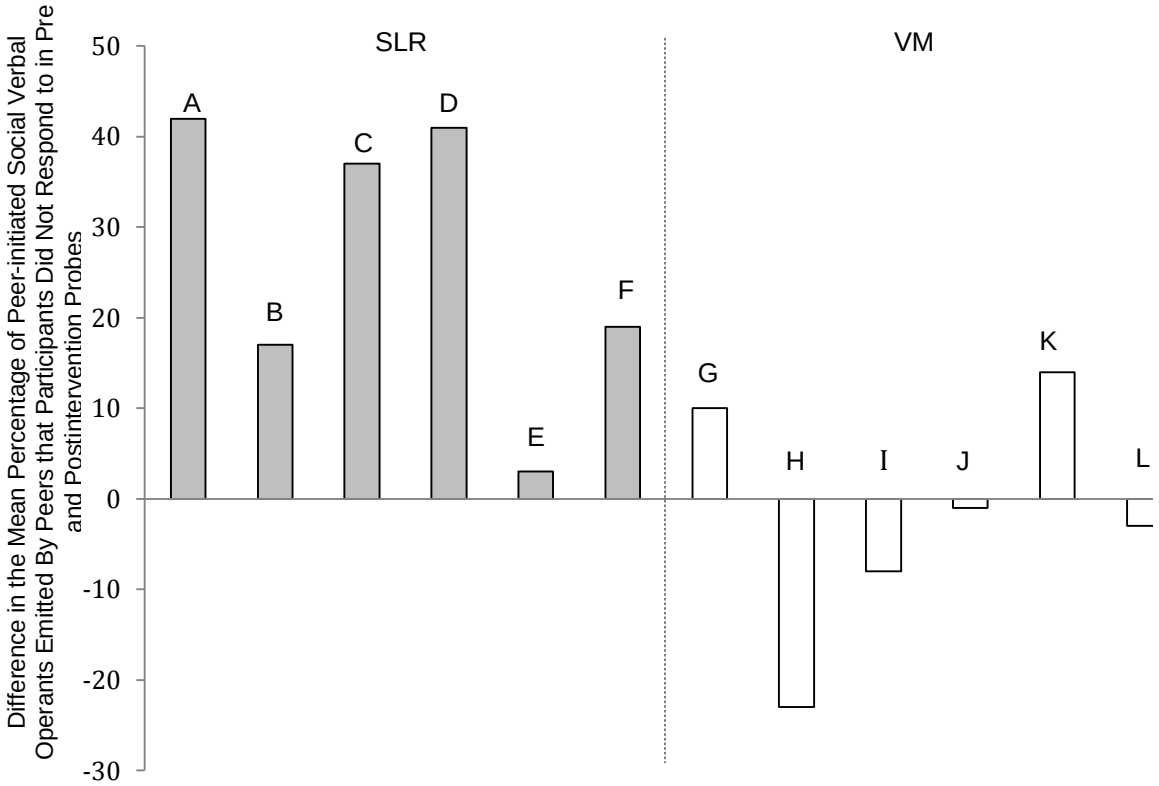


Figure 21. The difference in the percentage of peer-initiated social verbal operants participants responded to across pre- and postintervention probe sessions. The dashed line separates participants in the SLR condition from participants in the VM condition.

Group Results

Figure 22 shows the total number of self-initiated conversational units and sequelics emitted by all participants in each condition across pre- and postintervention experimental probe sessions. During the preintervention probe sessions participants in the SLR condition emitted a total of 33 self-initiated social verbal operants, following the intervention this number increased to 92. During the preintervention probe sessions participants in the VM condition emitted a sum of 85 self-initiated social verbal operants, following the intervention this number increased to 103.

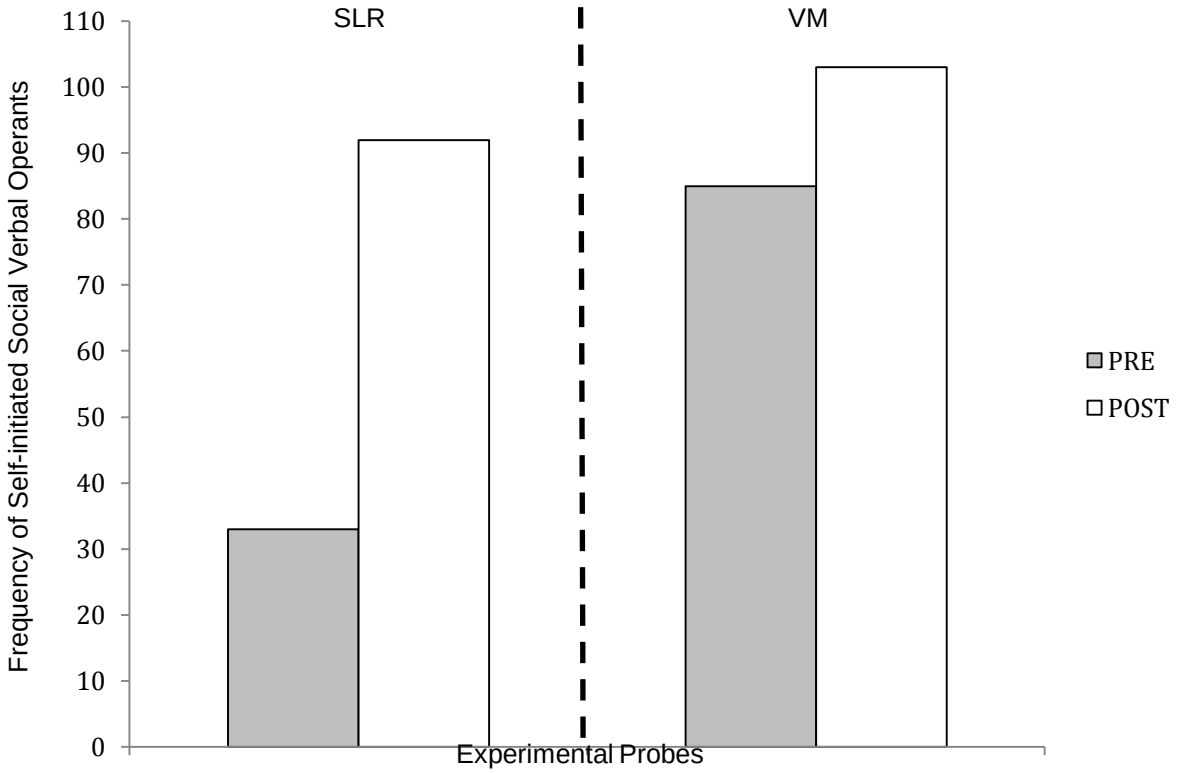


Figure 22: Total number of self-initiated vocal conversational units and sequelics emitted by all participants in pre- and postintervention probe sessions. The solid line denotes the social learning protocols.

Figure 23 depicts the total number of social vocal verbal operants (tacts, conversational units and sequelics) emitted by all participants in each condition across pre- and postintervention experimental probe sessions. During the preintervention probe sessions participants in the SLR condition emitted a total of 203 social vocal verbal operants, following intervention they emitted 444. During the preintervention probe sessions participants in the VM condition emitted a total of 458 social verbal operants, following intervention they emitted 465.

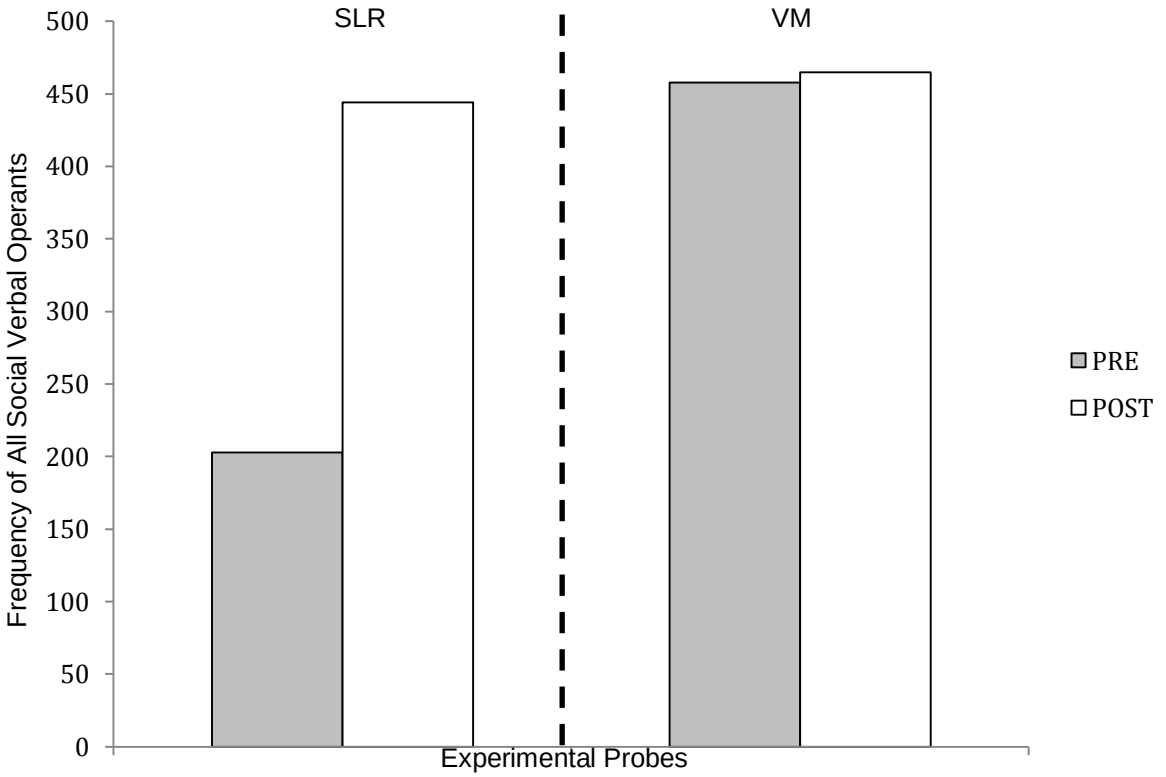


Figure 23. Total number of all social vocal verbal operants emitted by all participants in pre- and postintervention probe sessions. The solid line denotes the social learning protocols.

Figure 24 illustrates the total number of peer-initiated social vocal verbal operants to which participants either responded or missed the opportunity to respond to during pre- and postintervention experimental probe sessions. During the preintervention probe sessions peers initiated 335 social vocal verbal operants with participants in the SLR condition, and participants failed to respond to 205 opportunities. Following intervention peers initiated 500 social verbal operants with participants in the SLR condition and participants failed to respond to 187. Participants in the SLR condition increased their rate of responding from 39% to 63%. During the preintervention probe sessions peers initiated 519 social vocal verbal operants with participants in the VM condition, and participants failed to respond to 271 opportunities. Following intervention peers initiated 700 social verbal operants with participants in the VM

condition and participants failed to respond to 394. Participants in the VM condition decreased their rate of responding from 48% to 44%.

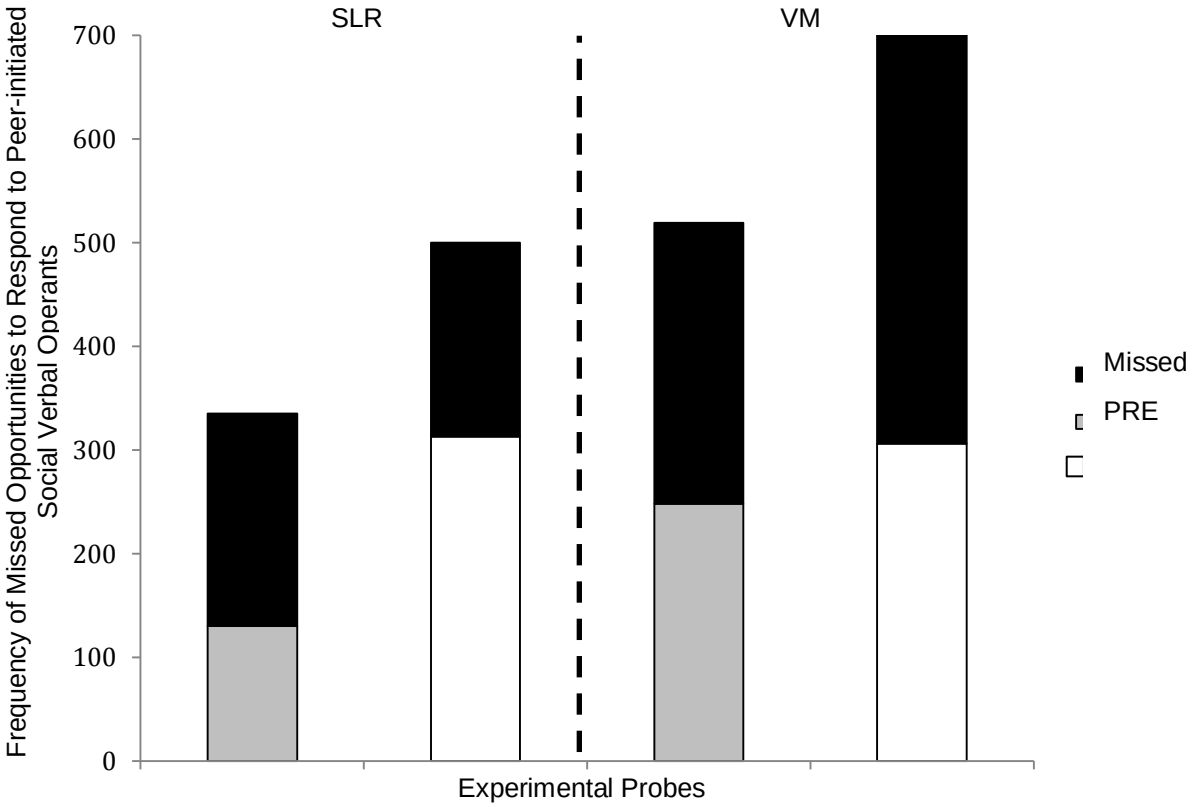


Figure 24. The total number of peer-initiated social vocal verbal operants participants responded to and missed in pre- and postintervention probe sessions. The solid line denotes the social learning protocols.

Figure 25 displays the difference between the mean number of dependent variables (self-initiated conversational units and sequelics, total social verbal operants, missed opportunities to respond to peer initiated social verbal operants and the percentage of peer initiated social verbal operants participants responded to) participants in two social learning conditions emitted across pre- and postintervention experimental probe sessions. Data show that participants in both the SLR and video modeling groups increased the number of peer-initiated social vocal verbal operants they responded to. Participants in the SLR condition increased by a mean of nine and participants in the VM group increased by a mean of 11. Participants in both the SLR and video

modeling groups increased the number of self-initiated social vocal verbal operants they emitted. The participants in the SLR condition had a mean increase of ten, as opposed to participants in the VM condition who had a mean increase of three. Data show that participants in both groups also increased in the total number of social vocal verbal operants they emitted. Participants in the SLR group made a large increase to a mean of 40 whereas participants in the VM group only increased by a mean of 1. Data show that the participants in the SLR condition decreased the number of peer-initiated social vocal verbal operants they failed to respond to by a mean of 3 whereas participants in the VM condition increased the number of peer-initiated social vocal verbal operants they failed to respond to by a mean of 21. Participants in the SLR condition increased the percentage of peer-initiated social vocal verbal operants they responded to by 24% while participants in the VM condition decreased by 4%.

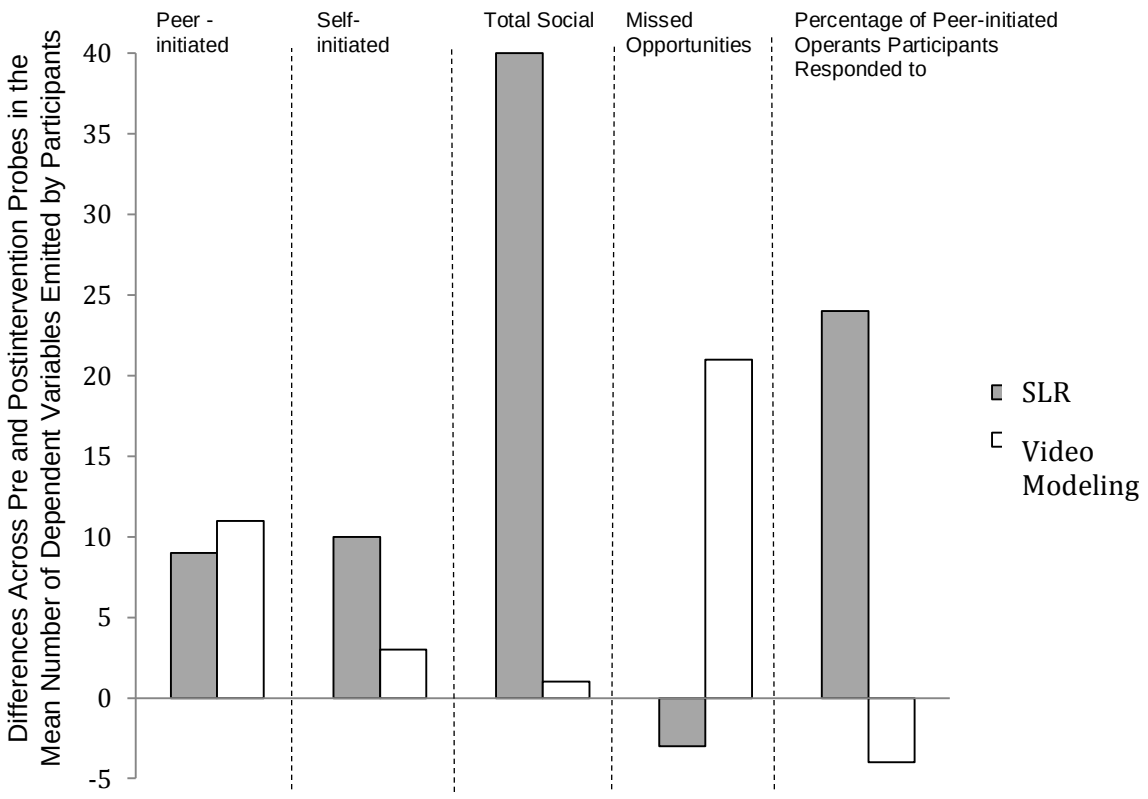


Figure 25. The differences, for all participants, across pre- and postintervention probe of the mean number of: self-initiated conversational units and sequelics, total social verbal operants, missed opportunities to respond to peer initiated social verbal operants and the percentage of peer initiated social verbal operants to which participants responded.

Figure 26 illustrates the mean number of self-initiated social verbal operants emitted by participants in the two social learning conditions across pre- and postintervention experimental probe sessions. During the preintervention probe sessions participants in the SLR condition emitted a mean of 5.5 self-initiated social verbal operants (with a standard deviation of 4.46); this increased to a mean of 15.3 (with a standard deviation of 11.57) during postintervention probe sessions. The participants in the video modeling condition emitted a mean of 14.17 self-initiated social verbal operants during preintervention probe sessions (with a standard deviation of 7.2) and a mean of 17.17 (with a standard deviation of 10.12) during postintervention probe sessions. See Tables 17 and 18.

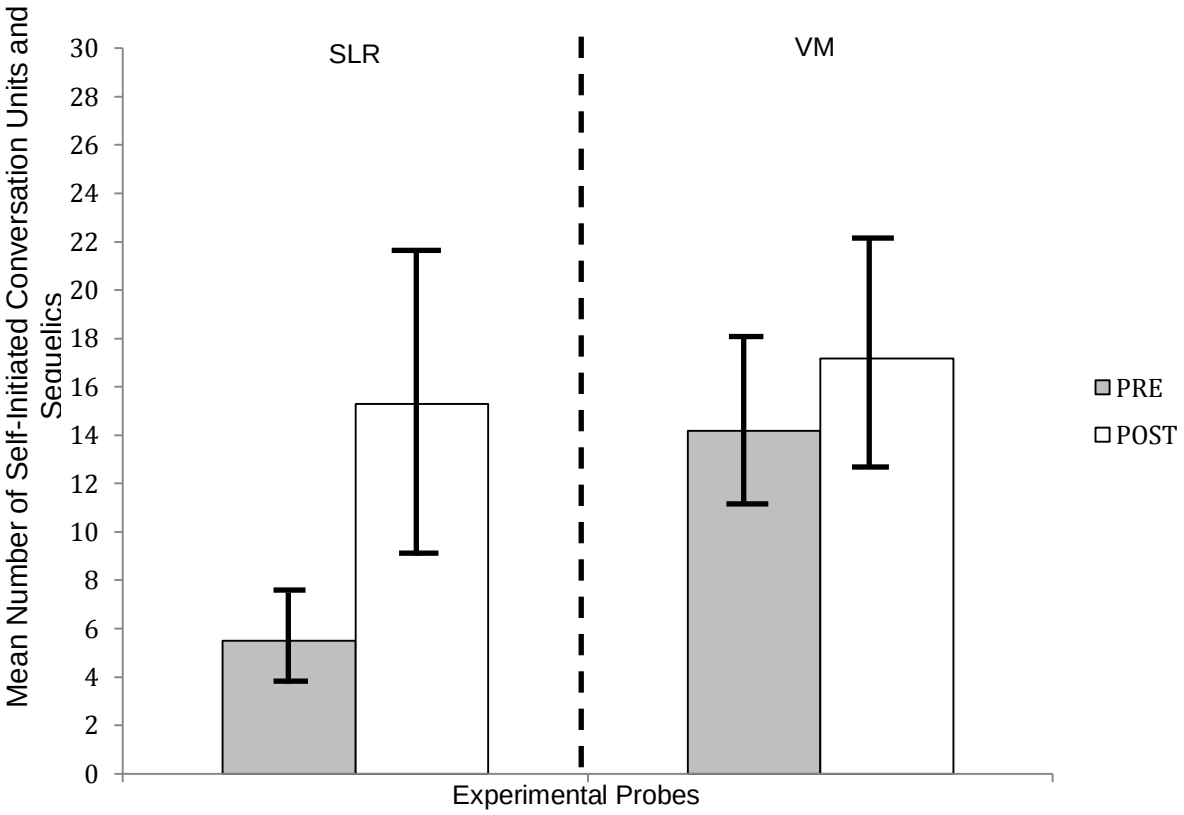


Figure 26. The mean number of self-initiated conversational units and sequelics emitted by all participants in pre- and postintervention probe sessions. The dashed line denotes the social learning protocols. The solid line denotes the standard deviation.

Figure 27 depicts the mean number of total social verbal operants (tacts, conversational units and sequelics) emitted by participants in the two social learning conditions across pre- and postintervention experimental probe sessions. During preintervention probe sessions the mean number of social verbal operants emitted by participants in the SLR condition was 33.83 (with a standard deviation of 19.77) this increased to a mean of 74 (with a standard deviation of 38.07) in postintervention probe sessions. The participants in the video modeling condition emitted a mean of 76.33 social verbal operants (with a standard deviation of 12.81) in preintervention probe sessions, this increased slightly to a mean of 77.5 (with a standard deviation of 29.95) in postintervention probe sessions. See Tables 17 and 18.

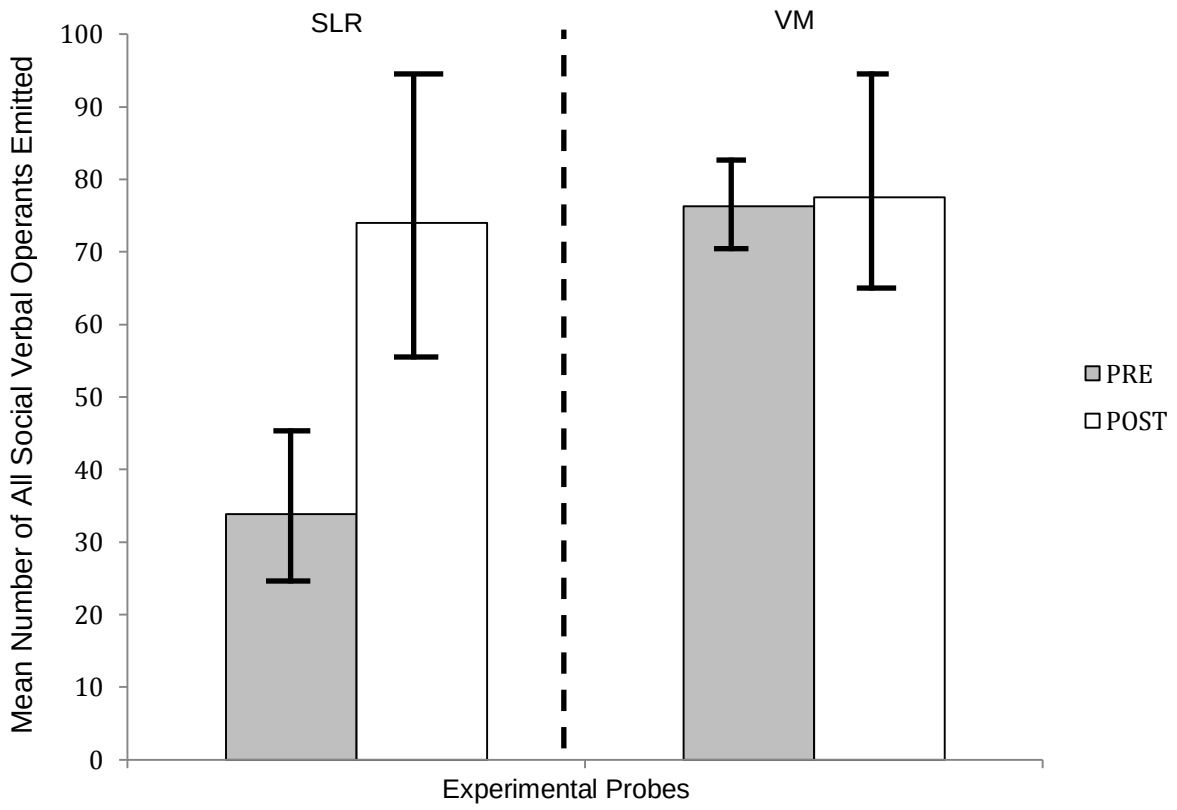


Figure 27. The mean number of total social verbal operants (tacts, sequelics and conversational units) emitted by all participants in pre- and postintervention probe sessions. The dashed line denotes the social learning protocols. The solid line denotes the standard deviation.

Figure 28 shows the mean number of missed opportunities to respond to peer-initiated social verbal operants by participants in the two social learning conditions across pre- and postintervention experimental probe sessions. During preintervention probe sessions participants in the SLR condition missed a mean of 34.17 opportunities to respond to peer's social verbal operants (with a standard deviation of 9.23), this decreased to a mean of 31.17 missed opportunities (with a standard deviation of 11.07) in postintervention probe sessions. Participants in the video modeling condition missed a mean of 45.17 opportunities to respond in the preintervention probe sessions (with a standard deviation of 18.65), this increased to a mean of 66 missed opportunities (with a standard deviation of 32.35) in the postintervention probe sessions. See Tables 17 and 18.

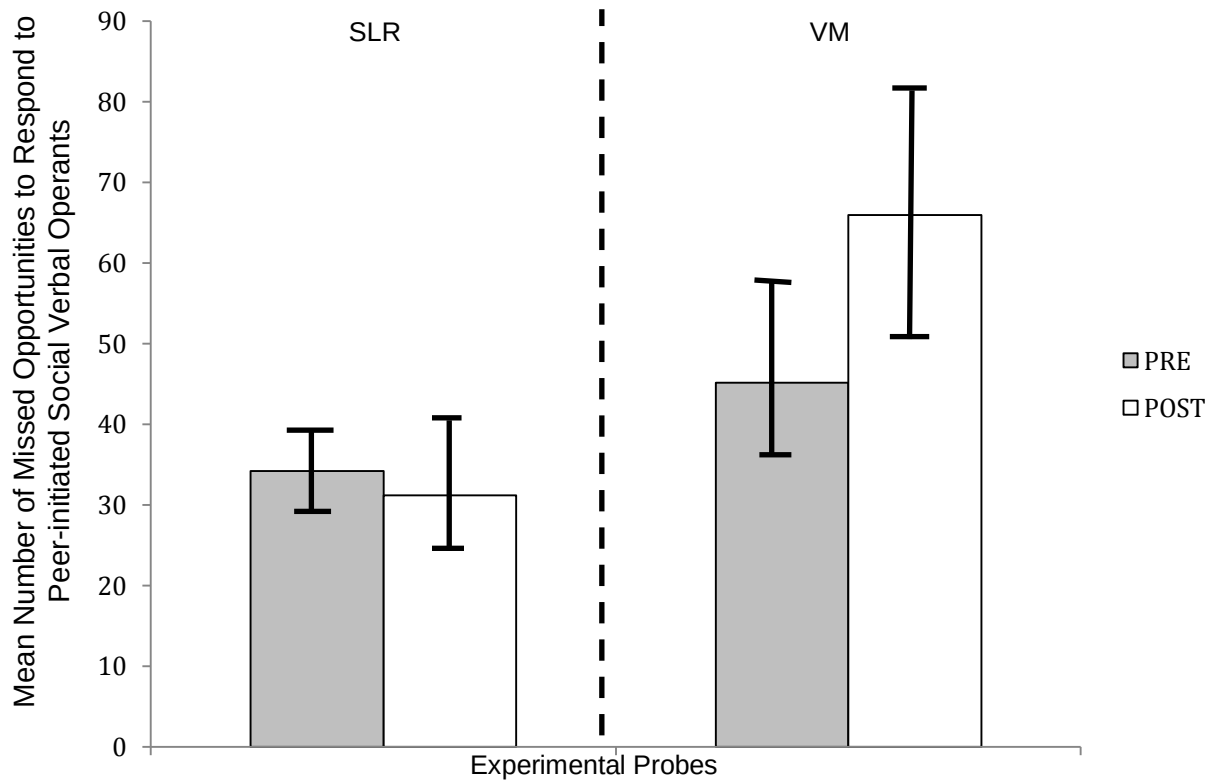


Figure 28. The mean number of all participants missed opportunities to respond to peer-initiated social verbal operants in pre- and postintervention probe sessions. The dashed line denotes the social learning protocols. The solid line denotes the standard deviation.

Figure 29 demonstrates the percentage of peer-initiated social verbal operants participants responded to in the two social learning conditions across pre- and postintervention experimental probe sessions. Data shows that during preintervention probe sessions participants in the SLR condition responded to 39% of the peer-initiated social verbal operants (with a standard deviation of 20.68), this increased to 63% in the postintervention probe sessions (with a standard deviation of 17.73). During preintervention probe sessions participants in the video modeling condition responded to 48% of peer-initiated social verbal operants (with a standard deviation of 17) during postintervention probe sessions this decreased to 44% (with a standard deviation of 10.43). See Tables 17 and 18.

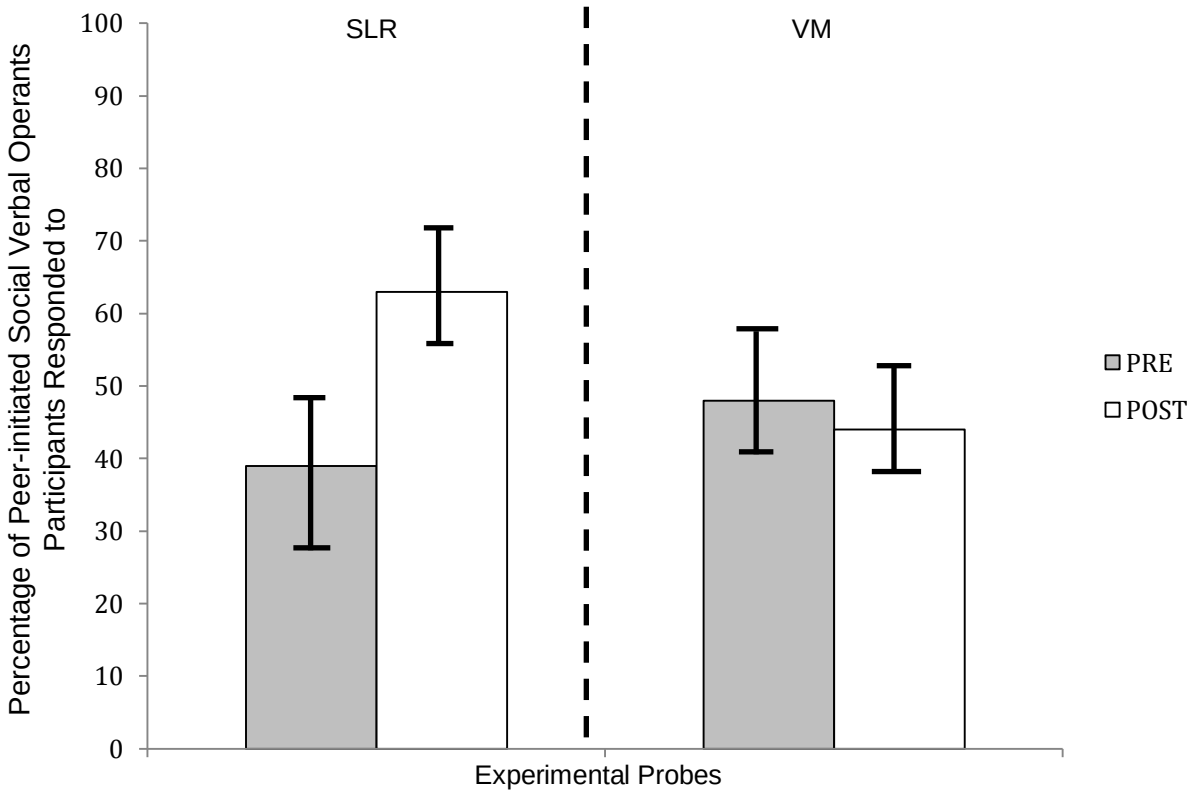


Figure 29. The percentage of peer-initiated social verbal operants participants responded to in pre- and postintervention probe sessions. The dashed line denotes the social learning protocols. The solid line denotes the standard deviation.

Table 17

Pre- and Postintervention Means, Standard Deviations and the Difference for Participants in the SLR Condition

	Pre Intervention Mean	**Pre Intervention Standard Dev.**	**Post Intervention Mean**	**Post Intervention Standard Dev.**	**Difference**
Self-initiated	5.5	4.46	15.3	11.57	+9.8
Total Social Verbal Operants	33.83	19.77	74	38.07	+40.17
Missed Opportunities	34.17	9.23	31.17	11.07	-3.0
Percentage Responded to	39.0%	20.68	63%	17.73	+23.8%

Table 18

Pre- and Postintervention Means, Standard Deviations and the Difference for Participants in the VM Condition

	Pre Intervention Mean	Pre Intervention Standard Dev.	Post Intervention Mean	Post Intervention Standard Dev.	Diff.
Self-initiated	14.17	7.20	17.17	10.12	+3.0
Total Social Verbal Operants	76.33	12.81	77.5	29.95	+1.17
Missed Opportunities	45.17	18.65	65.67	32.35	+20.5
Percentage Responded to	48.0%	17.0	44.0%	10.43	-4.0%

Intervention Results – Social Listener Reinforcement Protocol

Tables 19 and 20 show the data for the correct responses to learn unit presentations during the peer-yoked contingency game phases and empathy phases of the SLR protocol. Table 19 shows: the percentage of correct responses for learn unit presentations, range of correct responses participants emitted and the number of sessions it took participants to meet criterion for each peer yoked contingency phase. Across participants, the range of correct responses to learn unit presentations was 0% to 100% and it took no more than sixteen sessions to meet criterion for each phase. This information in presented in graphical format in Figure 30. Table 20 shows the mean number of correct responses to each component of the empathy sessions (what occurred, how would you feel, why and how can you help), the range of responding to empathy components and the number of sessions it took participants to meet criterion on each component. Across participants, the range of correct responses to learn unit presentation was 29% to 100% and it took no more than five sessions to meet criterion for each component. This information is presented in graphical format in Figure 31.

Table 19

Responses to Learn Unit Presentations for Phases 1-4 of the SLR Protocol

	Phase 1			**Phase 2**			**Phase 3**			**Phase 4**		
	Mean	Range	Met	Mean	Range	Met	Mean	Range	Met	Mean	Range	Met
Participant A	77%	10	3	78%	5-10	8	78%	5-10	4	71%	0-10	4
Participant B	75%	2-10	4	85%	6-10	5	63%	0-10	4	69%	2-10	8
Participant C	78%	4-10	4	87%	8-10	4	64%	2-10	5	59%	0-10	11
Participant D	50%	2-10	5	59%	2-10	16	72%	0-10	3	49%	0-10	12
Participant E	45%	0-10	5	58%	0-10	7	31%	0-10	8	56%	2-10	8
Participant F	52%	1-10	6	74%	5-10	11	63%	1-10	9	53%	0-10	5

Table 20

Correct Responses to Learn Unit Presentations for Empathy Phase of the SLR Protocol

	What			**How**			**Why**			**Help**		
	Mean	Range	Met	Mean	Range	Met	Mean	Range	Met	Mean	Range	Met
Participant A	18.7	16-20	3	18	15-20	3	19	18-20	2	19	17-20	3
Participant B	16.6	12-19	5	11.75	2-20	4	13.3	7-20	7	12.5	2-19	6
Participant C	18	18	2	18	14-20	3	14.6	6-20	3	16.3	12-19	3
Participant D	18.3	15-20	3	17.7	14-20	3	16.7	12-19	3	15.5	9-20	4
Participant E	13.6	9-18	5	17.3	15-19	3	13.4	4-20	5	14	8-19	5
Participant F	15.7	9-19	3	17.7	13-20	3	13	2-18	4	15.5	8-20	4

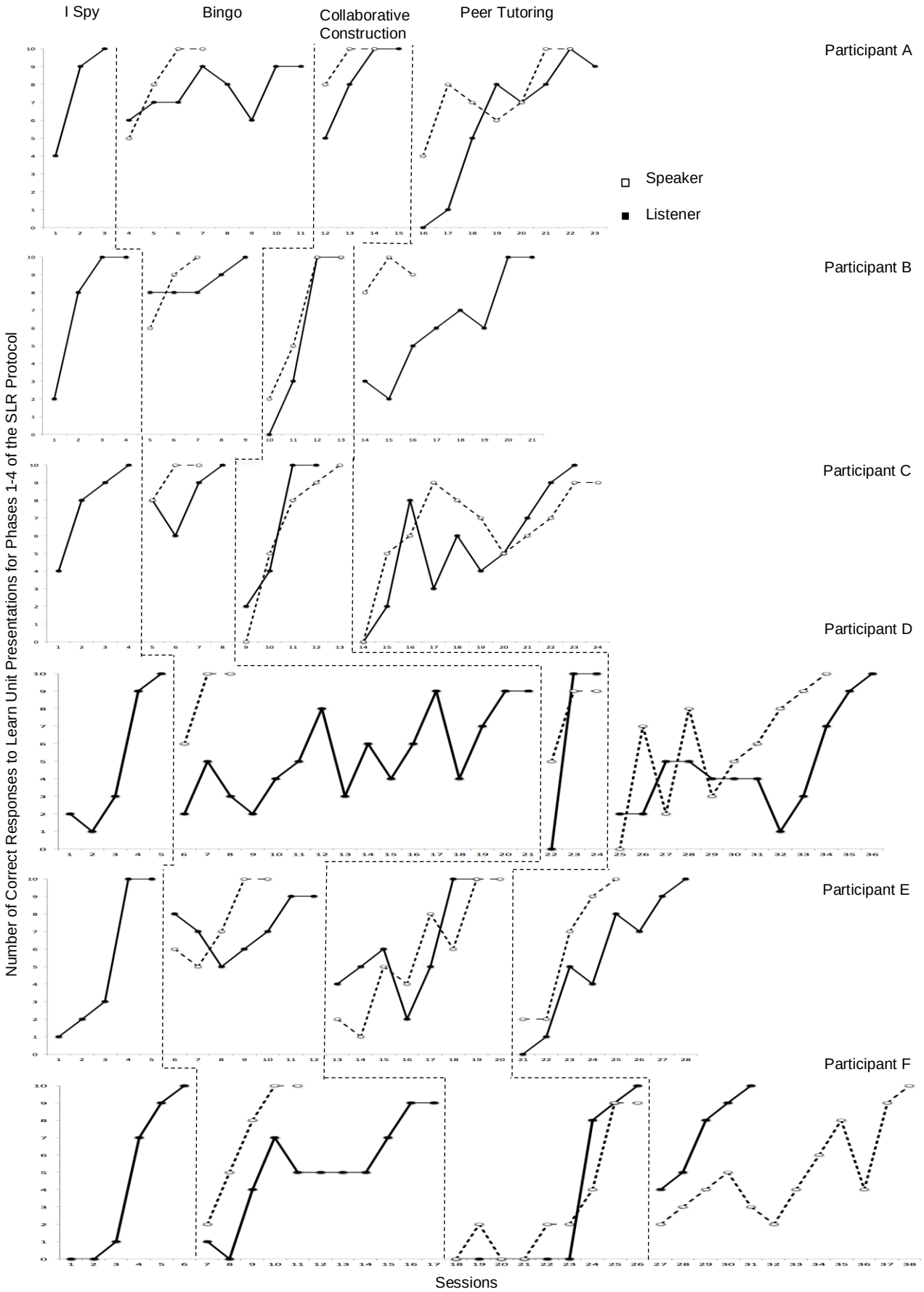


Figure 30. Number of correct responses to learn unit presentations for phases 1-4 of the SLR protocol.

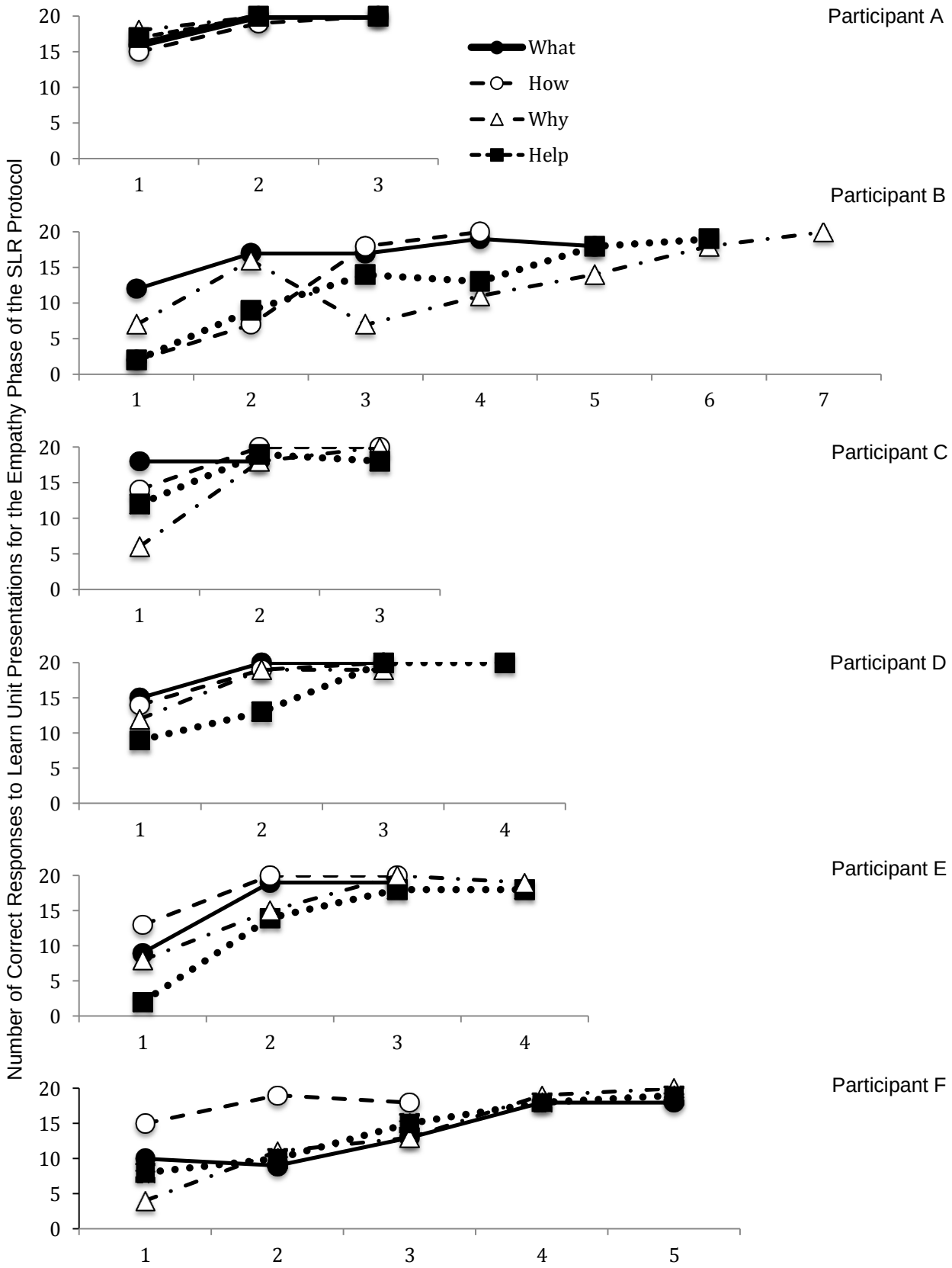


Figure 31. Number of correct responses to learn unit presentations for the empathy phase of the SLR protocol.

Intervention Results – Video Modeling Protocol

Tables 21 and 22 show the data for participants' acquisition of criteria across all five video modeling phases. Table 21 shows the percentage of participants' correct responses to instructional presentations across each phase of the video modeling protocol. Table 22 shows if participants met criterion on each stage of the video modeling protocol. There were three video exemplars for each phase of the VM protocol. Once participants met criterion (90% across two consecutive sessions) on the first video they were moved to the additional videos until they had completed the required number of instructional presentations in each phase. The participants in the VM condition were not required to meet criterion on each phase, because the number of instructional presentations they received was determined by the number of instructional presentations it took their matched partner to achieve criterion in each phase of the SLR protocol. This information is presented in graphical format in Figure 32.

Table 21

Percentage of Correct Responses to Instructional Presentations for Each Phase of the VM Protocol

	Phase 1	**Phase 2**	**Phase 3**	**Phase 4**	**Phase 5**
Participant G	13%	22%	0%	33%	53%
Participant H	17%	20%	0%	0%	0%
Participant I	0%	25%	0%	0%	0%
Participant J	33%	4%	11%	75%	4%
Participant K	61%	3%	32%	8%	0%
Participant L	87%	90%	64%	4%	0%

Table 22

Attainment of Criterion of all Phases of the VM Protocol Across Participants

	Phase 1			**Phase 2**			**Phase 3**			**Phase 4**			**Phase 5**		
	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3
Participant G	no			yes	no		no			yes	yes		yes	no	
Participant H	no			yes	no		no			no			no		
Participant I	no			yes	no		no			no			no		
Participant J	yes	no		no			no			yes	yes	yes	no		
Participant K	yes	yes		no			yes	yes	no	yes	no		no		
Participant L	yes	yes	yes	yes	yes	yes	yes	yes	yes	no			no		

Note: The grey boxes denote that the participant never contacted that exemplar of the phase.

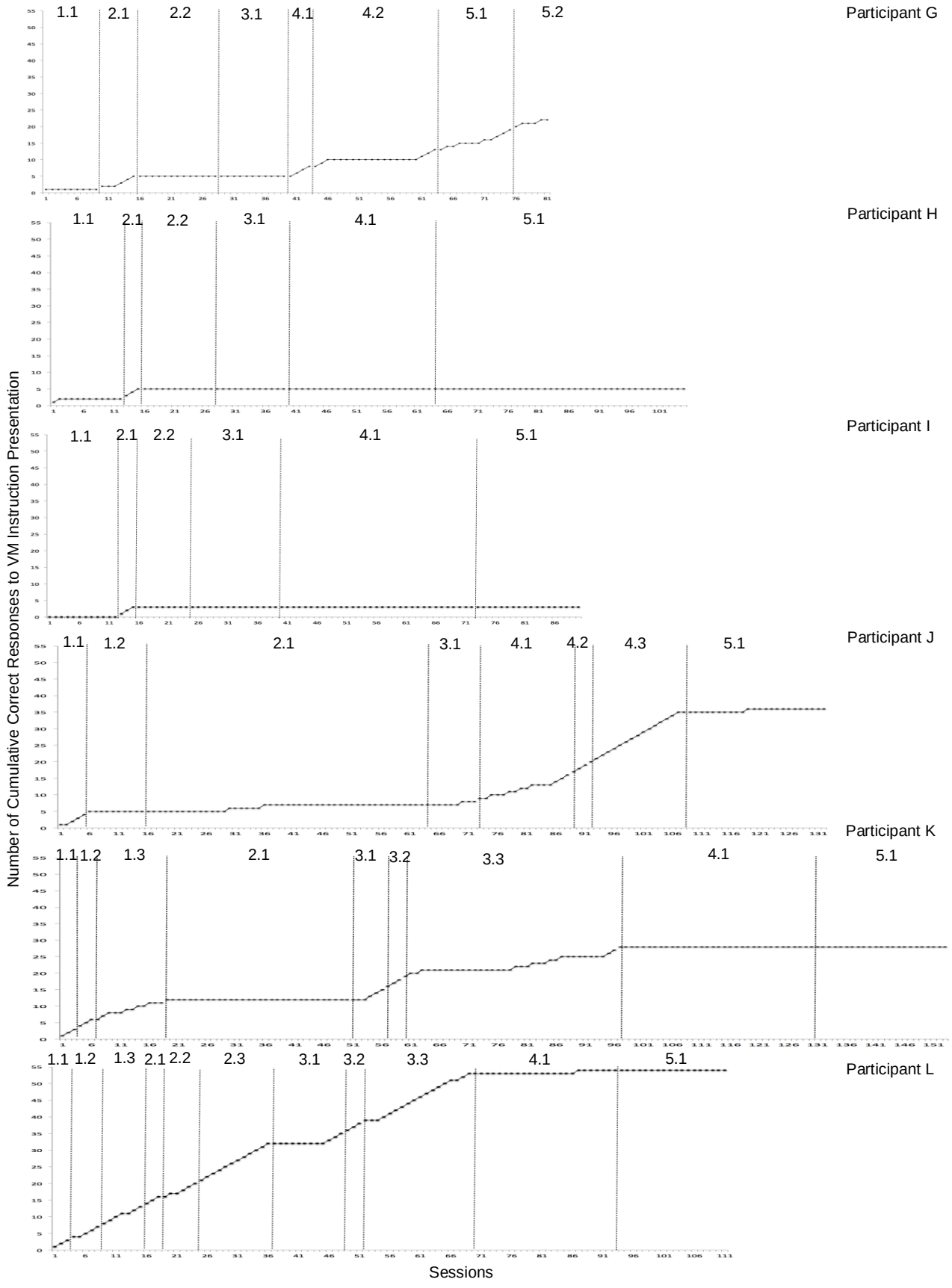


Figure 32. Number of correct responses to instructional presentations for all phases of the VM protocol.

Chapter IV

DISCUSSION

Overview

I reported an experiment that examined the emission of social verbal operants by preschoolers diagnosed with Autism and language delays and the effects of two social learning methods on those emissions. I sought to answer the experimental question put forth: what produces greater effects on the emission of social verbal operants, teaching the behaviors directly or conditioning the reinforcer for the emission of the behaviors? The findings provide the basis for an analysis of social learning resulting from teaching direct operants or conditioning the reinforcement value for emitting operants. The findings will be discussed in reference to: 1) theoretical explanations, 2) relation to relevant literature, 3) educational implications, 4) limitations, and 5) the proposed directions of future research on social verbal operants and complex social behavior.

Social Listener Reinforcement

Findings. The overall findings from the SLR protocol study suggest that by conditioning the emission of speaker / listener exchanges, individuals gain access to social reinforcement and therefore gain the motivation to interact with their audience. Through the series of activities conducted with a peer-yoked contingency game board, participants were reinforced for responding to peers' speaker behavior by acting as a listener and completing speaker / listener exchanges. Prior to the conditioning protocol, participants emitted a low number of sequelics and conversational units, suggesting that the reinforcement for listening to others was missing.

The results illustrate that following the intervention, participants increased the percentage of peer-initiated social verbal operants they responded to and decreased the number of missed

opportunities to respond. These data suggest that participants were more aware of and responded more to the presence of their peers. Listening to the verbal behavior of peers became a conditioned reinforcer through the SLR protocol; this increased the number of alternating listener / speaker exchanges that participants initiated, emitted and sustained.

Postintervention results show that the typically developing peers increased their initiation of conversation with the participants, which suggests that participants themselves acquired reinforcement value for their peers. The acquisition of social reinforcement can be seen in the increase of conversational units because the rotation of speaker / listener responses clearly became a conditioned response and the reinforcement value of listening to the speaker increased. The results of this experiment provide empirical evidence that an individual's emission of social verbal operants can be increased using the SLR protocol; supporting previous findings and extending the effects to different types of individuals (Reilly-Lawson & Walsh, 2007; Sterkin, 2010).

Yoked Contingency and Peer Approvals. It can be argued that the yoked contingency implemented in phases 1-4 of SLR conditioned the reinforcement of responding through listening, which allowed an establishing operation for joint attention to be created (Michael, 1993). During phases 1-3 of SLR ("I spy," "bingo" and "collaborative construction") peer partners frequently emitted approvals or jointly shared in their excitement as they moved towards accessing their reinforcer as a team. The yoked contingency required the peer partners to work together to emit conversational units in order to earn their reinforcer. This process systematically paired reinforcement with peers, which appears to have conditioned peer attention as reinforcers. Through the peer-yoked contingency participants learned that emitting speaker / listener exchanges functioned to recruit reinforcement. The yoked contingency therefore

functioned to induce conditioned reinforcement for listening and for engaging in complex social behavior by pairing reinforcement with joint attention.

During the peer tutoring phase (phase 4) of SLR participants were required to give approvals for all correct responses their peer partner emitted, providing multiple opportunities to experience the contingencies for obtaining approvals from peers. The focus on the emission of approvals may play the key role in creating reinforcement contingencies that led to the extension of social verbal behavior by conditioning peer approvals as a form (or strengthening its value) of generalized reinforcement (Galef, 1988; Greer & Singer-Dudek, 2008; Schemelzekopf, 2010). Research shows the acquisition of peer approvals as conditioned reinforcers is an important, if not necessary component of a fluent speaker-listener repertoire in which complex social verbal operants are emitted (Eby, 2010). When peer approvals become conditioned reinforcers individuals develop the capacity to be reinforced as a listener. If individuals are not reinforced for responding by listening to their peers, they will not emit speaker / listener exchanges and it is the emission of speaker / listener exchanges that makes an individual truly social (Eby, 2010; Greer & Du, in press; Greer & Ross, 2008; Greer & Speckman, 2009; Reilly-Lawson & Walsh, 2007; Schemelzekopf, 2010; Sterkin, 2011). Social reinforcement appears to be the critical verbal developmental cusp that is necessary for the beginning of a truly social repertoire. (Eby; Greer & Du; Greer & Speckman; Greer & Ross; Schemelzekopf; Sterkin)

Video Modeling

Findings. The overall findings from the video modeling study suggest that directly teaching social verbal operants can lead to an increase in the total number of social verbal operants emitted and the number of self-initiated social verbal operants emitted by some individuals. The results of this experiment show that social verbal operants can be taught using a

video modeling protocol; which supports previous findings (Apple et al., 2005; Charlop-Christy & Daneshvar, 2003; Charlop & Milstein, 1989; D'Ateno et al., 2003; LeBlanc et al., 2003; Maione & Mirenda, 2006; Nikopoulos & Keenan, 2003, 2004a, 2004b, 2007; Nikopoulos & Nikopoulou-Smyrni, 2008; Reagon et al., 2006; Sherer et al., 2001). However, the results also seem to validate prior research that showed video modeling has limited success increasing spontaneous emission of unscripted verbal operants outside the instructional setting (Bellini & Akullian, 2007).

The results of this study also demonstrate that typically developing peers increased their initiation of conversation with the participants suggesting that participants themselves acquired reinforcement value for their peers. This pairing of reinforcement value could be due to participants' overall increase in the total number of social verbal operants they emitted. The results also demonstrate that the participants in the video modeling condition increased the number of times they did not respond to peers or that they missed the opportunity to respond to a peer's social verbal operant. When analyzed together as a percentage of peer initiated social verbal operants participants in the VM condition responded to, the data show that they decreased their responding following the intervention. This suggests that participants in the VM condition did not increase their observing responses to peers nor did peers become a conditioned reinforce for the participants. These results suggest that the VM protocol may not necessarily condition social reinforcement.

Observational Learning. Research has shown that novel verbal behaviors can be imitated by children or even infants following a single demonstration during a modeling procedure, as long as other imitations are reinforced (Brigham & Sherman, 1968; Poulson, 1991). However, current video modeling literature (Apple, Billingsley & Schwartz, 2005;

D'Ateno, Mangiapanello, & Taylor, 2003; Delano, 2007; Nikopoulos & Keenan, 2004) shows us that not all individuals have this capability in repertoire. There has been little research on identifying the prerequisite repertoires individuals must have to make video-modeling instruction effective. Video modeling proponents state that generalized imitation is a prerequisite for video modeling instruction (Nikopoulos & Keenan, 2006; Sherer et al., 2001). However, no studies show measures of generalized imitation for participants prior to intervention in order to ensure they had this necessary skill in repertoire. Recent research exploring learning as a function of observation (Catania, 2007; Greer, Singer-Dudek, & Gautreaux, 2006; Pear, 2001; Stolfi, 2005), questions whether the real prerequisite needed to learn from a model is generalized imitation or observational learning?

According to Bandura's original social learning theory (1977), observational learning only occurs if the observer has an expectation that imitating the behavior will produce reinforcement. Bandura's (1977) original idea of observational learning has now been divided into two different skills: generalized imitation and observational learning. In looking at the behavioral literature (Du, 2010; Greer & Ross, 2008; Greer, Singer-Dudek & Gautreaux, 2006; Greer & Speckman, 2009; Rothstein & Gautreaux, 2006) there are key differences between generalized imitation and observational learning.

Generalized imitation refers to an individual's capability to imitate novel behaviors (Du, 2010; Greer & Speckman, 2009; Pereira-Delgado, Speckman & Greer, 2010). Generalized imitation develops through a process of conditioned reinforcement for the correspondence between observing a behavior and producing the same behavior (Du; Greer & Speckman; Moreno, 2010). Individuals with generalized imitation in repertoire should be able to imitate novel responses on the first try without receiving reinforcement, if they have received

reinforcement for imitating a number of behaviors previously. The repeated contact with the reinforcement contingencies for the see-do relation develops an imitation repertoire (Baer et al., 1967; Baer & Deguchi, 1985).

Catania (2007) defined observational learning as "learning based on observing the behaviors of another organism" (p. 227). Rothstein and Gautreaux (2006) elaborated on this definition explaining that "observational learning occurs when an observer observes the direct contingencies received by another and subsequently emits the target behavior observed" (p. 453). If an individual has generalized imitation in repertoire he/she is able to imitate a behavior he/she has observed. If an individual has observational learning in repertoire he/she is able to observe others and emit the learned behavior under the same environmental contingencies without ever being directly consequated for this behavior. Based on these current definitions of terms in behavioral literature (Greer, Singer-Dudek, Gautreaux, 2006) it appears that observational learning is the true prerequisite for video modeling as it is only with this capability in repertoire that an individual could demonstrate one-trial learning (Deguchi, 1984). In order to assess if an individual has observational learning in repertoire experimental probes must be conducted to assess if the individual can learn novel behaviors and performance behaviors through observation (Greer, Singer-Dudek, & Gautreaux, 2006). If consistent experimental probes were conducted across all participants in video modeling studies researchers may be able to determine what verbal behavior cusps and capabilities are necessary prerequisites for this teaching method to be effective.

Social Learning Methods

Findings. The results of the experiment demonstrate functional relations between the increase in the total number of social verbal operants emitted by preschoolers with Autism and

language delays, and both SLR and VM. The majority of the participants emitted an increased number of social verbal operants to varying degrees during postintervention probe sessions. However due to the differences between the groups at the outset, direct comparisons were not possible. Nevertheless, the findings are suggestive about the benefits and limitations of each social learning method as well as the usage with disparate individuals. When the data from both conditions were analyzed and compared the results show that the participants in the SLR condition demonstrated the greatest increase in the number of social verbal exchanges they initiated with typically developing peers; either because of the effectiveness of the protocol or because the participants emitted lower numbers of social verbal operants at the outset. It is hypothesized that participants in the SLR condition may have contacted more reinforcement from their audience, than participants in the video modeling condition contacted.

In analyzing the data for all participants it can be seen that there is variation in the effectiveness of both interventions across individual participants. These data suggest that there are necessary prerequisites cusps and capabilities that an individual must have in order to benefit from each intervention. Based on the result of this experiment it is hypothesized that individuals, with fluent listener / speaker repertoires and social approvals conditioned as a reinforcer, would benefit more from SLR. Whereas individuals who have observational learning, and social approvals, and social listening conditioned as a reinforcer, may benefit more from video modeling.

Difference in What Emerges from the Two Protocols: Scripted Social Language Versus Conditioned Reinforcement for Social Exchanges. The differences between group populations most likely played a role in the differences of the results of both protocols; however there are additional variables to consider. One alternative explanation for the different effects of

both social learning protocols centers on the differences in the methodologies of teaching direct operants versus allowing operants to emerge or develop through a conditioning procedure. The most important difference in these two methodologies is the role that reinforcement plays: what it is and how it is given. Vollmer and Hackenberg (2001) explain that "reinforcement contingencies, in general, and social reinforcement contingencies, in particular, are ubiquitous in applied behavior analysis" (Vollmer & Hackenberg, 2001). However, in analyzing the implementation of the social reinforcement contingencies in both of these methods it is clear that there needs to be a more fundamental understanding of social reinforcers: how they are obtained and the best way to utilize them to advance complex social behaviors (Vollmer & Hackenberg, 2001).

Proponents of video modeling argue that children need to be taught complex social behaviors (vocal and non-vocal) through a targeted training program (Nikopoulos & Keenan, 2006). The goal of video modeling is to teach the complete sequence of behaviors involved in social interactions so that individuals are not dependent on explicit cues (Nikopoulos & Keenan, 2004). In traditional video modeling there are no external experimenter-introduced contingencies, therefore individuals are not directly reinforced for imitating the observed behaviors. When individuals perform the modeled behaviors they come into contact with the same naturally occurring contingencies as the peer model; in the case of videos targeting complex social behaviors this reinforcement is access to social attention. The reinforcement contingencies implemented in video modeling are based on Bandura's observational learning theory which hypothesizes that simply watching another individual receive reinforcement for a particular behavior can increase that behavior in the observer as well as the model (Bandura, Ross, & Ross, 1961). However, prior to entering a video modeling protocol there is no standard

test participants must pass to ensure that these social contingencies function as reinforcers, therefore there is no way to tell if they are watching an individual receive reinforcement or simply watching them complete a task. Research consistently demonstrates that learning does not occur when performing the target behavior does not lead to a reinforcing consequence for the learner (Sigafoos & O'Reilly, 2007). Therefore if the reinforcement the learner observes another individual receiving does not function as a reinforce for him/her and it is not conditioned as a reinforcer during the protocol then he/she is not coming into contact with a reinforcer which means imitation/learning is not likely to occur (Baer, Peterson, & Sherman, 1967; Baer & Sherman, 1964). These theories on reinforcement suggest that individuals may not learn complex social behaviors from video modeling because the social attention the models receive is not a conditioned reinforcer. However, individuals who have both observational learning and social reinforcement in repertoire but lack specific verbal operants may benefit from video modeling protocols.

In the SLR protocol individuals participate in a variety of games with a peer partner. The games are structured to require individuals to emit a range of conversational units. The individuals receive reinforcement for working with a peer to complete tasks that require speaker / listener exchanges. Throughout the protocol the partners receive reinforcement for correct speaker / listener exchanges they emit by watching their character move up towards the prize. By working as a team the partners are able to earn access to a reinforcer. The SLR protocol reinforces individuals for emitting various forms of speaker / listener exchanges with peers. This protocol does not teach the conversational scripts but rather conditions social verbal exchanges to function as a reinforcer. The results of this study demonstrate that the SLR method appears to

lead to more consistent increases in the likelihood that individuals will emit novel complex social behaviors.

Results from this study suggest that video modeling did not increase conditioned reinforcement for social exchanges for the participants studied, which appears to add support to previous research (Apple et al., 2005; D'Ateno et al., 2003; Nikopoulous & Keenan, 2003; Sherer et al., 2001; Sworth, 2003; Taylor et al., 1999) that shows that individuals do not consistently emit unscripted speaker / listener exchanges in novel social settings. Bellini and Akullian (2007) conducted a meta-analysis of 23 video modeling single case studies. The results suggest that video modeling is an effective protocol for addressing social-communication skills; however they also found that the common problem was that after video modeling is conducted participants still struggle to emit unscripted responses. The results of these studies imply that video modeling teaches individuals to emit an intraverbal under very strict stimulus control pertaining to a specific antecedent; however when faced with novel settings individuals do not have the conditioned establishing operation or skills to emit novel complex social behaviors. The theoretical question then becomes are these individuals truly social if they cannot, or do not voluntarily engage in conversational units (speaker / listener exchanges) and do not have social reinforcement contingencies in repertoire (Greer & Du, in press; Vollmer & Hackenberg, 2001)? Results from this study support prior research (Greer & Ross, 2008; Reilly-Lawson & Walsh, 2007; Sterkin, 2011) which suggests that SLR is unique in its ability to condition the exchange of speaker / listener responses thus allowing participants to come into contact with their environment in ways they could not before.

Educational Implications. The attainment of social behavior and friendship is often the most important educational goal parents and teachers have for children diagnosed with Autism

and developmental disabilities. Research has shown that individuals with impaired social skills do not have the necessary behaviors in repertoire to interact with others according to social norms, and as a result suffer in both academic and social development (Rao, Beidel, & Murray, 2008). Elementary school children who do not have complex social skills in repertoire have significant problems in their social relationships as they struggle to initiate and maintain friendships. By early adolescence, these social impairments can lead to rejection and ridicule by one's peers (Church, Alisanski, & Amanullah, 2000).

One of the primary deficits in individuals with Autism is limited language and impaired social verbal behavior. Typically developing elementary children can read and write an average of 86,000 words (McGuiness, 2004) however children with Autism and language delays do not have this vast language repertoire. Individuals who do not engage in social interactions have fewer opportunities to learn language then children who are more socially engaged and initiate more verbal interactions (Kaise, Hester, & McDuffie, 2001). Research has shown that pedagogical procedures designed to increase language in children with developmental delays are needed. Although research has been conducted on important role adult approvals play on language acquisition (Greer & Ross, 2008, Hart & Risley, 1995; Chadwick & Day, 1971), limited research has been conducted on the effects of peer approvals on language acquisition. If, like this research suggests, peer approvals lead to the generation of more social language then the increase in verbal exchanges may help to compensate for the missing language opportunities students with disabilities have compared to their typically developing peers (Hart & Risley, 1995).

Limitations

There were several limitations found in this experiment. A major limitation was the inconsistently matched participants across conditions. Participants were initially placed in matched pairs based on the verbal behavior developmental cusps and capabilities they had in repertoire and the number of contextually appropriate conversational units they emitted during preexperimental probes. The intervention was begun before participants completed all additional pre-experimental probes and during this time the decision was made to explore the number of conversational units and sequelics participants emitted regardless of context. When the data from each participant's additional 6-9 pre-intervention probe sessions were analyzed, it showed that the groups were not evenly matched based on the number of social verbal operants they emitted. The flawed matching led to one group emitting higher levels of social verbal operants during preexperimental probe sessions. This error resulted in only indirect comparisons being able to be made between groups.

Due to the higher pre-test scoring of participants in the video modeling condition it could potentially be argued that participants encountered a ceiling effect, thus limiting the number of operants they could emit. However, the missed opportunities to respond data show us that participants had plenty of additional opportunities to emit social verbal operants. Normative data collected in previous studies shows that typically developing peers emit many more social verbal operants than were emitted by participants in the video modeling condition in the pre- and postintervention probe sessions.

Due to time constraints and participant maturation it was not possible to conduct an alternating treatment design. This alternating design would have provided the opportunity to see the effects of each treatment on the variation of populations. Time constraints also prevented

maintenance data from being collected. A maintenance probe session conducted a month after the conclusion of the experiment may have shown any lasting effects on participants' verbal behavior. This procedure would also have been more inline with current video modeling research (Bellini & Akullian, 2007).

Finally, a limitation in the SLR condition occurred when Participant E only participated in two postintervention probe sessions. A third experimental probe session was not conducted because he left the country on a prolonged trip that was not previously disclosed to school staff. Upon returning it was discovered that he had only been exposed to a foreign language for three weeks and thus it was decided that his postprobe data would be inconsistent due to confounding variables.

Future Studies

Following both social learning protocols participants increased the number of social verbal operants they emitted and their initiation of complex social behavior. Future studies should be conducted with evenly matched groups to get a direct group comparison. It would also be interesting to conduct the study with participants who had a greater discrepancy across levels of verbal behavior, to see if the relation between the protocols and the emission of social verbal operants may change based on the verbal behavior cusps and capabilities participants have in repertoire?.

In a study by Paterson and Arco (2007) the results showed that the effects of video modeling decreased when the models were withdrawn and increased again upon their reintroduction in the follow-up condition. For social skill interventions to be effective individuals need to acquire this capability and maintain it in their repertoire. In order to test for the long-term effectiveness of these protocols future studies should conduct maintenance probe

sessions to look at the emission of participants' social verbal operants a month or two after the intervention is complete.

Social skills and audience awareness are a necessary skill for students to experience success in more independent classroom settings (Church et al., 2000; Rao et al., 2008; Scruggs et al., 2007). Future studies should conduct experimental probe sessions in non-instructional settings with a larger number of peers in order to replicate general education environments such as physical education, recess on the playground, lunch, and toy area time. If the interventions are not effective at increasing the number of social verbal operants participants emit in these larger settings, researchers should explore what contingencies need to be added to the protocols in order to induce the behavior in these environments.

Due to the need for students to have a large verbal repertoire it is important to increase both the total number of social verbal operants they emit and the variety of operants they emit. Video modeling does not produce the natural contingencies associated with typical complex social behavior; instead it teaches specific responses to certain antecedent stimuli. Previous research (Bellini & Akullian, 2007; D'Ateno et al., 2003; Sherer et al., 2001; Thiemann & Goldstein, 2001) has found that although social behavior increases in postprobe sessions there is only a minimal increase in unscripted language, if any at all. Future studies should examine the variance in speaker responses, how frequently participants are emitting scripted versus unscripted responses and whether these responses are emitted in the appropriate environment.

Video modeling research discusses the need for students to be able to attend to a television (Kinney et al., 2003; Shipley-Benamou et al., 2002) and emit imitative behavior (Nikopoulos & Keenan, 2006). Numerous video modeling studies have been conducted that show great variability in students' responses. Sherer et al. (2001) had two participants who

viewed videos up to 324 times with no results although they were matched with the other 4 participants in terms of IQ and language ability; these findings raise the question of why some children are able to learn through video modeling while others are not. In examining the literature it appears that more research needs to be conducted to determine if there are necessary verbal developmental cusps and capabilities beyond generalized imitation that individuals need to have in repertoire as prerequisite to video modeling. As Catania (2007) suggested, imitation cannot be used synonymously with observational learning because it does not imply that the observer has learned something about the contingencies effecting the behavior. In order to understand why video modeling is effective and for whom video modeling can be effective, researchers need to conduct a systematic examination of the video components and the behavioral characteristics of individuals for whom the protocol has been successful.

Future video modeling research should continue to explore the effects of various confederates used during both video models and the experimental probe sessions. Would participants respond differently if they were engaging in the social behaviors with a student instead of an adult? Would a model who is more similar to the participants' targeted social peer, lead to greater generalization of the stimulus control and thus increased complex social behavior?

Researchers from the area of verbal behavior development should conduct future studies isolating the specific components of SLR that are responsible for the change in participants' social behavior (the presence of learn units, required joint attention, peer approvals, or the yoked contingency). In particular researchers should conduct further studies examining the effect of the empathy component of the SLR protocol. Does the inclusion of the empathy component effect the number of complex social behaviors participants emit? Would empathy instruction be more

effective if it was conducted in an "in-situ" setting with peers where relationships have already been established?

Conclusion

My analysis suggests, that the source of reinforcement for complex social behavior is social listener reinforcement. When individuals have social listener reinforcement in repertoire they are able to access the environment in new ways by attending to their peers. Attending to and engaging with their peers allows individuals to build their audience control repertoire which enables them to distinguish behaviors that generate reinforcement from peers and therefore increase social behaviors, that are socially consistent with their peers (Sterkin, 2011). Participants increased their initiation of social interaction with peers and peers increased their initiation of social interaction with participants when participants had social listening as a conditioned reinforcer.

This study also affirmed that conversational units are the measurable units of social behavior as well as the necessary components for the acquisition of such a repertoire. This research suggests that accessing social contingencies controls complex social behaviors. It asks researchers in the field of applied behavior analysis to question what reinforces novel social responding and how can this best be taught? This basic science study contributes to the verbal behavior literature by providing an understanding of the reciprocal relationship between the acquisition of complex social behavior and social verbal operants, and the social listener reinforcement protocol. Additionally the study contributes to the field of applied behavior analysis by providing an instructional procedure, which can be used to occasion generative and novel verbal behavior.

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APPENDIX

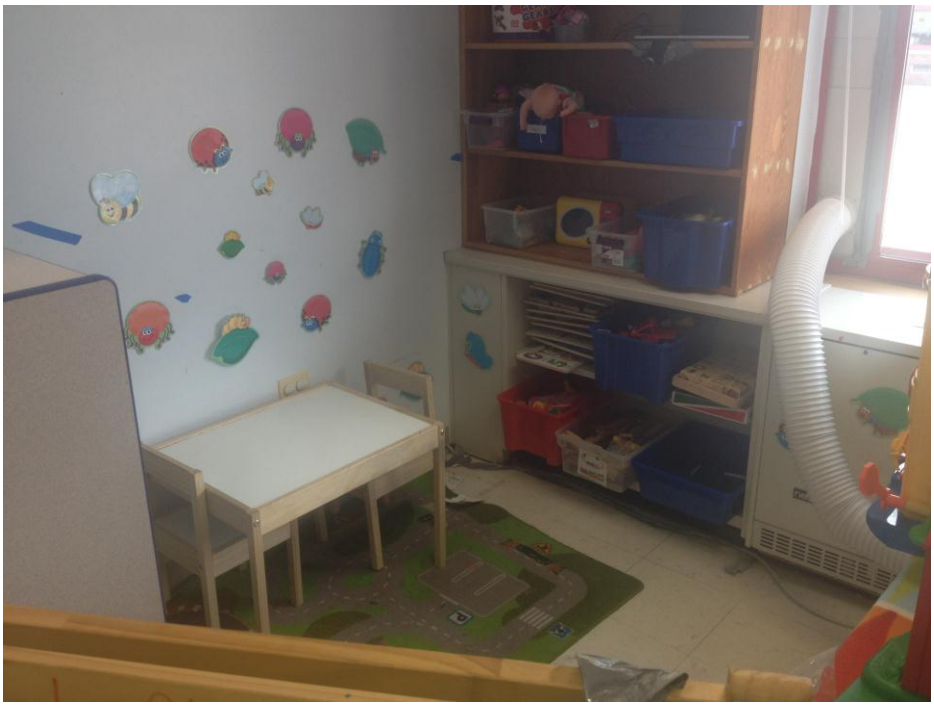
Appendix 1

Description of Participants Test Scores at the Onset of the Experiment

Participant	**Lap-D (z –scores)**	**Preschool Language Score**	**Stanford – Binet Intelligence scale 5th eds.**
A	Language Comprehension -0.64 Language Naming -1.18	Auditory 119 Expressive 119 Total 122	Full 101 Nonverbal 106 Verbal 96
B	No Score	Auditory 76 Expressive 74	No Score
C	Language Comprehension -0.36 Language Naming -1.75	Auditory 67 Expressive 68	No Score
D	No Score	Auditory 77 Expressive 82	No Score
E	Language Comprehension -1.88 Language Naming -2.33	Auditory 63 Expressive 66	No Score
F	Language Comprehension -0.95 Language Naming -0.13	Auditory 79 Expressive 70	Total 91 Verbal 74
G	Language Comprehension -1.75 Language Naming +0.5	Auditory 100 Expressive 90	No Score
H	No Score	Auditory 94 Expressive 110	Full 74 Nonverbal 83 Verbal 68
I	Language Comprehension -2.05 Language Naming -0.81	Auditory 78 Expressive 78	No Score
J	No Score	Auditory 92 Expressive 90	Total 73
K	Language Comprehension -1.64 Language Naming -1.23	Auditory 76 Expressive 72 Total 73	Total 90 Nonverbal 88 Verbal 93
L	No Score	Auditory 86 Expressive 88	Total 94

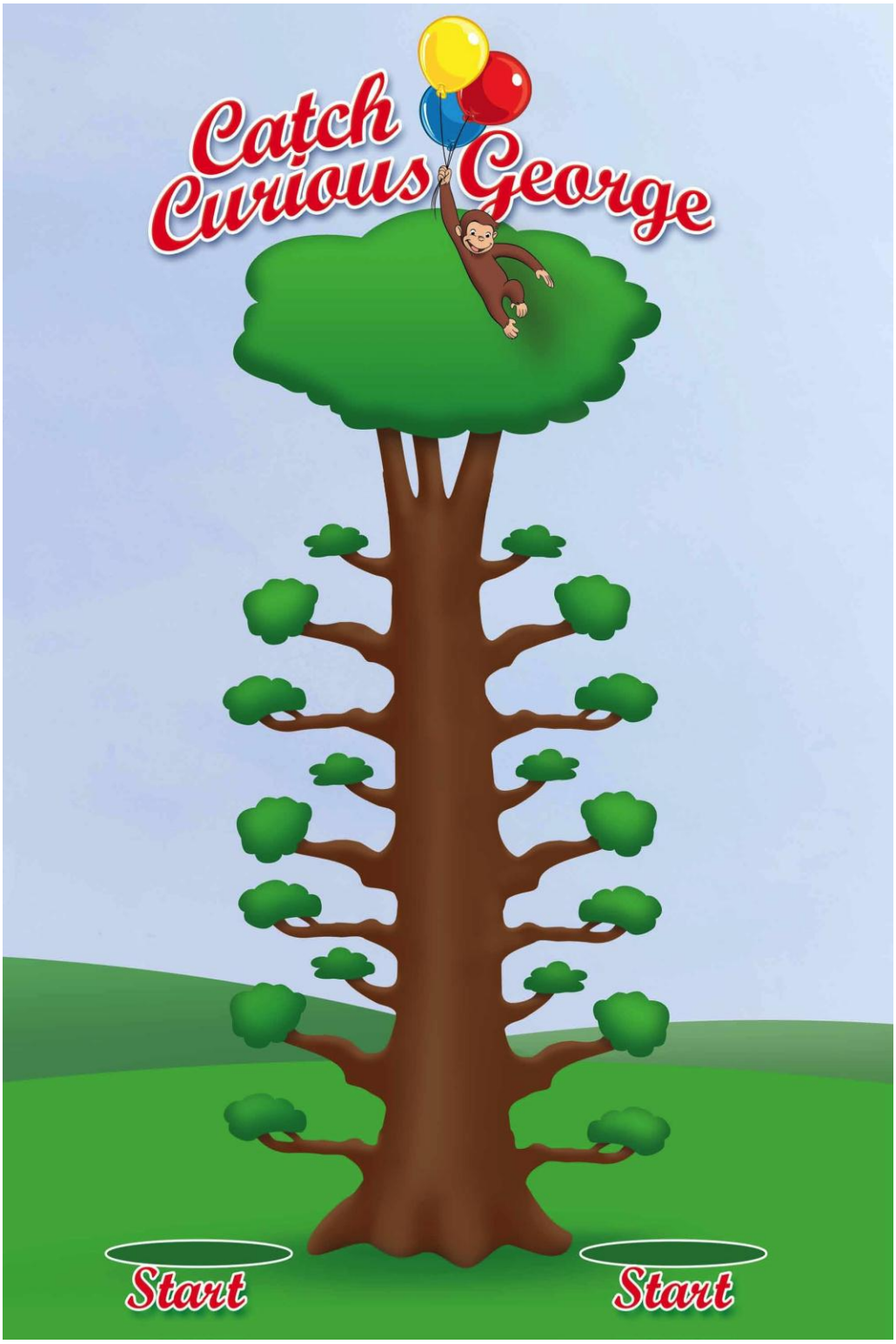
Appendix 2

Pictures of the Experimental Probe Area



Appendix 3

Peer-yoked Contingency Game Board



Appendix 4

Peer-yoked Contingency Game Board Characters

Appendix 5

Stimuli for the Collaborative Construction Phase of the SLR Protocol

Appendix 6

Participants in the SLR Condition Responses to Intervention

Dependent Variable	Increased	Decreased	No Change
Self-initiated social verbal operants	4	1	1
Total social verbal operants emitted	5	1	0
Missed opportunities to respond	1	5	0
Percentage of peer-initiated social verbal operants responded to	6	0	0

Appendix 7

Participants in the VM Condition Responses to Intervention

Dependent Variable	Increased	Decreased	No Change
Self-initiated social verbal operants	3	3	0
Total social verbal operants emitted	3	3	0
Missed opportunities to respond	5	1	0
Percentage of peer-initiated social verbal operants responded to	2	4	0

Appendix 8

Experimental Probe Data Form

Experimental Vocal Operant Probes

Date:_____ Participant:_____ Cohort: _____ Activity & Session:_____ IOA Initials: _____

	Mands	Tacts	Sequelics **Vocal**		Sequelics **Non Vocal**		Conversational Units - **Vocal**		Conversational Units – **Non Vocal**		Wh ?s	Approvals vocal	Disapprovals vocal	Missed Op. List.
Participant			**S.I.**	**P.I.**	**S.I.**	**P.I.**	**S.I.**	**P.I.**	**S.I.**	**P.I.**				
0 -:30														
:30 - 1:00														
1:00-1:30														
1:30-2:00														
2:00-2:30														
2:30-3:00														
3:00-3:30														
3:30-4:00														
4:00-4:30														
4:30-5:00														
Total														

Appendix 9

Experimental Probe Script Data Form

Participant:_____	**Date**: _____
Activity: _____	**Co-hort**:_____

Time Code	
0-30	
30-60	
1:00-1:30	
1:30-2:00	
2:00-2:30	
2:30-3:00	
3:00-3:30	
3:30-4:00	
4:00-4:30	
4:30-5:00	

Appendix 10

Social Listener Reinforcement – "I Spy" – Raw Data Forms

"I SPY" - Raw Data – Participants: ____________________________

participants	Date:		Session:		participants	Date:		Session:		participants	Date:		Session:
	What is it	**Item**	**Item Repeat**			**What is it**	**Item**	**Item Repeat**			**What is it**	**Item**	**Item Repeat**

Appendix 11

Social Listener Reinforcement – "I Spy" – Blocked Data Forms

"I SPY" - Blocked Data – Participant: _____

	Date:		Session:		Date:		Session:		Date:		Session:
	What is it	**Item**	**Item Repeat**		**What is it**	**Item**	**Item Repeat**		**What is it**	**Item**	**Item Repeat**
1				1				1			
2				2				2			
3				3				3			
4				4				4			
5				5				5			
6				6				6			
7				7				7			
8				8				8			
9				9				9			
10				10				10			
	Total				**Total**				**Total**		

	Date:		Session:		Date:		Session:		Date:		Session:
	What is it	**Item**	**Item Repeat**		**What is it**	**Item**	**Item Repeat**		**What is it**	**Item**	**Item Repeat**
1				1				1			
2				2				2			
3				3				3			
4				4				4			
5				5				5			
6				6				6			
7				7				7			
8				8				8			
9				9				9			
10				10				10			
	Total				**Total**				**Total**		

Appendix 12

Social Listener Reinforcement – "Bingo" – Raw Data Forms

"BINGO" – Raw Data – Participant: _____

Participant						Participant				
	Speaker	Listener	Speaker	Listener			Speaker	Listener	Speaker	Listener
1						1				
2						2				
3						3				
4						4				
5						5				
6						6				
7						7				
8						8				
9						9				
10						10				
11						11				
12						12				
13						13				
14						14				
15						15				
16						16				
17						17				
18						18				
19						19				
20						20				

Appendix 13

Social Listener Reinforcement – "Bingo" – Blocked Data Forms

"BINGO" - Blocked Data – Participant: _____

	Date:	Session:			Date:	Session:			Date:	Session:	
	Listener	**Speaker**			**Listener**	**Speaker**			**Listener**	**Speaker**	
1				1				1			
2				2				2			
3				3				3			
4				4				4			
5				5				5			
6				6				6			
7				7				7			
8				8				8			
9				9				9			
10				10				10			
Total				**Total**				**Total**			

	Date:	Session:			Date:	Session:			Date:	Session:	
	Listener	**Speaker**			**Listener**	**Speaker**			**Listener**	**Speaker**	
1				1				1			
2				2				2			
3				3				3			
4				4				4			
5				5				5			
6				6				6			
7				7				7			
8				8				8			
9				9				9			
10				10				10			
Total				**Total**				**Total**			

Appendix 14

Social Listener Reinforcement – "Collaborative Conversation" – Raw Data Forms

"Conversation Immersion" – Raw Data – Participant: _____

Participant						Participant				
	Speaker	Listener	Speaker	Listener			Speaker	Listener	Speaker	Listener
1						1				
2						2				
3						3				
4						4				
5						5				
6						6				
7						7				
8						8				
9						9				
10						10				
11						11				
12						12				
13						13				
14						14				
15						15				
16						16				
17						17				
18						18				
19						19				
20						20				

Appendix 15

Social Listener Reinforcement – "Collaborative Conversation" – Blocked Data Forms

"Conversation Immersion" - Blocked Data – Participant: _____

	Date:	Session:			Date:	Session:			Date:	Session:	
	Listener	**Speaker**			**Listener**	**Speaker**			**Listener**	**Speaker**	
1				1				1			
2				2				2			
3				3				3			
4				4				4			
5				5				5			
6				6				6			
7				7				7			
8				8				8			
9				9				9			
10				10				10			
Total				**Total**				**Total**			

	Date:	Session:			Date:	Session:			Date:	Session:	
	Listener	**Speaker**			**Listener**	**Speaker**			**Listener**	**Speaker**	
1				1				1			
2				2				2			
3				3				3			
4				4				4			
5				5				5			
6				6				6			
7				7				7			
8				8				8			
9				9				9			
10				10				10			
Total				**Total**				**Total**			

Appendix 16

Social Listener Reinforcement – "Peer Tutoring" – Raw Data Forms

"Peer Tutoring" – Raw Data – Participant: _____

Participant						Participant				
	Student	Teacher	Student	Teacher			Student	Teacher	Student	Teacher
1						1				
2						2				
3						3				
4						4				
5						5				
6						6				
7						7				
8						8				
9						9				
10						10				
11						11				
12						12				
13						13				
14						14				
15						15				
16						16				
17						17				
18						18				
19						19				
20						20				

Appendix 17

Social Listener Reinforcement – "Peer Tutoring" – Blocked Data Forms

"Peer Tutoring" - Blocked Data – Participant: _____

	Date:	Session:			Date:	Session:			Date:	Session:	
	Student	**Teacher**			**Student**	**Teacher**			**Student**	**Teacher**	
1				1				1			
2				2				2			
3				3				3			
4				4				4			
5				5				5			
6				6				6			
7				7				7			
8				8				8			
9				9				9			
10				10				10			
Total				**Total**				**Total**			

	Date:	Session:			Date:	Session:			Date:	Session:	
	Student	**Teacher**			**Student**	**Teacher**			**Student**	**Teacher**	
1				1				1			
2				2				2			
3				3				3			
4				4				4			
5				5				5			
6				6				6			
7				7				7			
8				8				8			
9				9				9			
10				10				10			
Total				**Total**				**Total**			

Appendix 18

Social Listener Reinforcement – "Empathy" – Data Forms

"Empathy" –Data – Participant: _____

	Date: Session:				**Date: Session:**					**Date: Session:**					**Date: Session:**					**Date: Session:**				
	What happened?	How would you feel?	Why?	How can you help?		What happened?	How would you feel?	Why?	How can you help?		What happened?	How would you feel?	Why?	How can you help?		What happened?	How would you feel?	Why?	How can you help?		What happened?	How would you feel?	Why?	How can you help?
1					1					1					1					1				
2					2					2					2					2				
3					3					3					3					3				
4					4					4					4					4				
5					5					5					5					5				
6					6					6					6					6				
7					7					7					7					7				
8					8					8					8					8				
9					9					9					9					9				
10					10					10					10					10				
11					11					11					11					11				
12					12					12					12					12				
13					13					13					13					13				
14					14					14					14					14				
15					15					15					15					15				
16					16					16					16					16				
17					17					17					17					17				
18					18					18					18					18				
19					19					19					19					19				
20					20					20					20					20				
Total					**Total**					**Total**					**Total**					**Total**				