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THE DIFFERENTIAL EFFECTS OF PIVOTAL RESPONSE TRAINING AND DIRECT INSTRUCTION ON COMPLIANCE AND SELF-INITIATIONS FOR TWO MALE PRESCHOOL STUDENTS DIAGNOSED WITH AUTISM SPECTRUM DISORDER

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Abstract

The purpose of this study was to examine the effects of using Pivotal Response Training (PRT) and Direct Instruction (DI) on the social skills of two preschool students diagnosed with autism spectrum disorder (ASD). This combination of interventions allowed for both participants to increase social skills using the fourth pivotal skill in the PRT intervention, increasing self-initiations. The study was conducted in a self-contained special education preschool classroom in a public school located in the Pacific Northwest. The results showed an increase of independent self-initiations between the two participants after PRT and the model-lead-test techniques of Direct Instruction were combined. This report suggests that PRT and DI method were effective and applicable for teaching two preschool children with autism to increase social interaction.

Keywords: social skills, self initiation, independence, pivotal response training, compliance, non compliance, preschool students with autism, action research, model, lead, and test, Direct Instruction.

Introduction

Having communication skills with those around you is crucial key for everyday social and learning interaction. The majority of students with severe disabilities need systematic instruction to learn communication forms and strategies that are easily understood by others. Functional communication skills allow students to participate in social interactions by giving them a means to express their intentions and to respond to others. (Kaiser, Hancock, Nietfeld, & McDuffie, 2001). Several techniques for increasing social skills for students with autism spectrum disorder (ASD) have been shown to prove effective (Humphries, 2003; Thompson, 2007). Unfortunately,

ISSN: 2278-4012, Volume:1, Issue:2, October 2012

it has been difficult to replicate many of these procedures in a school settings (Bellini, Peters, Benner, & Hopf, 2007).

Review of Literature

Research on pivotal response training (PRT) has been carried out across several diagnostic populations and settings (Koegel & Kern-Koegel, 2006; B. Williams & R. Williams, 2011). PRT is a naturalistic child and family-centered intervention that has been used to promote appropriate social interactions and communicative skills in children with ASD (Humphries, 2003, Koegel & Kern Koegel, 2006). PRT is based on the principles of applied behavior analysis (ABA) and has an impressive body of literature to support its use for children with autism (Koegel & Kern-Koegel, 2006). PRT excludes negative interactions, reduces dependence on artificial prompts, and emphasizes inclusive settings with natural prompts (L. Koegel, R. Koegel, Harrower, & Carter, 1999; Koegel & Kern-Koegel, 2006; Schreibman, Kaneko, & Koegel, 1991). Koegel et al. identified four pivotal areas of primary focus for PRT which were: responding to multiple cues and stimuli, improving child motivation, increasing self-management capacity, and increasing self-initiations. The fourth pivotal area, self-initiation training, primarily consists of teaching children to spontaneously ask questions to gain information. Specifically, it involves teaching children to make initiations as a result of natural cues in the environment. Typical self-initiating questions can include wh-questions, assistance-seeking questions, and information-seeking questions.

Another teaching technology that has been employed in classroom settings to teach essential skills is direct instruction (DI). DI has been successfully employed with a wide range of student populations and classroom settings (Grossen, 1995; Marchand-Martella, Slocum, & Martella, 2004). Direct instruction employs an error correction procedure called model-lead-test. The model, lead, and test procedure involves correction used in situations that need student responses that may be difficult to produce. Model, lead, test techniques are very systematic in nature, but through repetition and practice, the student will have mastery of the skill you are trying to teach. Several recent studies (Brasch, Williams, & McLaughlin, 2008; Hayter, McLaughlin, Weber, & Scott, 2007) have reported that employing model lead and test error correction can increase mastery of basic math facts for two high school students with intellectual disabilities. Peterson, McLaughlin, Weber, and Anderson, (2007) employed this same error correction procedure to teach an adolescent with autism various locations (e. g. bathroom, hall, classroom) in his school. For this study, the concepts of both PRT and DI were combined to model appropriate self-initiated social interactions “wh-“ questions, assistance-seeking questions, and information seeking questions.

The purpose of this study was to determine the effectiveness of combining the PRT intervention with the model, lead and test DI strategy to increase independently self-initiated social interactions. Another purpose was to provide evidence that pivotal response training could be

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implemented using two students with autism as peer teachers for one another. A final purpose was to provide some preliminary data that shows that employing pivotal response training can take place in a preschool classroom setting.

Methodology

Participants

The participants of the study were two male preschool children with autism spectrum disorder (ASD). Both participants attended a self-contained pre-school classroom located in a public school that specialized in educating students with autism and severe behavioral developmental disabilities. Participant 1 was a 6-year-old boy diagnosed with ASD when he was three years of age. Participant 1 had individualized education plan (IEP) goals in the following domains: social, behavioral, communication and fine motor. He was recently tested out of pre-academic goals when his IEP was updated. Participant 1 was referred for special education when parents reported his developmental milestones were delayed. Those delays were that he was not able to sit independently and he starting walking independently until 16-months, he started talking at 12-months but did not use words appropriately until 2 years-old, and his speech was echolalic in nature.

Participant 1's test results were 69 months from the *Battelle Developmental Inventory* with a quotient score of 100 in the cognitive developmental area. Also, additional testing using the *Preschool Language Scale (*Zimmerman, Steiner, & Evatt-Pond, 2004) found that his age equivalences were as follows: auditory comprehension was 1 year 9 months, expressive communication was 1 year and 11months, and total language was just 1 year and 9 months. These test results suggest participants receptive and expressive communication skills are significantly below average for his chronological age group. When reevaluated, the skills in all domains were below average for his chronological age group. The participant did not have a family history of learning problems. At the time of the study the student was receiving cognitive therapy, speech therapy, occupational therapy, and physical therapy.

Participant 2 was a 5 ½-year-old boy diagnosed with ASD when he was 4 ½-years-old. Participant 2 had individualized education plan (IEP) goals in the following domains: pre-academic, social, behavioral, communication, adaptive, gross motor, and fine motor. The participant was referred to special education because of concerns from parents dealing with communication and inability to attend. The participant received speech and occupational therapy (OT) before being enrolled in preschool.

The participant's test results at chronological age 58 months when using the *Batelle Developmental Inventory* (Newborg, 2004) was a quotient score of 58 in the Cognitive Developmental area and received an percentile score of 1% or less in the three sub-domains of attention and memory, reasoning and academic skills, perception and concepts, self-care,

ISSN: 2278-4012, Volume:1, Issue:2, October 2012

personal and responsibility. Also, additional testing was carried out using the *Preschool Language Scale* and the *Peabody Developmental Fine Motor Scale.* The test results of the *Preschool Language Scale* age equivalencies in auditory comprehension were 1 year 9 months, and expressive communication of 2 years and 4months. The test results from the *Peabody Developmental Fine Motor Scale* in grasping percentile were 1% and in visual motor percentile were 5%.

Both students were chosen because they had difficulty with appropriately initiating or being able to be successful with reciprocal interactions in social situations. Although, both students were seen to having some appropriate interactions and play together. To help both participants it was decided by the teacher and the classroom staff that both participants would benefit in being paired together for the study.

Setting

The study took place in a self-contained preschool special education classroom at an elementary school in the Pacific Northwest. Both participants were enrolled in all day preschool along with three other students. The morning class had 8 students including the two participants and the afternoon class had nine students including both participants. The class was a special education preschool classified as a classroom specialized in autism, behavior, and language/communication. The majority of students in the classroom were diagnosed with ASD, though the disability population of the classroom included intellectual disabilities, apraxia, and Down syndrome. The data were collected either in the morning or afternoon classroom during free play. The sessions lasted approximately 15 to 20 minutes in the classroom in the beginning stages seated away from the designated free play area and as the study progressed sessions remained in the vicinity of the free play area. This was done to implement the training with each student while taking away the distraction of other students, as well as to implement and integrate the methods used in the intervention as the study progressed.

Dependent Variables and Measurement Procedures

There were three dependent variables recorded for analysis. First was the frequency of compliance. Compliance was defined as completing a request from the first author or the other participant. The second measure was non compliance. It was defined as not responding within 10s to a prompt from either the first author or the other participant. These data were scored as the frequency non compliance (no comply)+ per 10 verbal prompts. Self-initiating questions include wh-questions, assistance-seeking questions, and information-seeking questions. An independent initiation (independent) was defined as one of the participants prompting some behavior from either the first author or the other participant. Also, each comply, non comply or independent initiation was scored for each participant once a prompt was presented either by the first author or one of our participants. Each participant was given 10s to respond to a prompt. If

ISSN: 2278-4012, Volume:1, Issue:2, October 2012

no response occurred, it was scored as a no comply. At the beginning of each session, the participant was told they were able to pretend to be the teacher while working with the first author. Data were collected two days a week for approximately 11 weeks.

Experimental Design and Conditions

An ABACAC single case designs (Barlow, Nock, & Hersen, 2008; Kazdin, 2010) was used. A description of each condition follows.

Baseline 1. The initial baseline consisted of giving the participant verbal prompts in which they could comply or not comply. Each participant was separately given 10 prompts. The first author would wait 10s for a response. These were scored as either as a comply (C), no comply (NC) or an independent response (I). Examples of prompts given were: " What do you want to play?" "What game are you playing?" "Build a car/tower/person." " Make a choice." etc. At this time no feedback or instruction was given to the participants.

PRT with DI training (Training). PRT combined with the DI modeling techniques were used to present verbal prompts to the participants. Each participant worked individually one-on-one with first author during the free choice activity in the classroom. The first author told each participant that he must pretend to be the teacher and he could tell the first author what to do pertaining some designated task (i.e. building with blocks, stringing beads, painting or coloring objects, etc). The DI training technique, required the first author to provide prompts that modeled the types of questions or demands the participant could give to the first author. Participants were given 10 prompts from which data were taken. Examples of prompts given included: " You ask me, 'which block is _____in the sequence?'" "You ask me, 'which bead is next to the _____ bead"' (L. Koegel et al., 1999) etc.

Baselines 2 and 3. The second and third baselines consisted working with the two participants during a free choice activity. Either the first author or one of the instructional assistants in the classroom would present each participant a total of 10 prompts. Again, the first author would wait 10s for a response before data were recorded. We hypothesized that the participants should know how to independently initiate prompts between each other, without feedback from the first author. Examples of independently initiated prompts included: "Make a big bubble" "Come play with me" "Let's race" etc. Complies, no comply, and independent

PRT with DI integration (Integration 1 and 2), The two participants worked together with first author during free choice. The first author told the students to take turns pretending to be the teacher while the other was to be the student. Using the DI model, lead, and test technique, the first author modeled and lead each participant's demands or questions that a "teacher" could give the "student." Next the first author would provided indirect reminders to participants when needed. Each reminder was recorded as a prompt. The first author would wait 10s for a response to the prompt before these data were scored. Examples of indirect prompts included: "You could

ISSN: 2278-4012, Volume:1, Issue:2, October 2012

ask him what color he wants to draw with?" "What should he do next?" "Remember how to ask questions?" etc.

Reliability of Measurement and Fidelity of Implementation

Reliability was taken five times for each participant across the phases of research. First, the instructional aides or supervisor within the classroom agreed upon the prompts. The prompts were given in front of with the instructional aid or supervisor and then shown again after the session. The number of agreements was divided by the number of agreements and disagreements and then multiplied by 100. Reliability of measurement was 98% for Participant 1 and 100% for Participant 2. Reliability as to the fidelity of implementing the various conditions was taken 6 times (once in baseline, once in baseline 3, and three times during interventions 1 and 2. To measure fidelity, the second and third authors came to the classroom unannounced and observed the first author implementing the procedures. These data were taken during each condition. After the session was completed, the second or third authors wrote down which condition was in effect. Reliability as to the implementation of the various experimental conditions was 100%.

Findings

Overall results of the study showed an increase in both compliance to prompts and independent self-initiations (See Figures 1 and 2) over time. During baseline, Participant 1 complied with prompts an average of 5 times out of 10. He displayed 0 independent self-initiations during the first baseline. For Participant 2 during baseline, his compliance averaged 2.5 out of 10 prompts. He had 0 independent self-initiations in baseline 1.

During the PRT intervention with the DI modeling technique (Training), Participant 1 complied with prompts an average of 3.7 per 10 prompts. His non-compliance deceased to of 1.3 times out of 10 prompts. There was an increase for independent self-initiated to an average of 5.0 per 10 prompts. Compliance for Participant 2 increased to 5.3 and his non-compliance decreased to 3.0 per 10 prompts. His independent self-initiated increased to an average of 1.7.

During baseline 2 for Participant 1, his non compliance was low (M = 2.0 range 1 to 3), his compliance remained high (M = 5.5; range 5 to 6), and his self-initiations increased (M = 2.5; range 1) to 4. For Participant 2, his non-compliance remained at levels found in training (M = 3.5; range 3 to 4). Likewise his compliance declined and increased (M = 4.5; range 2 to 7) and his self-initiations decreased (M = 2.0; range 0 to 4).

When both participants were paired together with first author (Integration 1), Participant 1 complied with prompts an average of 4.0 times out of 10. His non-compliance to prompts averaged only 1 time out of 10 prompts. Hi independent self-initiated interactions increased to an average of 5.0 times per session. Participant 2 complied with prompts an average of 3.5 times

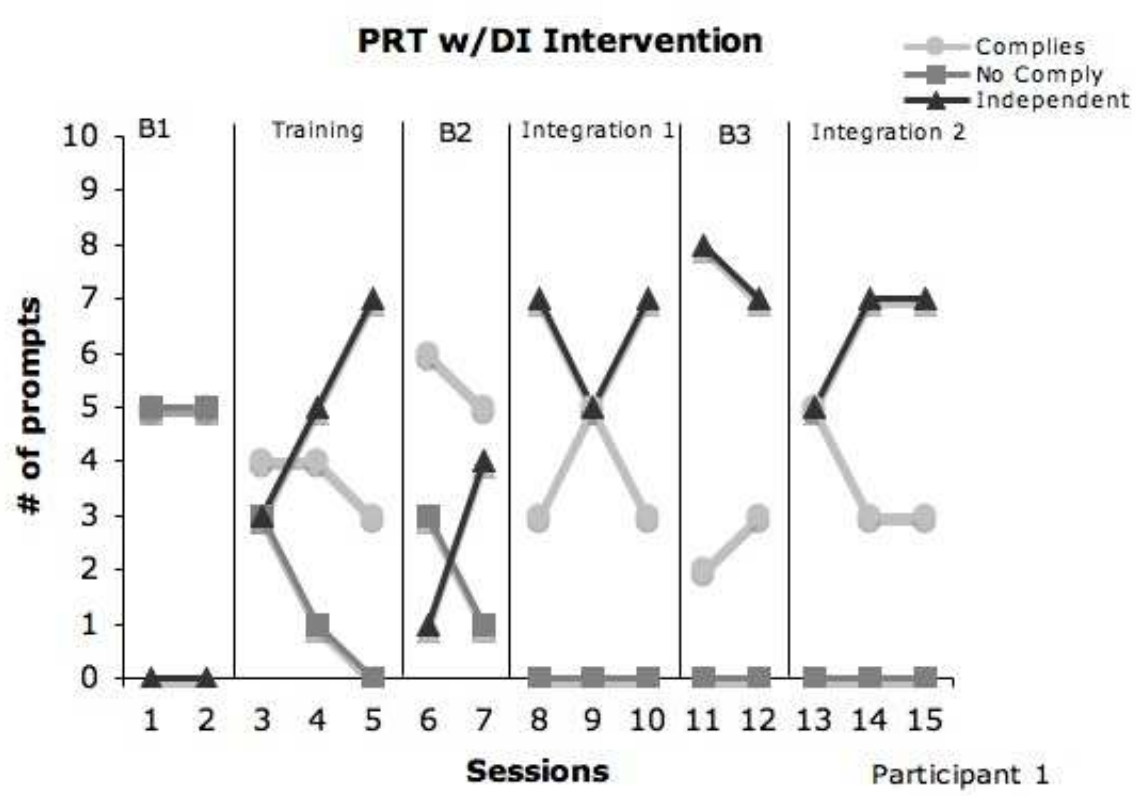
ISSN: 2278-4012, Volume:1, Issue:2, October 2012

out of 10. His non-compliance to prompts averaged 2.8 per of 10 prompts. His independently self-initiated prompts increased to an average of 3.8 times.

For the third baseline (B3), self-initiations remained high (*M* = 7.5; range 7 to 8), compliance declined (*M* = 2.5; range 2 to 3), and his non-compliance remained at 0.0. For Participant 2, compliance decreased (*M* = 2.5; range 2 to 3), non-compliance remained stable at 2.0, and his independent self-initiations increased (*M* = 5.5; range 5 to 6).

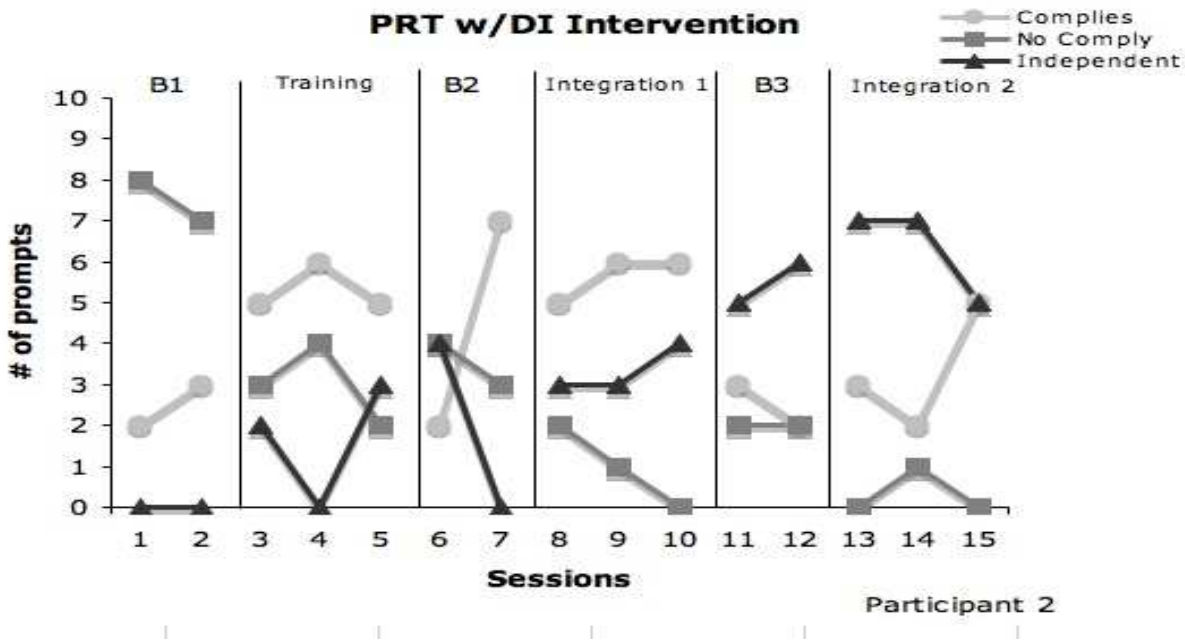
After the PRT intervention with DI error correction (Integration 2), outcomes were as follows. Participant 1 complied with prompts an average of 3.6 times out of 10 and did not comply with prompts an average of 0 times out of 10. His independent self-initiated compliance increased to 6.3 times. Compliance for Participant 2 increased to an average of 4.5 times out of 10. He only failed to comply with prompts an average of 2.0 times out of 10. His independent self-initiated compliance increased to an average of 4.8.

Figure 1. The number responses for Participant 1 during three baselines (B-1, B-2, B-3) during Training, Integration 1-2 using PRT and DI techniques.



ISSN: 2278-4012, Volume:1, Issue:2, October 2012

Figure 2. The number responses for Participant 2 during three baselines (B-1, B-2, B-3) during Training, and Integration 1-2.



Conclusion

Overall, the results of the study indicate that the pivotal response training paired with direct instruction error correction and modeling can increase two preschooler's compliance as well as to independently self-initiate. An interesting finding was the failure for compliance and self-initiations to reverse. It appeared that once each participant gained the skills of compliance and self-initiation, these behaviors continued to occur. The classroom teacher and the instructional assistants did mention that both participants began to self-initiate at other times during the school day and there was an overall improvement in their compliance.

Suggestions and Recommendations

Strengths of this study were that both students were able to have an independent training as a preview to the process and then integrate the training with their classroom peers. Thus both participants could prompt each other using natural cues in their environment. The reported outcomes extend the work of Humphries (2003) as well as Koegel, et al. (1999). Also, the DI model-lead-test procedures (Baumann, 1984) could be employed for teaching preschool students with autism compliance and interaction skills. A recent meta-analysis (Bellini et al., 2007), found that many school-based interventions to teach social skills to students with ASD have not always been effective. This present analysis provides some preliminary data as to the efficacy of PRT when combined with error correction.

ISSN: 2278-4012, Volume:1, Issue:2, October 2012

A major weakness of this study was that the data collected were event data and could thus be interpreted differently. Specifically, the author felt that sometimes responses or self-initiations by the participants were difficult to score. The crucial factor was if the response occurred within the 10 seconds of time allotted before data were collected. This led to some minor subjectivity in recording the type of response given (i. e. if the response was or was not independent.

The first participant was very cooperative throughout the study and was eager to participate in being the "teacher". However, at times he was unwilling to participate immediately during free play. Participant 2 required some coaxing and direction to get him to appropriately work together and attend to the other participant or the first author. Consequences in the form of praise and high-fives were used with this participant when he was non-compliant or did not appropriately attend. Both participants were rewarded intermittently with gummy bears after the completion of the session for good work and listening. The first author used a contingency frequently used in the preschool classroom using pictorial exchange communication (PEC) icons. These were employed at times to prompt our participants to work on the task (i.e. "First you come work with teacher then you can continue with free play"). Both participants came to the designated area to work, but the author felt that on some days, the participants did not do their best.

There limitations in the present study that should be noted. First, the three behaviors measured failed to decline during the two later baseline conditions. Also, for Participant 2, non compliance did not occur after the second baseline, and his self-initiations remained high during the last three phases (Integration 1 and 2 and B3). . Second, it was difficult for the first author to carry out the intervention. This probably occurred because data were being taken during free play context. Other students in the classroom would come over to the area to play or otherwise distract our participants. Third, the toys used in the study (i.e. colored blocks, colored beads, sequencing blocks etc.) were not always interesting to our participants. The first author tried to alternate the toys and drawing tasks across sessions.

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ISSN: 2278-4012, Volume:1, Issue:2, October 2012

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