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The Use of Noncontingent Reinforcement in the Regular Education Classroom with Attention-Deficit Hyperactivity Disorder Children

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The Use of Noncontingent Reinforcement in the Regular Education Classroom with Attention-Deficit Hyperactivity Disorder Children

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Heather A.D. Ochs

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Abstract

A problem that exists in many regular education classrooms is excessive disruptive behavior of students. This study will examine the disruptive behavior of two children, age 8, who have been diagnosed with Attention-Deficit Hyperactivity Disorder, in a simulated regular education classroom. Due to a renewed emphasis on linking treatment to functional analysis, noncontingent reinforcement was utilized to determine whether teacher mediated or peer mediated attention can decrease the disruptive behavior. This study used a multi-element design for the functional analysis and a reversal (ABAB) design to evaluate the effects of the noncontingent reinforcement treatment. Results indicated that peer attention was the variable that maintained the disruptive behavior of both children and suggested that noncontingent reinforcement was a partially effective treatment since levels of disruptive behavior decreased during the initial treatment phase, but could not be replicated for the final treatment phase.

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The use of Noncontingent Reinforcement in the Regular Education Classroom with Attention-Deficit Hyperactivity Disorder Children

Research suggests environmental factors such as escape, teacher attention, and peer attention may be responsible for the maintenance of disruptive behavior in the classroom. Many behavioral interventions such as differential reinforcement, response cost, or altering antecedent events, have been found to be effective in reducing disruptive behavior in the classroom and improving academic performance (DuPaul & Ervin, 1996). Many interventions exist but there is a renewed emphasis on linking treatments to functional analysis. An emerging trend in the applied behavior analysis research is the use of noncontingent reinforcement or the presentation of reinforcers on a time-based rather than response-based schedule. This study examined whether noncontingent reinforcement can be used to decrease the disruptive behavior of children with Attention-Deficit Hyperactivity Disorder (AD/HD) maintained by peer attention.

Functional Assessment

Functional assessment is utilized in order to determine what variables in the environment maintain the undesirable behavior in a particular individual (Iwata, Vollmer, &

Zarcone, 1990). The primary task in determining the motivation of behavior is to collect information about the behavior, how it can affect and is affected by the environment (Iwata et al., 1990). Discovering what maintains behavior is of crucial importance to the treatment of behavior disorders (Iwata et al., 1990). There are different ways that data can be collected and there are different conditions in which assessment takes place (Iwata et al., 1990). These methods are: indirect assessment, direct assessment, and functional analysis. These all serve the same purpose; however, they vary in terms of complexity and precision, and each method has its own strengths and weaknesses (Iwata et al., 1990).

Indirect assessment. The indirect assessment method consists of a subjective verbal report of the behavior under naturalistic conditions (Iwata et al., 1990). This is the simplest approach, and does not require any firsthand collection of data by the observer. To conduct an indirect assessment, the observer simply asks questions to the teachers, parents, or other relevant persons about the behavior and any significant events that may affect behavior (Iwata et al., 1990). The assessment interview should produce a clear description of the behavior by answering the following: (a) what is the behavior, (b) the situations in

which it does and does not occur, (c) antecedent events that may precipitate the behavior, and (d) the reactions of others around them (Iwata et al., 1990). The main advantage to using indirect assessment is that it is easy and efficient to apply (Iwata et al., 1990). Unfortunately, there are questions about the reliability and validity of this method because it relies on subjective recall of events (Iwata et al., 1990).

Direct assessment. The direct assessment method consists of a direct observation of the behavior under naturalistic conditions (Iwata et al., 1990). These data summarize the frequency and/or duration of the behavior, as well as the correlation between behaviors and environmental events such as an individual engaging in self injurious behavior that is accompanied by a caregivers attention or the cessation of instruction (Iwata et al., 1990). The primary advantage to direct assessment is that it is objective and relevant to everyday events (Iwata et al., 1990). There are also disadvantages to this method: it is complex, and naturally occurring events do not necessarily reveal functional relationships (Iwata et al., 1990). For example, Iwata et al (1990), described that some behavior disorders may be followed by highly intermittent reinforcement (e.g., the probability of escaping classroom

instruction following a tantrum or displaying aggressive behavior is no greater than 1 in 20 or possibly 30) which may actually be sufficient enough levels to maintain the problem behavior. Therefore, naturalistic observations may not consistently recognize the effects of intermittent events.

Functional analysis. As defined by Iwata et al (1990), a typical functional analysis involves direct observations of the behavior under preselected and controlled conditions. The components of a functional analysis involve the construction of at least one condition (experimental) in which the variable of interest is present (e.g., contingent attention for aberrant behavior), and a control condition in which the variable is absent (e.g., noncontingent attention, differential reinforcement procedures, etc.)(Iwata et al., 1990). The observations of behavior continue while the experimental and control conditions are alternated by means of a multi-element or reversal design (Iwata et al., 1990). The main advantages in using the functional analysis method are: it is extremely objective, and the experimenter has a high degree of control which allows for the identification of functional relationships (Iwata et al., 1990). There are also disadvantages to functional analysis. This method is quite complex, and it can lead to the possibility of

establishing a new behavioral function (Iwata et al., 1990).

Vollmer, Marcus, & Ringdahl (1995), conducted a functional analysis of individuals displaying self-injurious behaviors (SIB). This is a prototype that was used for the current study. A series of conditions were presented to the individuals in a multi-element format. These included positive reinforcement (attention or tangible), escape from tasks, and no-interaction conditions (Vollmer et al., 1995). The positive reinforcement conditions were used to determine whether the behavior was responsive to attention or tangible materials as a positive reinforcer (Vollmer et al., 1995). The escape condition featured removal of task demands contingent on SIB, and this was used to determine if the behavior was responsive to escape from the instructional sessions (Vollmer et al., 1995). Finally, the purpose of the no-interaction condition was to determine if the behavior was maintained independent of social consequences (Vollmer et al., 1995). The results of the functional analysis showed that the SIB of the participants was responsive to the escape condition, i.e., negative reinforcement (Vollmer et al., 1995). The rates of escape behavior increased when the participants were required to remain seated during instructional activities (Vollmer et al., 1995). This study therefore determined during the

functional analysis that SIB was more responsive to one condition than to any of the other conditions. This allowed the experimenters to focus on a treatment for SIB using escape.

Linking Functional Analysis to Treatment

Functional analysis can determine what variables maintain problem behavior, and thus what may help in alleviating the behavior. Treatments may be more effective when the functional analysis method is used in the assessment of behavior. As mentioned in the Vollmer et al. (1995) study, it was determined that the SIB behaviors of the participants responded to escape from the task, rather than positive reinforcement or the no-interaction condition. Therefore, Vollmer et al. (1995) could manipulate various escape conditions in the treatment sessions to determine which would be more effective. During the treatment sessions, noncontingent escape (NCE) and differential negative reinforcement of other behaviors (DNRO) were administered in a reversal design (Vollmer et al., 1995). It was determined that both of these treatment methods were effective in decreasing SIB (Vollmer et al., 1995). This study showed that three different conditions (positive reinforcement, escape, and no-interaction) could be used to

isolate one maintaining variable, which would then be the focus of the treatment condition. Therefore, functional analysis can lead to a possible treatment for the aberrant behavior.

There are many treatments that have been previously used to decrease undesirable behaviors such as: differential reinforcement of other behaviors (DRO) or differential reinforcement of alternative behaviors (DRA). Differential reinforcement of other behaviors (DRO) is the most commonly used intervention of the two (Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993). DRO and DRA procedures require that positive reinforcers are delivered contingent upon some other response or alternative response and are not presented contingent on the target undesirable response (Vollmer, et al., 1993). DRO and DRA have been shown to decrease SIB that are maintained by attention (Marcus & Vollmer, 1996).

In a study conducted by Vollmer et al. (1993), DRO was applied to individuals exhibiting SIB. Attention was delivered according to a resetting DRO schedule (Vollmer et al., 1993). If the individual did not engage in SIB, attention was delivered at the end of a 10 s interval; however, if the individual engaged in SIB before the 10 s interval concluded, the timer was reset (Vollmer et al., 1993). DRO was effective in decreasing the rates of SIB.

Functional analysis with normally developing populations (e.g., ADHD) has recently suggested peer attention as a powerful variable maintaining disruptive behavior (Northup, Broussard, Jones, George, Vollmer, & Herring, 1995; Northup, Jones, Broussard, DiGiovanni, Herring, Fusilier, & Hanchey, 1997). Northup et al. (1995) found that peer attention was the most significant motivator for 3 participants in their summer program for children with Attention Deficit Hyperactivity Disorder as a form of positive reinforcement. During the treatment probes, the occurrences of the target behaviors were reduced substantially. The treatment probes linked to assessment were based on extinction of peer attention (Northup et al., 1995). Umbreit (1995) identified escape from task demands as a variable that maintained disruptive behavior. The treatment probe linked to assessment was based on differential reinforcement of alternative behaviors. Peer attention was delivered in the form of the student working with a groups of children that did not include specific friends. In other words, peer attention was utilized to elicit appropriate behaviors, such as: being on task, complying with teacher instructions, and positive verbal and nonverbal behavior towards other students. The results indicated an immediate reduction of the students disruptive

behavior with an increase in the students appropriate interpersonal behavior (Umbreit, 1995).

Noncontingent Reinforcement

There are many limitations to the use of differential reinforcement procedures, however. First, the methods can become very cumbersome to administer (Marcus & Vollmer, 1996; Vollmer et al., 1993). Second, differential reinforcement may produce additional effects of extinction, such as emotional behavior and aggression (Marcus & Vollmer, 1996; Vollmer et al., 1993). Finally, differential reinforcement may produce low rates of reinforcement (Marcus & Vollmer, 1996; Vollmer et al., 1993). This means that in cases where an appropriate alternative behavior is rarely exhibited, the opportunities for reinforcement are also rare.

Noncontingent reinforcement (NCR) is a treatment method that has received limited recognition. It is a simple method that allows the experimenter to administer reinforcers to the individual regardless of whether they have engaged in the target behavior (e.g., SIB, aggression, etc.) or some alternative response. NCR, as a treatment for SIB and aggression, has emerged recently largely based on functional analysis research with developmentally delayed

individuals. According to Marcus & Vollmer (1996), NCR is comprised of three main components: (a) NCR is administered in a fixed-time (FT) schedule, which determines when the individual will receive access to preferred reinforcers during the session, regardless of the occurrences of aberrant or adaptive behaviors; (b) extinction; and (c) fading, when the schedule of noncontingent reinforcement is gradually decreased from a frequent FT schedule to a lean schedule (e.g., one delivery per 5 min). NCR is considered very effective in lowering the target response (Vollmer, et al., 1993). There have been recent studies which examined the usefulness of NCR and/or noncontingent escape (NCE).

There are many possible advantages to using NCR as a treatment method. First, NCR can guarantee that reinforcement delivery will be consistent, due to its independence of the behavior occurring (Vollmer et al., 1993; Vollmer et al., 1995; Lalli, Casey, & Kates, 1997). This is important when caregivers are responsible for monitoring and delivering treatments for several clients at once. Second, studies have indicated fewer extinction-related behaviors, due to the subject's availability to the reinforcers (Vollmer et al., 1993; Vollmer et al., 1995; Lalli et al., 1997). Finally, NCR is very easy to implement because the time schedule is not affected by the

participants behavior (Vollmer et al., 1993; Vollmer et al., 1995; Lalli et al., 1997).

Marcus & Vollmer (1996) combined DRA with noncontingent reinforcement (NCR) to decrease SIB. The reasons that DRA and NCR were used in combination were: (a) DRA provides for communication or skills training at appropriate times of the day to avoid extinction bursts, and (b) NCR reduces the need for the experimenters to administer reinforcers at the times when the SIB does not occur (Marcus & Vollmer, 1996). There was evidence that DRA combined with NCR could effectively reduce SIB.

In a study conducted by Vollmer et al. (1993), the subjects were three adult women, all of whom were diagnosed as severely or profoundly mentally retarded, and displayed chronic SIB maintained by staff attention. During the NCR treatment phase, attention was delivered on a fixed-time (FT) schedule. The long-term goal of the NCR condition was to establish a 5-minute schedule of noncontingent attention while keeping the rates of SIB low. The NCR treatment conditions decreased rates of SIB, and did not produce extinction bursts.

Hagopian, Fisher, & Legacy (1994) conducted a study with five-year-old female quadruplets that were diagnosed with pervasive developmental disorder (PDD) and varying

levels of mental retardation. All of the participants displayed aggressive behaviors, SIB, and disruptive behaviors maintained by attention. In the NCR treatment, attention was administered on a 10 s fixed-time interval(FI) schedule. A fading element was also implemented with each participant. The results indicated that the behaviors decreased.

Vollmer et al. (1995) examined the effectiveness of noncontingent escape (NCE) with two males, ages 4 and 18. Both displayed chronic SIB which was maintained by the removal of task demands. One of the participants displayed autistic-like behaviors while the other was diagnosed with mental retardation. The NCE treatment condition included brief escape from tasks according to a FT schedule ranging from 20 to 30 seconds. For both of the participants, the SIB showed immediate suppression with the NCE treatment condition.

In another study conducted by Derby, Fisher, & Piazza (1996), a 12-year-old female diagnosed with tuberous sclerosis and profound mental retardation displayed severe SIB maintained by attention. Both contingent and noncontingent attention were evaluated using a reversal design. During the NCR treatment, the examiner provided both verbal and physical attention on a continuous or near

continuous schedule, blocked SIB, and ignored self-restraint. During both contingent and noncontingent conditions, the physical attention did not prevent SIB or self-restraint. The results indicated that when attention was provided contingent upon SIB and self-restraint that the levels increased. During NCR however, the results indicated near-zero levels of SIB and self-restraint.

Marcus & Vollmer (1996) conducted a study using NCR and DRA. The participants were three preschool-age children (one female and two males). The female had been previously diagnosed with Down's syndrome and speech difficulties. She appeared to function in the moderate range of mental retardation and had a history of SIB, aggression, and disruptive behavior. One of the male participants appeared to function in the profound range of mental retardation, and exhibited aggressive behaviors. The third participant was diagnosed as having autism, and was referred due to severe tantrum behaviors including: SIB, aggression, and disruptive behaviors. Overall results indicated that NCR, alone in the form of tangible positive reinforcement, suppressed the maladaptive behaviors, but the treatment was strengthened when DRA was an added component. It was also noted that fixed-interval schedules significantly reduced the tantrums, which is compatible with both NCR and DRA. The results

indicated that NCR was an effective treatment for those behaviors maintained by access to tangible positive reinforcement.

Finally, in a study conducted by Lalli et al. (1997), NCR was utilized as a treatment for severe problem behaviors. The participants were three children, all of whom were admitted to an inpatient unit at a hospital due to severe problem behaviors. One of the children displayed mild developmental delays and was admitted for treatment of aggression, while the other two children both of whom had severe mental retardation, were admitted for treatment of SIB. A functional analysis was the first phase of the experiment and it was determined that problem behaviors were maintained by access to preferred objects or activities. During the NCR with extinction treatment phase in which only two of the children participated, the children were instructed that they could only play with a preferred toy or go for a walk when the timer sounded; otherwise, they could play with all of the other toys. Access to the preferred activity was every 30 seconds, regardless of their behavior. The examiner did not respond to acts of aggression or SIB during the sessions. The results for both children showed decreased rates of problem behavior during the NCR treatment condition. When the treatment was removed, the rates of

aggression were similar to those rates obtained during baseline. When the treatment was reintroduced, the behaviors again decreased, until the FT schedule was 270 seconds. At this time, there was a temporary increase in the rate of aggression. A third phase of the experiment administered NCR without an extinction phase and was conducted with the remaining child. The NCR conditions were similar to those conditions in the previous phase with one exception. In addition to NCR, the examiner provided access to the preferred object or activity contingent on the occurrence of SIB on a FI schedule. The results showed that in the first day of treatment, the rate of SIB was high, however, SIB did not occur in any of the remaining sessions. When the NCR was removed, SIB was increased to the levels observed in baseline. When NCR was reintroduced, there were high rates of SIB in the first few sessions, but SIB did not occur in any of the other treatment sessions.

Noncontingent reinforcement works for two possible reasons. First, NCR works because it alters the establishing operations of the reinforcer. The person becomes satiated on the reinforcer, and those behaviors that serve to access these reinforcers decline. Second, NCR works because of extinction. If a reinforcer is provided only on a time-based schedule, and it is withheld between

these times, the contingency between the behavior and the reinforcer is "broken."

Overall, many studies have demonstrated that NCR and NCE have the potential to be effective treatments with individuals among the developmentally delayed population.

Purpose of Study

Surprisingly, there are no studies examining NCR usefulness with other populations. The current study examined the effects of NCR, using teacher and peer mediated attention to decrease disruptive behavior in children with AD/HD. The purpose of this study was to conduct a functional analysis of the disruptive behavior of two children with AD/HD and link the functional analysis to treatment (NCR).

Method

Participants and Setting

Rick was an 8 year old male diagnosed with AD/HD and had received special educational services at the public school he attended. Rick was prescribed sustained-released Methylphenidate (20 mg b.i.d) and Welbutrin (75 mg b.i.d). The psychoeducational evaluation revealed intellectual functioning within the borderline to mildly mentally

impaired range of ability, and borderline to severe delays with regard to academic functioning. Norm-referenced, informant ratings completed by Rick's mother indicated clinically significant levels of hyperactivity and attention problems. In addition, an AD/HD rating scale completed by Rick's mother indicated that he was highly inattentive and highly impulsive.

Sam was an 8 year old male diagnosed with AD/HD. Sam was prescribed Adderall (20 mg b.i.d) and Risperdal (0.5 mg h.s). The psychoeducational assessment revealed significantly above average intellectual functioning and reading skills with average math and written language skills. Norm-referenced, informant ratings completed by Sam's mother indicated clinically significant levels of hyperactivity, aggression, depression, and attention problems. In addition, an AD/HD rating scale completed by Sam's mother indicated that he was highly inattentive and highly impulsive.

Both children were referred to a summer school program in the Psychological Assessment Center at Eastern Illinois University. The children participated in another study which was being conducted concurrent with this study. The program began at 8:30 and ended at 11:30, Monday through Thursday for 3 weeks. In addition to the sessions

conducted, individualized academic tutoring was provided for the children. For Rick, these tutoring sessions included phonics and remedial-level site word training. For Sam, these sessions included building fluency and organization in written expression. Classroom activities were conducted in a 10 x 10 therapy room which included a chalkboard, posters, and desks/chairs which were arranged to resemble a natural classroom setting. During the sessions, the two children were either seated together or alone in separate workrooms. The children were to work independently on Language Arts and Mathematic assignments. The children received their normal doses of medication throughout the program.

Response Definitions

Disruptive behavior was the target behavior of interest. Disruptive behavior definitions were replicated from a study conducted by Northup, Broussard, Jones, George, Vollmer, & Herring (1997). Disruptive behavior was defined as out-of-seat behavior and inappropriate vocalizations. Out-of-seat behavior was defined as the child not maintaining his/her full body weight in his/her chair. Inappropriate vocalizations were defined as any verbalization made by the child that was not due to a direct request from the teacher.

Observational data were collected by a trained observer from behind a one-way mirror. To assess disruptive behavior, the observer used partial interval recording system to determine if "disruptive behavior" occurred within each of a series of continuous 10 second intervals. Observational codes consisted of tk (talking), os (out-of-seat), PA (peer attention), TA (teacher attention), ES (escape), and NPA (noncontingent peer attention) (Appendix C). A total hyperactivity score was derived only from child behavior codes (tk and os) for each session, and was calculated by determining the percentage of 10 s intervals during which disruptive behavior was coded.

Disruptive behavior was measured while the students worked independently on paper-and-pencil tasks. These assignments were categorized as "easy" (approximately 100% accuracy) and "difficult" (less than 70% accuracy) based on informal curriculum based assessment measures which were conducted on the first days of the program. For Rick, easy work included language arts exercises requiring tracing, drawing, and coloring, while his difficult work consisted of matching exercises and simple addition worksheets. For Sam, easy work included second grade level math sheets while his difficult work consisted of third and fourth grade level math sheets.

Interobserver Agreement

Using a 10 s partial-interval recording procedure, two observers recorded simultaneously but independently all responses. Agreement was calculated on an interval-by-interval basis for each of the response definitions. Interobserver agreement averaged 97% (range, 91% to 100%) across all responses. Kappa coefficients of agreement were also calculated for each session with each child. Rick's Kappa coefficients ranged from .38 to 1.00 (M = .89), and Sam's Kappa coefficients ranged from .66 to 1.00 (M = .90). Kappa coefficients were also calculated for each environmental code. Kappa for peer attention, across all responses, ranged from .38 to 1.00 (M = .81), for teacher attention Kappa was .88, for escape Kappa was 1.00, and for noncontingent peer attention Kappa ranged from .91 to 1.00 (M = .96).

Experimental Conditions

In order to determine the motivation for each child's disruptive classroom behavior, a functional analysis was conducted that assessed the effects of (a) positive reinforcement in the form of teacher attention, (b) positive reinforcement in the form of peer attention, and (c) escape

from task. Assessment continued until one or more stimuli produced a reliable (i.e., replicated) increase in disruptive behavior. According to the procedures outlined by Northup et al. (1997), each child was exposed to the following conditions:

Contingent teacher attention. During this condition, the child was seated alone with the teacher in a separate classroom from the other student and teacher. Rick and Sam worked on easy assignments during the teacher attention sessions. Each teacher gave the following instructions their student, "Do as much work as you can while I grade papers. If you talk or leave your seat, I will tell you to get back to work." The teachers ignored all responses made by the student except disruptive behavior. Then a brief reprimand, such as "You need to stay in our seat", or "You need to get your work done" would be given to the student. This condition was designed to resemble a classroom situation wherein the child's disruptive behavior accesses teacher attention.

Contingent peer attention. During this condition, the child was seated with a peer confederate. The peer confederate was asked to provide assistance in the form of "reminders" only when the target child was disruptive. The peer confederate was privately instructed to "pay attention

to what (the student) is doing, and if you see them (engaging in the specified target behavior), say something to them about that". The confederate would respond to disruptive behavior by saying things such as "Get back to work." Peer attention quickly changed to teasing, laughter, and approval statements. Both students worked on assignments that were considered to be easy. This condition is designed to resemble a classroom situation wherein the child's disruptive behavior accesses peer attention.

Escape. The students were again in separate classrooms, each accompanied by a teacher. The assignments that the students worked on were considered to be difficult. Each teacher gave the following instructions to their student: "Do as much work as you can while I grade papers. If you talk or leave your seat, I will take your work away and say 'time out'." Contingent upon the occurrence of disruptive behavior, the target student's worksheet was immediately removed, and the teacher said "time out", turned and moved away from the student. After 20 s, the teacher placed the worksheet back on the student's desk and the student was told to "Get back to work." Data were not collected while the student was in the time out period. This condition was designed to resemble a classroom situation wherein the child's disruptive behavior allows

them to escape their work.

Noncontingent peer attention. This setting is exactly the same as the contingent peer attention setting. The children were seated across from each other and were instructed to work on their easy assignments. Children whose functional analysis results suggested a sensitivity to positive reinforcement (peers, teacher) received noncontingent presentation of the identified stimulus as an instructional modification.

For the child who is sensitive to peer attention, these activities provided peer attention and interactions continuously, regardless of that child's behavior. The teacher informed the students that "Once the timer rings, you will be allowed 30 seconds of free time. Once the timer rings again, you will have to get back to work on your papers. When the timer rings again, you will have another break with your classmate. Remember, when the timer sounds you will be able to talk. Until then, work on your papers." Thus, peer attention was delivered on a 90 second time-based schedule. The children stopped working every 90 seconds and engage in 30 seconds of play. They were instructed to talk about their work but any discussion will be allowed. Data on disruptive behavior were not collected during the 30 s play activities.

Procedural Integrity

Conditional probabilities were calculated for all conditions to predict the percentage of disruptive behavior followed by the programmed consequence. For example, during Rick's contingent peer attention conditions, the percentage of intervals with disruptive behavior that were followed (in the same or next interval) by attention from his classmate was calculated.

For Rick, during contingent peer attention conditions, peer attention followed disruptive behavior an average of 81% of the time (range, 53% to 100%). During contingent teacher attention conditions, teacher attention followed disruptive behavior an average of 90% of the time (range, 80% to 100%). Finally, during escape conditions, escape followed disruptive behavior an average of 89% of the time (range, 63% to 100%). For Sam, during peer attention conditions, peer attention followed disruptive behavior an average of 78% of the time (range, 60 to 91). During teacher attention conditions, teacher attention followed disruptive behavior an average of 50% (range, 0% to 100%). Finally, during escape conditions, escape followed disruptive behavior an average of 40% (range, 0% to 100%).

Design

A multi-element design was used for the functional analysis and a reversal (ABAB) design was used to evaluate the effects of the NCR treatment. Data collected during the contingent peer attention condition of the FA served as the original baseline for the treatment evaluation.

Procedures

The children arrived around 8:30 and were escorted to the room by one of the teachers. Once both of the children were in the classroom, a warm-up exercise would occur (e.g., calender, previous days events). From 9:00 to 11:00 the children participated in the various environmental conditions (PA, TA, ES, NPA). Each FA condition was presented in an arbitrary order until within condition trends were clear. Treatment evaluation of NCR followed FA, followed by a brief reversal, and finally, a second treatment condition. Each condition, whether FA or treatment, lasted for 10 minutes. From 11:00 to 11:30 the children received their individualized tutoring.

Results

Functional Analysis

Results of the functional analysis for Rick are

presented in Figure 1. The levels of disruptive behavior were relatively low and inconsistent with regard to teacher attention and escape conditions. Contingent peer attention resulted in a significantly higher rate of disruptive behavior. For Rick, the percentage of intervals during FA averaged 98% for peer attention (range, 98% to 100%), 51% for teacher attention (range, 12% to 88%), and 32% for escape (range, 7% to 87%). The results of the functional analysis for Sam are presented in Figure 2. The levels of disruptive behavior were low with regards to teacher attention and escape conditions. Contingent peer attention resulted in significantly higher rates of disruptive behavior. For Sam, the percentage of intervals during FA averaged 66% (range, 60% to 100%), 3% for teacher attention (range, 0% to 7%), and 2% for escape (range, 0% to 4%). Due to the high rates of disruptive behavior during the contingent peer attention condition, it was decided to evaluate the effectiveness of NCR using peer attention as the reinforcer and as a treatment for both of the students based on the functional analysis data.

NCR Treatment Conditions

The results of the assessment and treatment conditions for Rick are depicted in Figure 1. Rick's assessment data indicated that disruptive behavior ranged from 98% to 100%

(M = 99%) during the baseline contingent peer attention condition. During the initial NCR treatment condition, the disruptive behavior ranged from a high of 97% then decreased to a low of 57% (M = 78%). During the second contingent PA condition, the disruptive behavior remained at a mean of 78% with a range of 65% to 87%. A return to the treatment condition shows inconsistencies with the percentages of behavior. Rick displayed disruptive behavior within a range of 82% to 100% (M = 94%) during this condition.

The results of Sam's treatment conditions are similar to those obtained by the other child. The results of the assessment and treatment conditions for Sam are depicted in Figure 2. Sam's assessment indicated a range of 60% to 100% (M = 66%) during the baseline contingent peer attention condition. During the initial NCR treatment condition, disruptive behavior ranged from 11% to 66% (M = 37%), and increased to 96% during a reversal to the contingent PA condition. A return to the NCR treatment condition shows inconsistencies with regard to levels of disruptive behavior. Sam displayed a range of 28% to 100% (M = 79%) during this final phase.

Discussion

Functional analysis identified peer attention as the

variable that maintained the disruptive behavior for both Rick and Sam. There were clear decreases in hyperactivity during the initial NCR phase, and escalated hyperactivity with return to peer attention. However, the final NCR phase did not replicate the effects observed in the initial treatment phases for either student. Thus, the current study also failed to replicate previous research examining the effects of NCR.

Limitations

As with any study, there are limitations which need to be addressed to aid in future replications of the current study and others which link assessment to treatment of children with AD/HD. One limitation would be that the analogue nature of the classroom setting and teachers may not reveal information about individual behavior in natural settings.

A second limitation is the limited number of subjects that participated in the study. To replicate the classroom setting, more students are necessary. When the advertisement was placed in the local paper, it was noted that four children were needed. Only two children met the requirements that were stated.

A third limitation is the varying abilities of the two

participants. Rick was functioning in the mildly mentally impaired range of ability, while Sam was functioning in the above average range of ability. This discrepancy may have contributed to the unstable peer attention conditions since it is possible that Rick was less aware of the changes that were occurring in the experimental conditions.

A fourth limitation was the limited time frame in which the study was conducted. The three week program did not allow an equivalent number of sessions to be run each consecutive day. There was one occasion in which Rick could not attend due to a physician's appointment. This absent day affected the remaining days of data collection.

The intense schedule, especially during the final days, may have contributed to the failure to replicate the NCR treatment effects. These sessions were conducted in very rapid succession which may have established "escape from tasks" as a motivation.

Contributions

With the above limitations in mind, the current findings can contribute to an emerging literature in three ways. First, the current study contributed to the limited application of FA to normally developing children. In most of the studies examined, peer attention is the culprit with

regards to disruptive behavior in the classroom. Oftentimes we "prescribe" teacher praise or ignoring, or suggest medication, all of which have been shown to be minimally effective for peer attention maintained behavior (e.g., Northup et al., 1995; Northup et al., 1997).

Second, this study contributes to the limited literature on linking assessment to treatment and children with AD/HD. This area of interest is currently being examined more noticeably, and the treatment is already familiar to most educators. The FA of both children indicated that peer attention was motivating their disruptive behavior in the classroom. Using this information, a treatment was developed allowing for noncontingent peer attention to occur under the assumption that the disruptive behavior would decrease.

A final potential contribution relates to the recent evidence suggesting that noncontingent reinforcement may work because it alters the child's motivation of the disruptive behavior, rather than through extinction. During the NCR conditions, peer attention was not withheld. As a result, extinction was not included as part of the treatment, yet, the disruptive behaviors maintained by peer attention decreased.

Future Directions

Although these findings are encouraging, replication of this study is necessary to address the weaknesses that were encountered. Future studies may find the following suggestions useful for replication of the current study. First, we used a simulated classroom to conduct our conditions. Future studies should consider testing FA and treatments in a real classroom which would allow teachers to witness the intervention firsthand.

Second, the current study tested only noncontingent peer attention because of the FA results. Future studies may find that children with AD/HD are motivated by teacher attention or escape (DuPaul & Ervin, 1996).

Finally, the current study examined the use of NCR without an extinction component. Future studies may wish to develop other treatments for peer attention maintained behavior.

References

Derby, K.M., Fisher, W.W., & Piazza, C.C. (1996). The effects of contingent and noncontingent attention of self-injury and self-restraint. Journal of Applied Behavior Analysis, 29, 107-110.

DuPaul, G.J., & Ervin, R.A. (1996). Functional

assessment of behaviors related to attention-deficit/hyperactivity disorder: Linking assessment to intervention design. Behavior Therapy, 27, 601-622.

Hagopian, L.P., Fisher, W.W., & Legacy, S.M. (1994). Schedule effects of noncontingent reinforcement an attention-maintained destructive behavior in identical quadruplets. Journal of Applied Behavior Analysis, 27, 317-325.

Iwata, B.A., Vollmer, T.R., & Zarcone, J.R. (1990). The experimental (functional) analysis of behavior disorders: Methodology, applications, and limitations. In A.C. Repp & N.N. Singh (Eds.), Perspectives on the use of nonaversive and aversive interventions for persons with developmental disabilities (pp. 301-330). Pacific Grove, CA: Brooks/Cole.

Lalli, J.S., Casey, S.D., & Kates, K. (1997). Noncontingent reinforcement as treatment for severe problem behavior: Some procedural variations. Journal of Applied Behavior Analysis, 30, 127-137.

Marcus, B.A., & Vollmer, T.R. (1996). Combining noncontingent reinforcement and differential reinforcement schedules as treatment for aberrant behavior. Journal of Applied Behavior Analysis, 29, 43-51.

Northup, J., Broussard, C., Jones, K., George, T.,

Vollmer, T.R., & Herring, M. (1995). The differential effects of teacher and peer attention on the disruptive classroom behavior of three children with a diagnosis of attention-deficit hyperactivity disorder. Journal of Applied Behavior Analysis, 28, 227-228.

Northup, J., Jones, K., Broussard, C., DiGiovanni, G., Herring, M., Fusilier, I., & Hanchey, A. (1997). A preliminary analysis of interactive effects between common classroom contingencies and methylphenidate. Journal of Applied Behavioral Analysis, 30, 121-125.

Umbreit, J. (1995). Functional assessment and intervention in a regular classroom setting for the disruptive behavior of a student with attention deficit hyperactivity disorder. Behavioral Disorders, 20, 267-278.

Vollmer, T.R., Iwata, B.A., Zarcone, J.R., Smith, R.G., & Mazaleski, J.L. (1993). The role of attention in the treatment of attention-maintained self-injurious behavior: Noncontingent reinforcement and differential reinforcement of other behavior. Journal of Applied Behavior Analysis, 26, 9-21.

Vollmer, T.R., Marcus, B.A., & Ringdahl, J.E. (1995). Noncontingent escape as treatment for self-injurious behavior maintained by negative reinforcement. Journal of Applied Behavior Analysis, 28, 15-26.

Vollmer, T.R., Ringdahl, J.E., Roane, H.S., & Marcus, B.A. (1997). Negative side effects of noncontingent reinforcement. Journal of Applied Behavior Analysis, 30, 161-164.

Appendix A

Description of Procedures

APPENDIX A

Eastern Illinois University ♦ Psychological Assessment Center
School Psychology Program Charleston IL 61920 (217) 581-2127

♦♦

SUMMER ACADEMIC PROGRAM

Description of Procedures

Each child enrolled in the three week summer academic program will receive academic instruction (drill, practice, tutoring) four days per week (Mon-Thurs) for four hours per day. Healthy snacks will be provided during each morning recess. During classroom activities, each child's academic performance will be monitored through analysis of work products and direct observation of on-task behavior. One of the purposes of the classroom activities is to determine if children respond better to different types of instruction. Therefore, classroom instruction will vary so that we can observe student responses to: (a) adult attention, (b) peer attention, and (c) the type, length or difficulty level of work. According to each child's performance, we will make appropriate written recommendations to parents.

The program will also include several traditional measures of academic performance and behavioral difficulties. Parents and children may be asked to complete standard rating scales that will determine academic and behavioral strengths and weaknesses. Children may also be administered formal educational tests to determine their current levels of achievement in math, reading and written language.

All information will be confidential and kept in locked file cabinets in the Psychological Assessment Center. Some of the information, with the parent's consent, may be presented for research purposes. In these cases, the name of the child will be changed and no identifying information will be used.

Appendix B

Parental Consent Form

APPENDIX B

Eastern Illinois University ♦ Psychological Assessment Center
School Psychology Program Charleston IL 61920 (217) 581-2127

PARENTAL CONSENT FORM

Purpose: The purpose of this research project is to determine effective strategies for enhancing the academic performance of students. As a participant in this project, your child will be evaluated using standard and experimental (described below) procedures. These procedures will potentially generate more useful information for parents and teachers.

Procedures: Your child's academic and behavioral performance will be assessed using traditional, appropriately standardized psychoeducational instruments. In addition, your child may be observed during a simulated classroom activity to determine the most effective strategies for enhancing motivation, work completion and accuracy. These activities will include drill, practice and tutoring of academic skills. Some of these sessions may be videotaped in order to reliably assess on-task behavior.

Right to Privacy: All information collected may be used for training and research purposes. All materials and videotaped sessions will be maintained in a locked filing cabinet and no persons will have access to this information except those individuals directly involved in your child's evaluation. You will receive a summary of all information in the form of a psychological report and you may at any time request a copy of all materials and videotapes.

Participant's Rights: Your child's involvement in this project is voluntary. You have the right to withdraw from this project at any time. If you have any questions or concerns, or would like more information about our research and training program, please contact the university trainer, Kevin Jones, PhD, at 217-581-2128.

♦♦

I HAVE READ AND UNDERSTAND THE PURPOSE OF THE PROJECT, THE PROCEDURES INVOLVED, AND MY RIGHTS AS THE LEGAL GUARDIAN OF A PARTICIPANT. I AGREE TO ALLOW MY CHILD TO PARTICIPATE IN THIS PROJECT.

______________________________ ____________

Signature Date

____

Child's Full Name (please print)

Appendix C

Partial Interval Recording Data Sheet

Name of student: _____ Date: _____ Observer: _____ Rel: Y N Session Code _____

Interview Code: _____ t1 = _____ t2 = _____

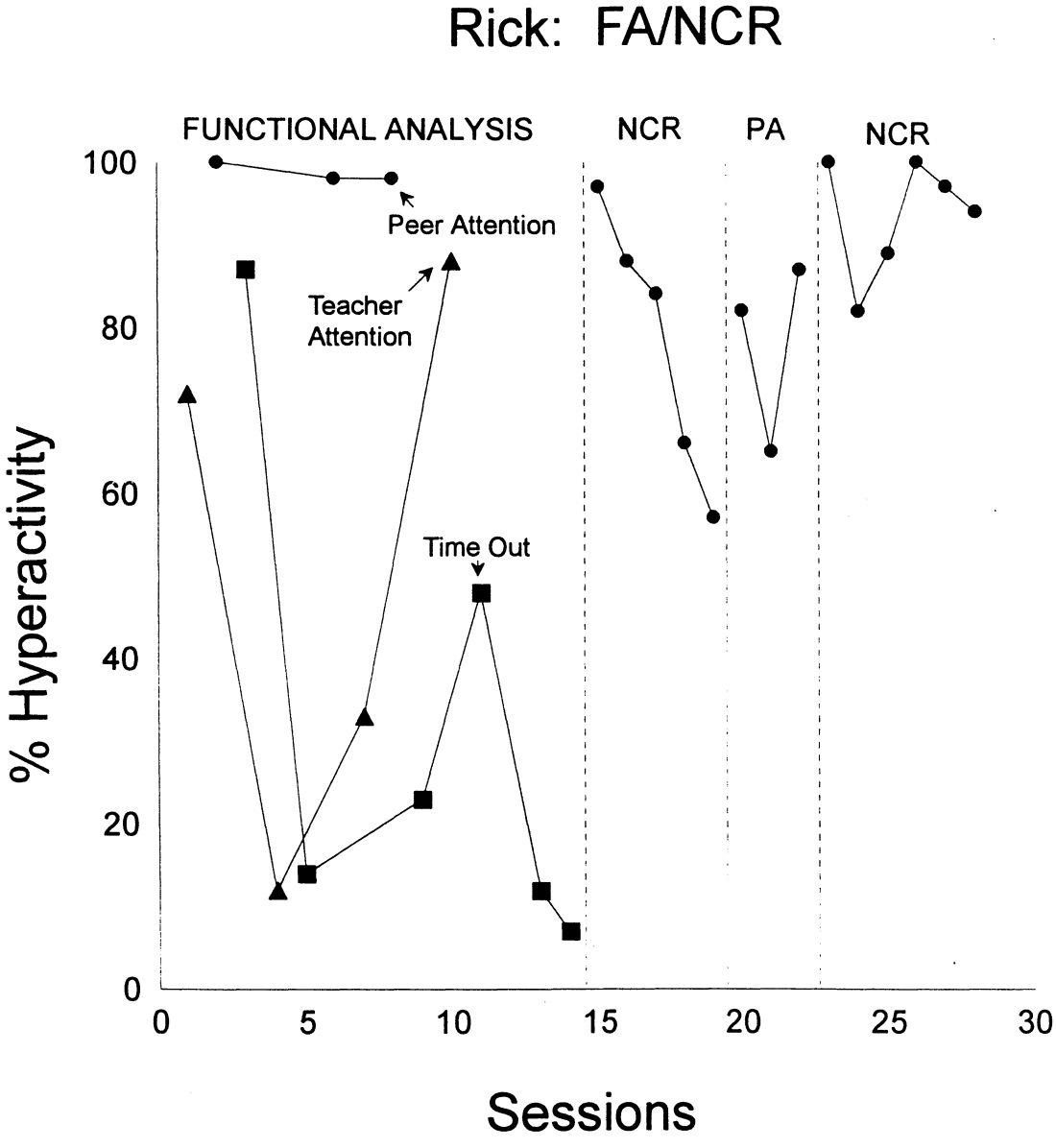
ISW = independent seatwork TDWC = Teacher-directed whole class

1 on off tk os T ES PA	2 on off tk os T ES PA	3 on off tk os T ES PA	4 on off tk os T ES PA	5 on off tk os T ES PA	6 on off tk os T ES PA	7 on off tk os T ES PA	8 on off tk os T ES PA	9 on off tk os T ES PA
10 on off tk os T ES PA	11 on off tk os T ES PA	12 on off tk os T ES PA	13 on off tk os T ES PA	14 on off tk os T ES PA	15 on off tk os T ES PA	16 on off tk os T ES PA	17 on off tk os T ES PA	18 on off tk os T ES PA
19 on off tk os T ES PA	20 on off tk os T ES PA	21 on off tk os T ES PA	22 on off tk os T ES PA	23 on off tk os T ES PA	24 on off tk os T ES PA	25 on off tk os T ES PA	26 on off tk os T ES PA	27 on off tk os T ES PA
28 on off tk os T ES PA	29 on off tk os T ES PA	30 on off tk os T ES PA	31 on off tk os T ES PA	32 on off tk os T ES PA	33 on off tk os T ES PA	34 on off tk os T ES PA	35 on off tk os T ES PA	36 on off tk os T ES PA
37 on off tk os T ES PA	38 on off tk os T ES PA	39 on off tk os T ES PA	40 on off tk os T ES PA	41 on off tk os T ES PA	42 on off tk os T ES PA	43 on off tk os T ES PA	44 on off tk os T ES PA	45 on off tk os T ES PA
46 on off tk os T ES PA	47 on off tk os T ES PA	48 on off tk os T ES PA	49 on off tk os T ES PA	50 on off tk os T ES PA	51 on off tk os T ES PA	52 on off tk os T ES PA	53 on off tk os T ES PA	54 on off tk os T ES PA
55 on off tk os T ES PA	56 on off tk os T ES PA	57 on off tk os T ES PA	58 on off tk os T ES PA	59 on off tk os T ES PA	60 on off tk os T ES PA	61 on off tk os T ES PA	62 on off tk os T ES PA	63 on off tk os T ES PA
64 on off tk os T ES PA	65 on off tk os T ES PA	66 on off tk os T ES PA	67 on off tk os T ES PA	68 on off tk os T ES PA	69 on off tk os T ES PA	70 on off tk os T ES PA	71 on off tk os T ES PA	72 on off tk os T ES PA
73 on off tk os T ES PA	74 on off tk os T ES PA	75 on off tk os T ES PA	76 on off tk os T ES PA	77 on off tk os T ES PA	78 on off tk os T ES PA	79 on off tk os T ES PA	80 on off tk os T ES PA	81 on off tk os T ES PA

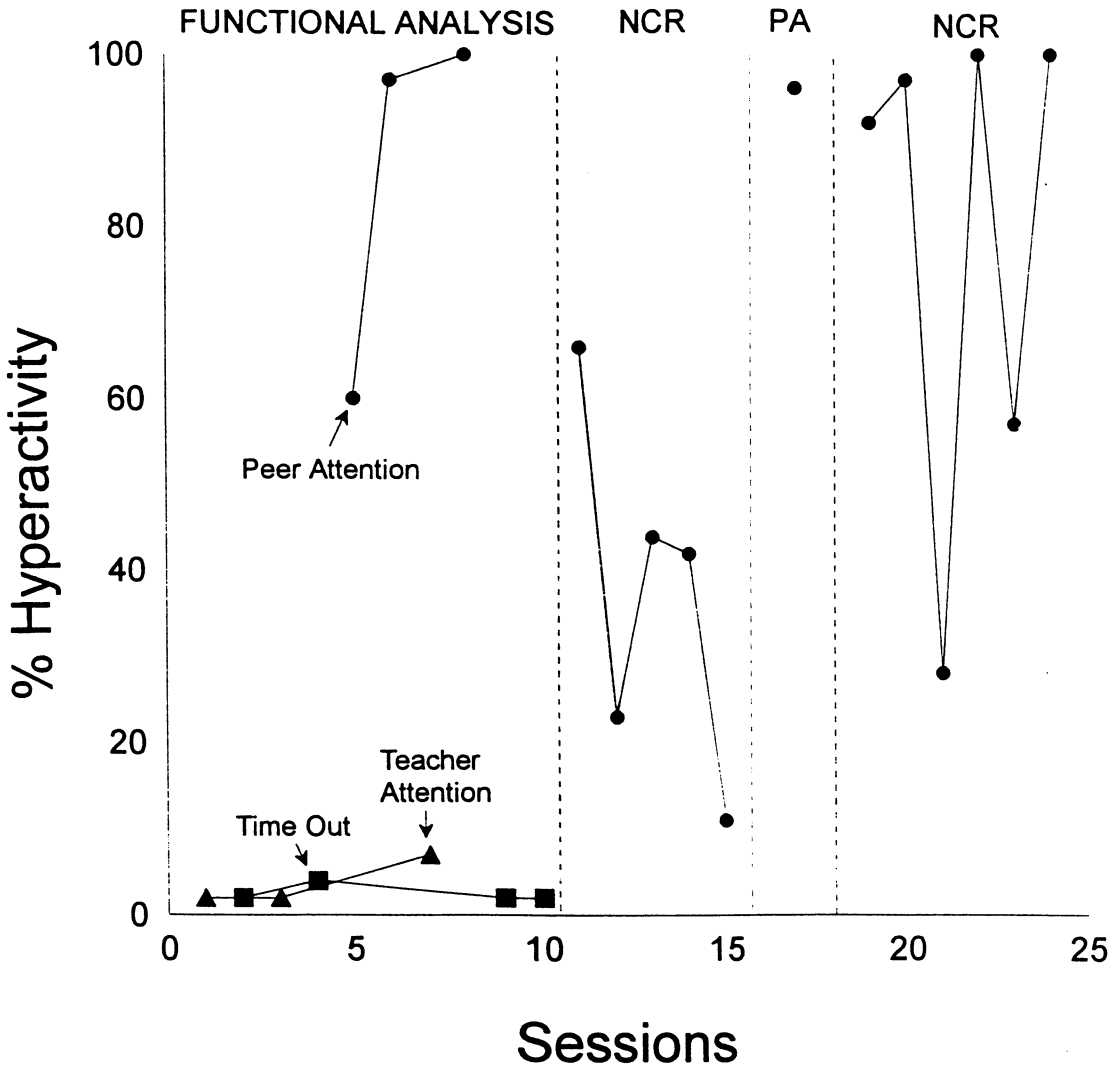
Figure Caption

Figure 1. Levels of disruptive behavior across functional analysis, noncontingent reinforcement (NCR), reversal (peer attention), and noncontingent reinforcement (NCR) conditions for Rick.

Figure 2. Levels of disruptive behavior across functional analysis, noncontingent reinforcement (NCR), reversal (peer attention), and noncontingent reinforcement (NCR) conditions for Sam.


Rick: FA/NCR
FUNCTIONAL ANALYSIS
NCR
PA
NCR
Peer Attention
Teacher Attention
Time Out
% Hyperactivity
100
80
60
40
20
0
0
5
10
15
20
25
30
Sessions

Sam: FA/NCR


FUNCTIONAL ANALYSIS
NCR
PA
NCR
100
80
60
40
20
0
% Hyperactivity
Peer Attention
Teacher Attention
Time Out
0
5
10
15
20
25
Sessions