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Noncontingent Delivery of Preferred Stimuli to Treat Problem Behavior in the Classroom

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NONCONTINGENT DELIVERY OF PREFERRED STIMULI TO TREAT PROBLEM BEHAVIOR IN THE CLASSROOM

by

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ABSTRACT

Non-contingent Delivery of Preferred Stimuli to Treat

Problem Behaviors in the Classroom

by

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Utah State University, 2010

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Students with emotional and behavioral disorders (EBD) have very poor long-term outcomes. Non-contingent reinforcement (NCR) has been used to successfully reduce problem behaviors. NCR is frequently used with populations with severe disabilities and in hospital settings using function-based reinforcers. Very few studies have applied the use of NCR to EBD populations, and to students whose cognitive scores fall within the normal range. No studies have examined the use of preferred tangible reinforcers delivered non-contingently with participants with EBD or in classroom settings. This study measured the effects of delivering tangible reinforcers selected through preference assessments on the disruptive and on-task behaviors of three students with EBD in the classroom setting. Results indicate the use of preferred tangibles delivered on a fixed schedule can be effective in reducing disruptive behavior in the

classroom without reducing on-task behaviors, and may, in fact, be effective in increasing on-task behaviors in the classroom. (41 pages)

CONTENTS

Page

LIST OF FIGURES

INTRODUCTION

Students with emotional and behavioral disorders (EBD) have very poor long-term outcomes. They are more likely to drop out of high school and more likely to be involved with the criminal justice system. They are less likely to obtain and maintain long-term employment or pursue higher education. Anderson, Kutash, and Duchnowski (2001) report that rates of school completion, independent living and post-secondary educational enrollment are lower for students with EBD than for students classified as having a learning disability. Anderson et al. (2001) also report that students with EBD tend to have the lowest adult adjustment outcomes of any disability group. Bradley, Doolittle, and Bartolotta (2008) found that in recent years only small gains have been made in bridging achievement gaps, social interactions and long-term outcomes for students with EBD. They continue to have lower rates of participation in classroom instruction, higher rates of suspension and expulsion, lower post-school employment rates, dysfunctional adult interpersonal relationships and high rates of involvement with the criminal justice system (Bradley et al., 2008).

There are many factors that may contribute to the negative outcomes of students who are placed in school programs designed to address emotional and behavioral needs. Students referred to school-based day treatment programs typically exhibit behaviors such as noncompliance, disruptive behaviors, aggression, social problems and emotional lability. Disruptive behavior interferes with instruction and achievement for students with EBD. Disruptive behavior in one student can also affect the learning of other students because it can take away from instructional time as the teacher has to stop providing instruction to address compliance issues. Punitive measures for addressing problem

behaviors such as time-out, suspension and expulsion, exacerbate the problem by removing students from instructional settings creating further disruptions to their education. As a result, these students often make minimal achievement gains over time. For example, Anderson et al. (2001) found that students with EBD showed little change in achievement scores between the beginning and end of elementary school.

Since disruption is a major referral concern, decreasing disruptive behavior is a major goal of programs for children with severe behavioral and emotional disorders so that students can eventually exit the program and return to less restrictive educational placements. It is, therefore, crucial that teachers and programs are able to implement a variety of positive behavior strategies to address disruptive behaviors in order for EBD students to be successful. Two main classes of interventions are consequence-based interventions and antecedent-based interventions.

Consequence-Based Interventions

Consequence-based interventions rely on the delivery of some sort of contingency that occurs after a behavior has been exhibited. One major sub-type of consequence-based interventions is differential reinforcement. Differential reinforcement is the systematic reinforcement of a specific behavior. Different types of differential reinforcement include differential reinforcement of other behavior (DRO), of incompatible behaviors (DRI) and differential of lower/higher rates of behavior (DRL/DRH). DRO and DRI in particular have the advantage of reducing inappropriate behavior while simultaneously teaching an acceptable replacement behavior. While

differential reinforcement has been found to be very effective for a number of problem behaviors, it has definite drawbacks. First, differential reinforcement requires a high level of vigilance so as to make sure that every incident of the behavior is reinforced. This can be very difficult for teachers to do while simultaneously providing instruction, which can lead to treatment fidelity problems. Differential reinforcement is often paired with extinction – no longer providing reinforcement for a behavior that was previously reinforced. Extinction can be very effective at reducing problem behaviors by eliminating the reinforcing value of the behavior. However, extinction may not always be possible. For example, students are often socially reinforced by their peers for disruptive behaviors. While a teacher may be able to withdraw her own attention from a particular behavior, it is difficult to remove such social reinforcement when it comes from peers. Because peer attention is not under control of the teacher, the student may still receive reinforcement for inappropriate behavior. Other behaviors that are difficult to address using extinction are those that are maintained by automatic reinforcement. For example, the maintaining reinforcer for self-stimulating behaviors like arm flapping may be the sensory stimulation that comes with the flapping. This is an automatic reinforcer that cannot be removed by a teacher. It is, therefore, not possible to put the behavior on extinction. Another drawback to using extinction is that, often, there is an extinction burst – a sharp increase in the occurrence of the behavior before the behavior begins to drop off. This extinction burst can be incredibly disruptive as well and, with some behaviors, potentially dangerous. Serious behaviors, such as aggression or self-injury, may warrant immediate intervention in order to maintain a level of safety for the student and those

around him which may undermine the use of extinction.

Antecedent-Based Interventions

Antecedent-based interventions are done by altering the setting events or motivating operations that precede the target behavior. Antecedent-based interventions include interventions targeting command type and rate of commands, curricular revision and demand fading, as well as fixed-time reinforcement programs such as non-contingent reinforcement. Non-contingent reinforcement (NCR) is defined as providing reinforcement on a fixed-time (FT) schedule independent of behavior. NCR has several advantages. First, NCR on a fixed-time schedule would allow teachers to provide positive behavioral support at regular intervals, allowing them to teach without having to simultaneously focus on watching for the occurrence or absence of behavior. Roane, Fisher, and Sgro (2001) suggested that the ease of implementing such schedules may make NCR preferable to contingent reinforcement treatments in some settings. Roscoe, Iwata, and Goh (1998) further postulated that NCR has the following advantages over extinction and differential reinforcement: NCR generally does not produce extinction bursts, does not require the use of restrictive devices and eliminates deprivation of reinforcement that can occur when a subject doesn't meet the criteria for reinforcement.

REVIEW OF LITERATURE

Early studies of NCR focused on its application with individuals with severe disabilities and severe developmental delays largely targeting self-injurious behaviors (SIB). Vollmer, Iwata, Zarcone, Smith, and Mazaleski (1993) looked at the effect of non-contingent attention in reducing SIB among three adult females in a public residential facility. The subjects were referred for treatment of chronic SIB. A functional analysis was conducted that indicated that the behaviors were maintained by attention. A multi-element design for two participants and an ABAC reversal design for one participant were used to compare the effects of differential reinforcement (DRO) and NCR in reducing SIB. During the DRO condition, experimenters delivered attention contingent upon the absence of SIB while during the NCR condition, attention was delivered on a fixed-time schedule regardless of the subject's behavior. Results indicated that both DRO and NCR can be effective treatment procedures for SIB that is maintained by socially mediated positive reinforcement. For two of the subjects, NCR initially suppressed behavior more effectively as rates of aberrant behavior remained variable in the DRO condition before decreasing to zero over time. For one participant, more aggression and disruption were seen during the DRO condition even though those behaviors eventually stopped. This suggests that NCR may serve to attenuate extinction-based increases in behavior that are often associated with DRO. For the third subject, NCR immediately reduced the rate of SIB from that in the baseline condition. After returning to baseline, a DRO condition was introduced which also suppressed SIB, but the rate of SIB was higher and more variable in this condition. No extinction burst was seen with this subject. These

results imply that while both DRO and NCR may be effective in reducing aberrant behavior, NCR may produce more immediate and stable decreases in such behavior and may serve to limit the amount of extinction-induced aberrant behavior exhibited.

Lalli, Casey, and Kates (1997) studied the effects of NCR to treat aggression and SIB while studying variations in reinforcement schedules by determining schedules based on the mean latency to the first problem behavior during baseline. They also studied whether or not extinction was a critical component of NCR. The participants were three male children in an inpatient hospital unit. The two older participants (ages 7 and 9) had severe mental retardation (MR), and a 3-year-old participant had mild developmental delays. Sessions were conducted in a dormitory room of the hospital and in the unit's special education unit for one participant. After a functional analysis, an ABAB reversal design was used to evaluate the effectiveness of the NCR schedules for two participants and a multiple baseline across settings design was used for a third participant. For all test conditions the initial NCR interval was established by determining the mean latency to the first problem behavior during baseline. For participant one, this initial interval was ninety seconds and for the other two participants it was one hundred-twenty seconds. This is a much longer interval than previous studies which generally started with an interval of ten seconds. Fixed-time (FT) intervals were then progressively increased until they reached ten minutes for the first two participants and twelve minutes for the third. For participants one and three, NCR with extinction was evaluated to determine whether or not the system for determining the FT intervals would be effective. Results indicated that using a mean latency to the first behavior was an effective method for setting FT

schedules and that the schedules could then be rapidly faded to a lean schedule of reinforcement. This is particularly important when considering the use of NCR in school settings because lean schedules of reinforcement are easier for teachers to implement while causing minimal disruption to instruction. For the second participant, NCR without extinction was evaluated to determine whether or not extinction is a necessary component of NCR. Results showed that problem behavior could be reduced using NCR without extinction which suggests that satiation is the key component to change behavior, not extinction. This makes NCR even easier to implement as it allows for the occasional incidental reinforcement of a behavior while still producing rapid decline in problem behavior. This also opens the door for effectively using NCR without doing a functional analysis because it is not necessary to ensure removal of a functional reinforcer in order to produce change in behavior.

While most research on the use of NCR focuses on the reduction of SIB or aggression among populations with more severe disabilities, Coleman and Holmes (1998) extended the research by applying NCR to a new population and a new set of behaviors. Their focus was on the use of non-contingent escape (NCE) to reduce disruptive behaviors among young children with speech delays. Participants were three 4-year-old children (two boys and one girl) who had been receiving speech therapy for at least 7 months. The first participant had been diagnosed with pervasive developmental delay (PDD) and the other two participants, including the female participant, had been diagnosed with autism. Sessions took place two days a week at a speech clinic. The dependent variables studied were (a) disruptive behavior, including falling to the floor,

kicking over a chair, climbing on the table, screaming, crying, and inappropriate noises, and (b) compliance, defined as correct responding to an instruction within five seconds without physical guidance and without engaging in disruptive behaviors. While no formal functional analysis was conducted, it was determined through interviews with therapists and observation that the function of the behavior was escape. The effectiveness of NCE was studied using a multiple baseline design. During the test condition, the speech therapist provided a thirty second break on an FT schedule which was arbitrarily set at 1 minute and increased by 30-second increments when the child exhibited no disruptive behavior for three consecutive sessions. The terminal interval was four minutes. Results showed that NCE suppressed disruptive behavior and increased compliance for all participants which increased instructional opportunities.

Continuing to expand the research on NCR with wider populations, Jones, Drew, and Weber (2000) tested the effects of non-contingent peer attention to treat disruptive classroom behavior of a typically developing student in a regular education classroom. The participant was an 8-year-old boy with ADHD who functioned in the above average range for both intellect and achievement. A functional analysis indicated that the maintaining reinforcer was peer attention. For purposes of this study disruptive behavior was defined as talking out, playing with objects or getting out of seat. A multi-element design was used to perform a functional analysis and it was determined that the function of the behavior was peer attention. During the NCR condition, a timer bell sounded at 90 second intervals during which students were allowed to interact for 30 seconds before returning to their desks and their work. Extinction was not used due to the difficulty of

controlling peer response to disruptive behaviors. A reversal design indicated that NCR was effective in reducing disruptive behavior from 60%-100% of intervals during functional analysis to a mean of 37% of intervals during NCR. These findings support the use of NCR with a variety of populations and behaviors and further indicate that extinction is not a necessary component to produce change in behavior.

Very few studies have applied the use of NCR to EBD populations, and to students whose cognitive scores fall within the normal range. The first was conducted by Rasmussen and O'Neill (2006). They looked at the effects of NCR on the problem behavior of children with EBD in a day-treatment classroom setting. The dependent variable, verbal disruptions, was defined as singing out loud, talking to a peer while the teacher was talking or talking out without a hand raise. Participants were two 12-year-old boys who had been diagnosed with bipolar disorder and an 8-year-old boy diagnosed with an anxiety disorder. The participants had been admitted to a short-term day-treatment program housed in a psychiatric hospital upon referral from a public school where they had been identified as having EBD. No formal functional analysis was done, but functional assessment interviews and systematic classroom observations led to the determination that the function of the disruptive behavior was social attention from adults. During NCR conditions, social attention in the form of verbal praise and pats on the arm was delivered on a fixed-time schedule. For the first participant this schedule was initially set at 10 seconds and was eventually thinned to 75 seconds. For the second participant the initial interval was 20 seconds and was later thinned to 60 seconds. For the third participant the initial interval was 20 seconds and was later thinned to 90 seconds.

Results found NCR to be effective and it continued to be effective after the schedule thinning. The significance of this study was that it extended the research to the EBD population as well as added to research on applying NCR in a variety of settings.

Waller and Higbee (2010) furthered this research by implementing NCR with EBD students in a less restrictive educational placement. The setting was a special class for students with EBD within a public junior high school. Participants were two eighth-grade males who qualified for special education services under the classifications of Emotional Disturbance (ED) and Specific Learning Disability (LD) and who were receiving services in a special class due to the level of behavioral supports needed for their success. All sessions were conducted during math instruction, though they took place during different class periods. The dependent variables studied were disruption and academic behavior. Disruption was defined as talking without permission, making noises such as singing, humming or tapping, playing with or throwing objects, or getting out of seat without permission. Academic behavior, or work, was defined as writing on a worksheet, operating a calculator, or raising a hand to ask a question related to the assignment. Both were measured using a 10 second partial interval recording system. After a functional analysis it was determined that the behavior was being maintained by escape from tasks. Based on the procedures set by Lalli et al. (1997) a fixed-time schedule was calculated and one minute breaks from tasks were delivered non-contingently according to the schedule. Later in the study breaks were decreased to 30 seconds and FT schedules were incrementally increased when disruptive behavior remained under 10% for three consecutive sessions. The terminal schedules were 10

minutes. Both participants demonstrated a significant decrease in disruptive behavior during NCR conditions, even after reversal and these decreases were maintained after the schedule was thinned. There was also a marked increase in academic behavior and it was noted that students often chose to work through their breaks. It was hypothesized that this was because the students knew they had access to breaks and didn't have to be disruptive in order to get them. This study is an important addition to the research in that it expands the research on the use of NCR with students with EBD and extends it into a public school setting.

Most research that has been conducted on the use of NCR has selected reinforcers based on the results of functional assessment. The first study to do otherwise was conducted by Fischer, Iwata, and Mazaleski (1997). They examined the extent to which arbitrary reinforcers given on a fixed schedule suppressed SIB. The participants were two adults living in a public residential facility for people with developmental disabilities. Both were referred to the treatment center because of SIB and had been diagnosed with profound mental retardation. The dependent variables were face slapping for one participant and hand mouthing for the other. Researchers first conducted a functional analysis to determine the maintaining reinforcers. A preference assessment was then conducted using a paired-stimulus procedure. The three items chosen most frequently were labeled as arbitrary reinforcers and all of the reinforcers were food items. After a test to assure that these reinforcers were, indeed, arbitrary, the reinforcers were used on a fixed-time schedule which was systematically thinned. Results indicated that arbitrary reinforcers delivered non-contingently were effective in reducing the problem behavior

even when incidents of the behavior still produced a maintaining reinforcer. This was an important finding because it indicated that functional analysis may not be a necessary component of NCR and that NCR could be used to suppress behaviors that may be automatically reinforced by using preferred stimuli.

These findings were further investigated by Fisher, O'Conner, Kurtz, DeLeon, and Gotjen (2000) who questioned whether low-preference stimuli would produce changes in behavior or whether it was necessary to select a high-preference stimulus. The participant was a 17-year-old boy with severe mental retardation, among other debilitating health problems. He had been admitted to an intensive outpatient program for the treatment of destructive behaviors including aggression, disruption and self-injury. After a preference assessment a high-preference tangible reinforcer (music) and a low-preference tangible reinforcer (rain stick) were selected and delivered on a fixed-time schedule. A multi-element design was used to compare three conditions: high-preference, low-preference and attention. Results showed that the high-preference stimulus was effective at reducing problem behavior, but the low-preference stimulus was not. This is important because it suggests that the reinforcer used must be a highly preferred or powerful reinforcer in order for the reinforcement schedule to be effective. The power of reinforcement may be determined through the use of a preference assessment.

Currently, there are no studies that have examined the use of preferred tangible reinforcers delivered non-contingently with participants with EBD or in classroom settings. If tangible reinforcers delivered on a fixed-time schedule are effective in reducing problem behaviors for students with EBD, it would provide a new flexibility in

selecting interventions for these students. Non-contingent reinforcement, as mentioned previously, has the advantage of being easier for teachers to use while simultaneously providing instruction which serves to maintain treatment fidelity and, thus, be more effective. The use of tangible reinforcers would give teachers the ability to use NCR to effectively reduce behaviors that are maintained by reinforcers that teachers are unable to manipulate, such as peer attention and automatic reinforcement. This study extends the research conducted by Waller and Higbee (2010) on the use of NCR to reduce problem behaviors in students with EBD. Specifically the research question examined is: "What effects does NCR have on the disruptive and on-task behaviors of students with EBD when using preference assessment to select reinforcers rather than functional analysis?"

METHODS

Participants and Setting

Three participants were selected from a public school-based day treatment elementary unit for students with severe EBD. They were selected based on the need for behavioral intervention based on teacher report and classroom observation and willingness to participate including parental permission. Participants who exhibited frequent disruptive behavior during math groups, and who did not exhibit consistent or frequent aggressive behaviors that require removal from the classroom were selected. All participants had cognitive scores within the normal range. All participants were classified with a disability as defined by IDEA. Placement in this setting was determined by the IEP team and was considered based on student educational needs and history of behavior that requires a more restrictive placement. The unit is also a mental health day-treatment program that is run in combined effort with a local mental health agency. Upon placement in the program by the IEP team, students are admitted through the local agency and receive services on-site from mental health case workers, family therapists and, if needed, a psychiatrist. The unit houses three classrooms: a Kindergarten – first-grade classroom, a second – fourth-grade classroom, and a fifth – sixth-grade classroom. Also in the unit is a reception area, small waiting area, four offices, a small staff room, a common area with three small tables and chairs and student lockers, a time-out area with three timeout booths and three restrooms (two student and one staff).

Thomas is a 10-year-old fifth-grade student. He is a Caucasian male who qualifies

for special education services under the classification of Emotional Disturbance. According to the Woodcock-Johnson III Test of Cognitive Abilities, Thomas had a standard score in General Intellectual Ability of 100. Robert is a 10-year-old fourth-grade student. He is a Caucasian male who qualifies for special education services under the classification of Emotional Disturbance. According to the Woodcock-Johnson III Test of Cognitive Abilities, Robert had a standard score in General Intellectual Ability of 111. Samuel is an 8-year-old second-grade student. He is an African-American male who qualifies for special education services under the classification of Emotional Disturbance. According to the Woodcock-Johnson III Test of Cognitive Abilities, Samuel had a standard score in General Intellectual Ability of 95.

All sessions were conducted during small math groups in the classroom. Preference assessments were given in a common area outside of the classroom due to need for table space and to prevent disruption in the classroom. Thomas and Robert were in the same math group which was a group of 8 students led by the classroom teacher. Another group of 5-6 students met in another area of the same classroom. This classroom was run by two school district staff (a teacher and a paraprofessional), and two mental health case workers. Samuel was in a math group of 6 students led by a paraprofessional. Two other groups of 4-5 students met in other areas of the classroom. This classroom was run by three school district staff (a teacher and two paraprofessionals), and two mental health case workers. Other staff members were occasionally present including the mental health agency program supervisor and family therapists. Thomas and Robert's math group met in student desks in the fifth – sixth-grade classroom while Samuel's group met at a

horseshoe-shaped table in the second – fourth-grade classroom.

Response Definition and Measurement

Two dependent variables were measured for each student. The first dependent variable was disruptive behavior. For Thomas, disruptive behavior was defined as follows: During small group math instruction and independent work Thomas makes inappropriate noises with his mouth (talking out of turn, making sounds with voice and/or lips, loud yawning etc.), with objects (hitting pencil on desk or chair, playing with chair etc.), or with other body parts (hitting desk or objects with hands, tapping or stomping feet etc.). Disruptive behavior also includes getting out of seat without permission, dancing or making other inappropriate body movements when out of seat (with or without permission). Disruptive behavior does not include involuntary noises such as sneezes, speaking or getting out of seat with permission, or walking or moving about classroom quietly with permission.

For Robert, disruptive behavior was defined as follows: During small group math instruction and independent work, Robert speaks or makes other vocalizations out of turn, turns around in his chair to face other students or climbs out of chair, plays with objects (hitting pencil on desk or chair, rocking chair back and forth) makes inappropriate movements (running back to seat from drinking fountain, shaking head, waving arms in the air etc.) or gets out of seat without permission. Disruptive behavior does not include involuntary noises such as sneezes, speaking or getting out of seat with permission, standing quietly at desk while working, or walking or moving about classroom quietly

with permission.

For Samuel, disruptive behavior was defined as follows: During small group math instruction and independent work, Samuel speaks or makes other vocalizations out of turn including speaking to other students, shouting out answers, making noises with mouth and/or lips (sound effect noises, smacking lips, buzzing lips etc.). Disruptive behavior does not include involuntary noises such as sneezes, or speaking with permission.

The second dependent variable collected was on-task behavior. For all students, on-task behavior was defined as follows: During math small group instruction or independent work, student is oriented towards the teacher or task, working math problems on his paper or white board, using a calculator to solve problems, raising his hand to ask questions related to the assignment, quietly working problem in other ways including appropriately using manipulatives, counting on fingers, looking at charts or other resources posted in the classroom to work a math problem etc.

All data were collected via videotaped sessions. Disruptive behavior was recorded using a partial-interval recording system using 10-second intervals. On-task behavior was recorded using momentary time sampling at the end of each 10-second interval. If student was appropriately interacting with a reinforcer at the end of the interval, an X was scored and the interval was not counted. For Thomas, a mean of 13% of intervals were dropped (range 3-25%), for Robert 12% (range 3-23%) and for Samuel 11% (range 0-30%). The percentage of intervals dropped decreased over the course of the study as behavior change remained stable suggesting that dropping of intervals was not an extraneous

variable that should have interfered with the accuracy of the results. Intervals were measured using the time stamping mechanism on recorded sessions.

Inter-observer agreement (IOA) data were collected on one third of sessions through an independent observer who reviewed videotaped sessions independently and recorded behavior. If observers recorded the same instance/absence of behavior during the same interval it was considered agreement. IOA was calculated by dividing the number of intervals of agreement by the total number of intervals recorded and multiplying by 100 to produce a percentage. Inter-observer reliability was established through training on a set of sessions. The independent observer received some instruction on how to record data. After the set of sessions had been scored, incidents of disagreement were reviewed and discussed to establish reliability. After reliability was established, a new set of sessions were scored by the independent observer. For Thomas, IOA data were collected on 37% of sessions. IOA for disruptive behavior had a mean of 98% (range 95% - 100%) and IOA for on-task behavior had a mean of 98% (range 95% - 100%). For Robert, IOA data were collected on 35% of sessions. IOA for disruptive behavior had a mean of 96% (range 93% - 97%) and IOA for on-task behavior had a mean of 98% (range 97% - 100%). For Samuel, IOA data were collected on 35% of sessions. IOA for disruptive behavior had a mean of 97% (range 95% - 98%) and IOA for on-task behavior had a mean of 98% (range 95% - 98%).

Treatment Integrity (TI) data were collected on one third of treatment sessions by an independent observer who reviewed videotaped sessions independently. The observer recorded the number of opportunities for reinforcement and whether or not the reinforcer

was delivered within 2 seconds of the designated schedule. TI was calculated by dividing the total number of opportunities by the number of times the schedule was met. For Thomas, TI was collected on 36% of treatment sessions and had a mean of 95% (range 86% - 100%). For Robert, TI was collected on 33% of treatment sessions and had a mean of 97% (range 94% - 100%). For Samuel, TI was collected on 45% of treatment sessions and had a mean of 97% (range 92% - 100%).

Procedures

A reversal design was used to evaluate the effectiveness of the intervention. An ABAB design was used for Thomas and Samuel, and an ABA design was used for Robert. This difference is due to some instability in the data that didn't allow for phase changes to happen as quickly as for the other two participants. The study was unable to be conducted any longer due to the end of the school year. One ten minute session was conducted per participant each day, four times a week. All sessions were videotaped and data were collected via these videotaped sessions upon later review. Some sessions were cut short by interruptions in the class, the ending of the group or malfunctions in the video camera. If a session was at least 6 minutes long, its percentage was calculated and included. If the session was shorter than 6 minutes it was dropped. Percentage of intervals with behavior present was calculated by dividing the number of intervals with behavior present by the total number of intervals, multiplying by 100, and rounding to the nearest whole number.

Baseline.

During the baseline phase, students participated in small group math instruction, small group math practice and independent math work. The groups did not have a consistent schedule for activities, but, rather, varied from day to day dependent upon the material being covered. The regular classroom management system remained in place throughout all baseline and treatment sessions. The behavior management system is based on a level system where students lost points for inappropriate behavior. There is also a system of time-out procedures based on precision commands. Students could be sent to an time-out in the classroom (known as a "seat away"), a non-seclusionary time-out in a booth outside the classroom or a seclusionary time-out also in the booth, based on escalating or aggressive behavior. None of the participants left the room for a time-out during sessions, but there was one instance of a seat away in the classroom for Thomas during a baseline session. Baseline sessions continued until there was a stable pattern of behavior as determined by visual inspection of the data. All phase changes were based on disruptive behavior.

Preference Assessment.

After a stable baseline was established, a brief multiple-stimulus without replacement preference assessment using tangible reinforcers was given to determine high-preference items to be used as reinforcers. Procedures followed those outlined in Carr, Nicolson, and Higbee (2000). Items for use in preference assessments were selected based on teacher and student interviews. An array of eight items was presented and the student was directed to choose the one he wanted. That item was consumed in the

case of edibles, or was removed from the array after the student had interacted with the item for 10 seconds in the case of inedibles. The remaining items were re-arranged in a new array and the procedure was repeated. This was repeated until there were no items remained. The item chosen first was scored as "1," the second as "2," and so forth. This is considered one trial. Three trials were administered to each student. A brief break was offered between trials where students were allowed to get a drink and take some time so as to prevent satiation when consuming edibles. Scores for the three trials were combined to come up with an overall rank order.

The items used in the preference assessment for Thomas were, in the order they were ranked (from first to eighth): Magic: The Gathering cards (overall rank 1), Havarti cheese (2/3), Gusher's fruit snacks (2/3), gummi worms (4), Squirt soda (5), Reese's Peanut Butter Cups (6), Kit-Kat pieces (7), and Reese's Pieces (8). For Robert the items used, in the order they were ranked, were: Reese's Peanut Butter Cups (1), Hershey's bar pieces (2), mini marshmallows (3), goldfish crackers (4), Peanut Butter M&M's (5), gummi worms (6), Gusher's fruit snacks (7) and pretzel sticks (8). For Samuel the items used, in the order they were ranked, were: Skittles (1/2), gummi worms (1/2), Spiderman Fruit Snacks (3), mini marshmallows (4/5), Swedish Fish (4/5), Sour Patch Kids (6), Goldfish crackers (7), and Hershey's bar pieces (8).

Non-contingent Reinforcement (NCR).

At the beginning of each treatment session, the top four ranking items (five in the case of Samuel where there was a tie for the 4th ranked item) from the initial preference assessment were presented in a quick, single-trial preference assessment to determine

which reinforcer to be used for that treatment session. The items were presented in an array and the students were directed to choose the one they wanted. This was repeated until all items had been chosen. The item selected first was used as the reinforcer for that day's session. Results from daily preference assessments are shown in Figure 1. The selected item was then administered on a fixed-time (FT) schedule throughout the session. The NCR schedule was calculated similar to the schedule calculated by Lalli et al. (1997). That is, the mean latency to the first target behavior during the first baseline sessions was used to establish the initial FT schedule. The mean latency to the first target behavior was 34 seconds across baseline sessions for Thomas, 16 seconds for Robert, and 19 seconds for Samuel. In the case of Thomas, where the reinforcer frequently chosen was a non-edible, tangible item, he was given 10 seconds to interact with the item and then directed to put it away inside his desk. He was reminded at the end of the 10 seconds when needed, however, this was only necessary for part of the first treatment session and he did not need to be reminded for the remainder of the sessions. A small, silent, vibrating timer was used to measure the time between reinforcement. A brief return to baseline conditions in which the NCR conditions were removed was instigated when behavior had stabilized at a low rate as determined by a visual inspection of the data.

Non-contingent Reinforcement + Schedule Thinning.

After the reversal to baseline conditions, a NCR plus schedule thinning phase was conducted for Thomas and Robert.NCR conditions were reinstated with an increase in the FT interval of 25% (rounded to the nearest whole second). For Thomas, the first schedule

was held until there was a stable change in behavior (four sessions). The schedule was then increased by 25% each session for the next three sessions with the terminal schedule being 85 seconds. This was done due to the ending of the school year. Samuel participated in three sessions of schedule thinning with the FT schedule being increased 25% each session for a terminal schedule of 36 seconds.

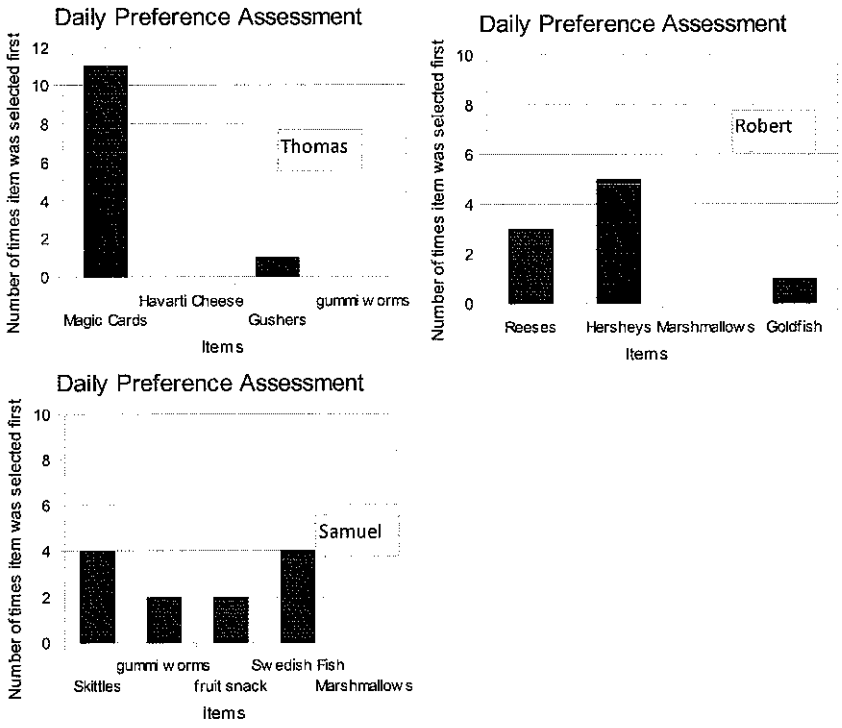

Figure 1. Results from daily preference assessments.

RESULTS

Disruptive Behavior

The results for the percentage of intervals with disruptive behavior are shown in Figure 2. Thomas and Samuel showed significant decreases in disruptive behavior during NCR phases.

For Thomas, baseline behavior was somewhat variable, though with an increasing trend after the first session. Upon implementation of the NCR treatment, there was an immediate and drastic drop in disruptive behavior. The mean decreased from 43% (range 32-62%) during baseline to 11% (range 2-28%) during treatment. With the exception of one session, disruptive behavior for the NCR phase was 12% or below. This low rate of target behavior remained stable throughout the treatment phase with the exception of the one session with 28%. During the reversal to baseline conditions there was an immediate increase in disruptive behavior. During this phase behavior was somewhat variable, but with a mean of 53% (range 35-72%). During the NCR plus schedule thinning phase, behavior again decreased and showed a decreasing trend as schedule continued to be thinned. A small spike in behavior occurred when the schedule was thinned a second time (from 43 seconds to 54 seconds), but when thinned to 68 seconds and 85 seconds on subsequent days continued to decrease with the lowest rate of behavior for the phase (7%) occurring with the terminal schedule (85 seconds). The mean for the NCR plus thinning phase was 20% (range 7-32%).

For Samuel there was a fairly stable level of disruptive behavior during baseline

conditions. The mean for this phase was 64% (range 62-87%). While there was a very slight decreasing trend in the baseline data, upon implementation of NCR treatment conditions, a drastic drop in behavior occurred that was not consistent with this trend. Mean for the NCR phase was 24% (range 12-55%). It was noted after session 10 and 11 for Samuel that the selected reinforcer was increasing disruptive behavior as the student was exhibiting inappropriate interactions with the reinforcer. After the second such session, that particular reinforcer (Spiderman fruit snacks) was removed from the array for any future sessions. Disruptive behavior then returned to a low rate. If we remove those 2 outliers from the data, the mean for the NCR phase becomes 16% (range 12-22). Upon reversal to baseline conditions disruptive behavior immediately increased (mean 55%, range 46-62%) and remained high with an increasing trend. Re-instatement of NCR with schedule thinning saw another drop in behavior (mean 27%, range 17-35%), however there was an increasing trend in the data as the schedule was thinned.

For Robert, the data were somewhat variable. During baseline, behavior was variable, but after the first session held at a relatively high rate. Mean for this phase was 46% (range 8-68%). When the first session outlier is removed, the mean for this phase becomes 53% (range 35-68%). During the NCR condition, there was a decrease in behavior, though less drastic than that for other participants and with some variability. Mean for this phase was 40% (range 27-98%). If the outlier is removed the mean becomes 34% (range 27-45%). During the reversal to baseline conditions, behavior drastically increased to levels far above those of any other phase. Both sessions showed disruptive behavior to be present during 85% of sessions.

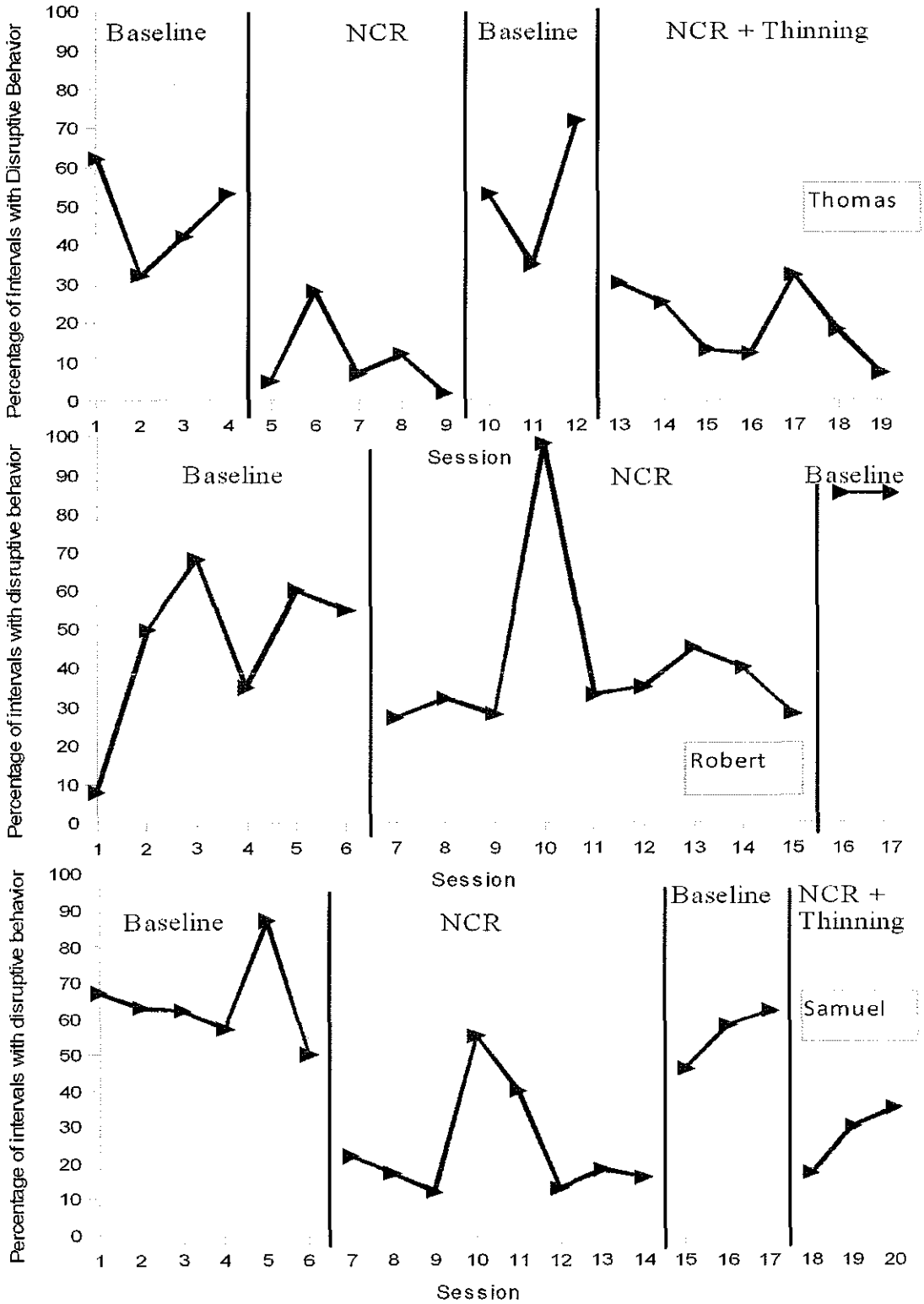

Figure 2 . Percentage of intervals of disruptive behavior for Thomas, Robert and Samuel during baseline and NCR sessions.

On-task Behavior

Results for on-task behavior were much more variable and are shown in Figure 3. Thomas exhibited variable rates of behavior during baseline with a mean of 41% (range 17-67%). On-task behavior increased during NCR conditions to a mean of 92% (range 84-100%). Behavior during the reversal to baseline conditions was stable at low rates with a mean of 38% (range 32-45%) and stable at high rates through all NCR + thinning sessions with a mean of 92% (range 89-95%).

Samuel exhibited moderate levels of on-task behavior during baseline which was slightly variable with a mean of 49% (range 26-62%). Upon implementation of the NCR treatment condition behavior jumped to 88% and remained high with all sessions during the treatment phase staying higher than those during baseline. Mean for this phase was 86% with a range of 70-100%. Reversal to baseline conditions saw a very slight overall decrease in behavior with a mean of 79% (range 75-82%). The first session of thinning saw a jump to a rate of 96%, but further sessions both saw a decline in the behavior with the terminal schedule (36 seconds) showing a rate of 69%. Mean for this phase was 84% with a range of 69-96%.

Robert exhibited highly variable rates of on-task behavior throughout baseline and treatment sessions. The mean for baseline conditions was 65% (range 52-93%). Behavior through this phase was very inconsistent with no stable trend. During the NCR phase, behavior remained variable, though the jumps between sessions were not quite as severe. The mean for this phase was 83% (range 66-98%). Reversal to baseline conditions saw a

drastic drop in on-task behavior to a mean much lower than either of the previous phases (33%, range 28-33%).

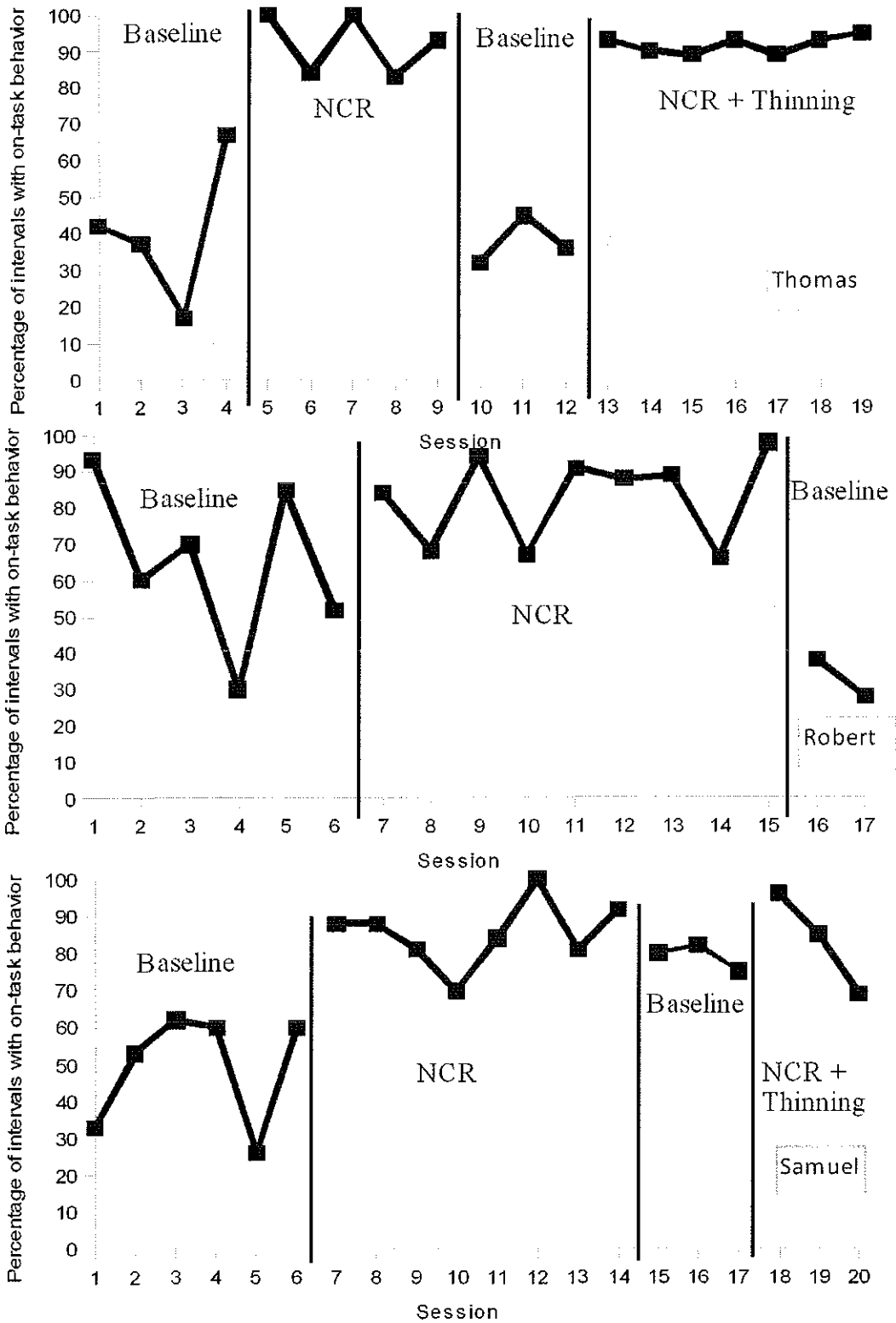

Figure 3 . Percentage of intervals of on-task for Thomas, Robert and Samuel during baseline and NCR sessions.

DISCUSSION

This study extends research conducted by Waller and Higbee (2010) through the use of preferred tangible items rather than function-based reinforcement. The data suggest that the use of preferred tangibles delivered on a fixed-schedule can be effective in reducing disruptive behavior in the classroom. All participants showed a decrease in disruptive behavior, though this decrease was more marked and stable in some participants than others. Thomas showed a dramatic change in behavior during NCR conditions. Samuel also showed dramatic differences between NCR conditions and baseline conditions. Robert showed a markedly dramatic increase in disruptive behavior when the NCR condition was removed. This suggests that the intervention may have been more powerful than earlier data may convey. It should be noted, however, that these data sessions were conducted during the final week of school, so the increase in disruptive behavior could be typical of the end of the school year and not specifically due to the removal of the intervention. Further research is needed to determine if the change in behavior is indeed related to the intervention and not to extraneous factors.

There is also some evidence to suggest that low rates of behavior can be maintained with schedule thinning. Thomas showed a continual decrease in behavior during schedule thinning conditions. There was a small spike in behavior when the schedule was thinned a second time, but on successive thinning behavior continued to decrease. Upon a terminal schedule of 85 seconds, Thomas exhibited a rate of disruptive behavior that was below that of any other NCR + thinning session. Because of this trend it is likely that behavior would have remained at acceptable rates with further schedule

thinning, but further research is necessary to strengthen this claim.

It is important to note that the NCR procedure did not reduce rates of on-task behavior. An intervention that reduces disruptive behavior, but disrupts learning by reducing on-task behavior as well is not a useful classroom intervention. The results suggest that on-task behavior is not reduced by the procedure and, in fact, there is some evidence to suggest that the use of NCR may be effective in increasing on-task behavior. Thomas showed drastic increases in on-task behavior during all session where NCR was present and an immediate drop in behavior during the reversal to baseline. Samuel showed an increase in on-task behavior, but the behavior only decreased marginally when NCR was removed. Because of this it is difficult to say whether the increase in on-task behavior was directly related to the intervention or if it was caused by extraneous variables. Samuel also showed a decreasing trend in on-task behavior during schedule thinning. This may have been caused by a number of factors. Thinning happened at a rapid rate. A more gradual thinning schedule may have made a difference in the rate of behavior. As mentioned previously, these sessions were conducted during the last week of school which may have been a factor in the amount of time spent on-task. However, even with the decline in on-task behavior, at the terminal schedule, the percentage of on-task behavior was above any of the baseline rates. Data for Robert were highly variable and not very stable, though the sharp drop in on-task behavior upon reversal suggests the intervention may have had some impact upon his on-task behavior. Due to the level of variability in the data and the lack of more baseline or schedule thinning data, more research is needed to determine the link between NCR and on-task behavior.

The potential for NCR to be used to increase behavior is an interesting finding. Historically NCR has been used to decrease behaviors. The typical population targeted by NCR has lower cognitive/verbal abilities. Participants in this study had cognitive scores that fell in the normal range. This higher cognitive/verbal ability combined with prior reinforcement history (typically contingency-based reinforcement schedules) may contribute to this increase in behavior where it would not be expected. Further research should explore this relationship and how NCR could be used to increase behavior.

There are, however, limitations to this study that provide room for further research. Time constraints forced by the end of the school year did not allow thinning to be conducted systematically to a practical terminal schedule. Because of variability in the data and several absences, Robert did not participate in any schedule thinning. Also, Samuel seemed to show an increase in disruptive behavior as the schedule was thinned. More time would have allowed for the thinning to happen at a more gradual pace. Because of the time constraints it is difficult to know if the increase in problem behavior is related to a rapid rate of schedule thinning or if it was just behavior typical of the end of the school year. Thomas did, however, continue to show a decrease in behavior even with rapid schedule thinning, though he did not reach a practical terminal schedule that would be useful to a typical classroom teacher.

Due to variability in classroom activities from day to day, this study did not measure or track work activity or productivity and instead measured on-task behavior. It would be important to ensure that time spent on task is also productive time and that students are completing assignments with accuracy. Future studies should look into this

relationship to ensure that the use of NCR is not interfering with educational opportunities and progress made in the classroom.

From this study, it appears that NCR may be an effective tool for reducing disruptive behavior with students with EBD. Further research could extend the use of NCR to other problem behaviors, and other educational placements (perhaps less restrictive environments like the regular education classroom). Further research is needed to determine a practical terminal schedule since thinning procedures were cut short by the end of the school year. Further research could also be directed at examining whether or not NCR can be effectively used to increase positive classroom behaviors like on-task behavior.

A major referral concern for students with EBD who are placed in restrictive settings is disruptive behavior. Antecedent interventions, such as the use of non-contingent reinforcement offer teachers another alternative for treating these behaviors. The use of preferred tangibles allows teachers to use NCR without having to go through the time-intensive procedures necessary to perform a functional analysis and allow NCR to be used with behaviors whose function may not allow for function based reinforcement to be controlled. Results from this study suggest that tangible reinforcers may be effective in helping to reduce these behaviors when delivered on a fixed schedule.

REFERENCES

Anderson, J.A., Kutash, K., & Duchnowski, A.J. (2001). A comparison of the academic progress of students with EBD and students with LD. *Journal of Emotional and Behavioral Disorders, 9*(2), 106-115.

Bradley, R., Doolittle, J. & Bartolotta, R. (2008). Building on the data and adding to the discussion: The experiences and outcomes of students with emotional disturbance. *Journal of Behavioral Education, 17,* 4-23.

Carr, J.E., Nicolson, A.C., & Higbee, T.S. (2000). Evaluation of a brief multiple-stimulus preference assessment in a naturalistic context. *Journal of Applied Behavior Analysis, 33*(3), 353-357.

Coleman, C.L., & Holmes, P.A. (1998). The use of noncontingent escape to reduce disruptive behaviors in children with speech delays. *Journal of Applied Behavior Analysis, 31*(4), 687.

Fischer, S.M., Iwata, B.A., & Mazaleski, J.L. (1997). Noncontingent delivery of arbitrary reinforcers as treatment for self-injurious behavior. *Journal of Applied Behavior Analysis, 30*(2), 239.

Fisher, W.W., O'Connor, J.T., Kurtz, P.F., DeLeon, I.G., & Gotjen, L. (2000). The effects of noncontingent delivery of high- and low-preference stimuli on attention-maintained destructive behavior. *Journal of Applied Behavior Analysis, 33*(1), 79-83.

Jones, K.M., Drew, H.A., & Weber, N.L. (2000). Noncontingent peer attention as treatment for disruptive classroom behavior. *Journal of Applied Behavior Analysis, 33*(3), 343-346.

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*(1), 127-137.

Rasmussen, K., & O'Neill, R.E. (2006). The effects of fixed-time reinforcement schedules on problem behavior of children with emotional and behavioral disorders in a day-treatment classroom setting. *Journal of Applied Behavioral Analysis, 39*(4), 453-457.

Roane, H.S., Fisher, W.W., & Sgro, G.M. (2001). Effects of a fixed-time schedule on aberrant and adaptive behavior. *Journal of Applied Behavior Analysis, 34*(3), 333-336.

Roscoe, E.M., Iwata, B.A., & Goh, H. (1998). A comparison of noncontingent reinforcement and sensory extinction as treatments for self-injurious behavior. *Journal of Applied Behavior Analysis, 31*(4), 635-646.

Vollmer, T.R., Iwata, B.A., Zarcone, J.R., Smith, R.G., & Mazaleski, J.I. (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*(1), 9-21.

Waller, R.D., & Higbee, T.S. (2010). The effects of function-based fixed-time reinforcement on inappropriate and appropriate classroom behavior of students with mild cognitive disabilities. *Journal of Applied Behavior Analysis, 43,* 149-153.