

CLASSROOM APPLICATIONS OF A TRIAL-BASED FUNCTIONAL
ANALYSIS IN AN EARLY CHILDHOOD EDUCATION SETTING

by

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ABSTRACT

Classroom Applications of a Trial-Based Functional Analysis
in an Early Childhood Education Setting

by

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Functional analysis has proven to be an effective way of determining the function of problem behaviors. However, this process can consume a great deal of time and resources. Also, the majority of analyses are conducted with subjects greater than six years of age with unfamiliar persons conducting the analysis. Therefore, there is a need to examine a method that will expend less time and resources, and to determine if this new method will be effective with subjects in an early childhood setting. The current study examines the ability of classroom teachers to conduct a trial-based functional analysis within an early childhood classroom. Results suggest that trial-based functional analysis conducted by classroom teachers is effective in early childhood settings. The study's findings also suggest that a function-based intervention may effectively reduce problem behaviors for preschoolers.

(48 pages)

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INTRODUCTION

Problem Behavior in Early Childhood Settings

According to a study done by the Yale University Child Center, children in pre-kindergarten programs are more than three times more likely to be expelled from school than other children (Gilliam, 2005). With these alarming statistics, it is imperative that early childhood professionals find a way to address problem behavior in their classrooms before expulsion is more frequently used. Dufrene, Doggett, Henington, and Watson (2007) stated that there is a need for early assessment and intervention for students that present with behavior difficulties, given that as many as one-third of children in a preschool setting exhibit disruptive behaviors in a clinically significant manner. However, there has been relatively little research on early childhood behavioral interventions. This is a concern considering that problem behaviors in early childhood have been linked to greater academic difficulties later on in school (Gettinger & Stoiber, 2006). Gettinger and Stroiber believe that this link is a reason that intervening in early childhood programs is necessary to prevent these and other negative outcomes.

Within early childhood settings, some children may be experiencing a new environment (for the first time) within which consequences of behavior may be different than their home environment, and thus may exhibit challenging behaviors. One challenging behavior, non-compliance, makes it difficult for the teacher to continue class until taking time to address one student's non-compliance. It is important to address this behavior early, so that the disruptions are minimized.

Although there are limited studies on methods to address problem behaviors in early childhood education, some professionals have begun to study problem behaviors in preschoolers. Some of these studies have used some type of functional behavior assessment to determine the function of the behavior before addressing the behavior. For example, Wilder, Harris, Reagan, and Rasey (2007) targeted noncompliance in typically-developing preschool children. Research assistants, who had no previous interaction with the two children (who served as subjects), conducted The Wilder et al. study. The researchers conducted the study within an unfamiliar environment to the children and collected data on behavior in two contexts (being asked to pick up toys and being asked to stop a preferred activity). The functional analysis (FA) of problem behavior (an assessment designed to determine environmental influences on problem behavior) showed that both children had the most noncompliant behavior when asked to clean up during a preferred activity versus cleaning up non-preferred activities. Both children used non-compliance to escape non-preferred activities. A token system was put in place as an intervention for both children based on the results of the FA. Compliance during the treatment phase increased to an average of 100% with child 1 and 80% with child 2. Wilder et al. concluded that using an FA can be an effective method of determining the function of a behavior with children of a preschool age in a controlled environment. When teachers are aware that using an FA with preschool children can be effective, they may be more likely to take an active role in conducting an FA or implementing interventions based on results of an FA.

Wilder, Chen, Atwell, Pritchard, and Weinstein (2006) noted that preschool children may spend 20% to 35% of the day transitioning between activities. Transitions

are a time when young children often exhibit challenging behaviors such as aggression, screaming, whining, or tantrums. Wilder et al. (2006) exposed two children to trials consisting of a 2-min pre-transition period, the transition itself, and a 2-min post-transition period conducted in a therapy room with a one-way mirror. One child exhibited an escape function from the non-preferred activity and the other child's behavior was maintained by continued access to preferred activity. Advance notice and differential reinforcement of other behavior (DRO) with extinction were evaluated with each child using reversal designs. During DRO with extinction, tantrums either gradually decreased or did not occur, based on child. These results suggest that brief trial-based functional analysis can be used to identify the maintaining variables for disruptive behavior exhibited by typically developing preschool children (Wilder et al., 2006).

Given that the two previous studies suggest that assessments are useful in determining the function of behavior for young children, they suggest that it may be possible to target the problem behavior of early childhood within the classroom environment. However, neither of the studies were conducted in classrooms, nor were assessments performed by classroom personnel. Thus, although these assessments are promising, additional replications with classroom personnel as therapists conducted in educational settings are warranted.

Burchinal, Hyson, and Zaslow (2008) found that many pre-service programs for early childhood educators do not provide instruction about current research or beliefs about effective practices. Hyson, Tomlinson, and Morris (2009) focused on degree granting programs, finding that only 29% of these programs believed that knowing about and using others' research was a priority. In the state of Utah, in the school district where

this thesis was conducted, preschool teachers for students between the ages of 3 and 5 years old are required to have a Child Development Associates (CDA), or be working towards one after hire, but assistants in the classroom do not have to have these credentials. If the requirements elsewhere are similar to those in this school district, it may mean that many early childhood educators have difficulty interpreting the results from studies possibly due to a deficit in their training, or access to current research when their training is completed.

It is crucial for those who work in the education field, especially with young children to be educated in ways that they may be able to identify problem behaviors and then ways to discover the root or reason for those problem behaviors. Elimination or reductions in behavior problems in early childhood will improve behavioral and academic outcomes. Methods for determining function of problem behavior are important because they allow early childhood educators to develop effective and efficient reinforcement-based interventions.

Functional Analysis of Problem Behavior

According to Mace (1994), FA is the “gold standard” for determining the function of a problem behavior. An FA is an examination of the functional relations between problem behavior and environmental events. In an FA, putative antecedents and consequences of problem behavior are arranged within an experimental design so that their separate effects on problem behavior can be observed and measured (Cooper, Heron, & Heward, 2007).

The development of the FA by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) was a milestone for applied behavior analysis. Previous to the FA, a person may have needed to attempt multiple behavioral interventions to identify an effective intervention. Given that each behavioral intervention could take weeks to show results, this process consumed a great deal of time and delayed access to effective intervention. Professionals now use an FA to efficiently determine the function of a behavior and develop effective function-based interventions, thus improving student outcomes.

Traditional FAs consist of several steps. First, the problem behavior must be defined in specific, observable and measurable terms so that all people who will be involved with assessment and/or data collection are aware what is and what is not an incidence of problem behavior. In a traditional FA assessors typically move the participant to a controlled environment where they are presented with multiple sessions test or control conditions, lasting 10 to 15-min per session. Test conditions typically include: attention, demand, ignore (or alone), and tangible. In the attention condition, an assessor gives the child access to toys and then states that he or she “needs to do some work.” If the child engages in problem behavior the therapist gives a response, usually of disapproval and possibly brief physical contact, such as a hand on the shoulder. If the problem behavior does not occur, no attention is given. In the demand condition, a therapist issues tasks to the child using prompting when necessary to complete the task. If the child engages in problem behavior, the therapist gives the child a brief break from the task. In an ignore session, the child is placed without access to any materials and no consequences are arranged for problem behavior. Despite presence or absence of the problem behavior, the therapist issues no statements and makes no contact with the child

(if the therapist is not present, as in the alone variation on the ignore condition, no one is available to interact with the child, regardless of the presence or absence of problem behavior). In the tangible condition, the child sees preferred items, such as toys or foods, but does not have access to those items. When and if the child exhibits problem behavior, the therapist gives the preferred items to the child for a brief period of access. In the control condition, the child has access to materials and is given brief periods of attention, such as a positive statement or touch usually every 30 seconds. No demands are placed during this time. Not all conditions must be tested with each child. For example, if other people are necessary for the problem behavior to occur, as is the case with aggression, then it may not be necessary to conduct an alone condition with that individual. Once the FA has been conducted, the relative frequency or other measure of problem behavior in each test condition relative to the control condition are analyzed and the assessor develops a hypothesis regarding the function of the behavior.

The primary advantage of FA is the ability to yield a clear demonstration of the variables that relate to the occurrence of the problem behavior. However, there are a number of limitations to conducting a traditional FA. First, the assessment may temporarily strengthen, or increase, the problem behavior (Durand, 1997). Second, some teachers or other school personnel may find the FA unacceptable because it includes reinforcing problem behavior during sessions (Carr, LeBlanc, & Love, 2009). Third, some behaviors may not be amenable to FA because they occur very infrequently (Kelly, Reitman, & Noell, 2003). Fourth, FAs conducted in contrived settings may not take into account variables that increase the probability of the problem behavior in a natural environment (Lang, et al., 2008). Finally, the effort and expertise to conduct and interpret

FA can create obstacles to use in practice (Cooper et al., 2007). This study will mainly address the fourth and fifth limitation.

Though the FA procedures used by Iwata et al. (1982/1994) have been proven effective and reliable in many studies, obtaining controlled environments in an educational setting may be challenging. In a school setting, an empty room that could be used to perform an FA is not always easy to find. If the room is available, time to use that controlled setting may still be limited by the teacher's ongoing classroom responsibilities. For a teacher, conducting a traditional FA is not possible because of their responsibilities to implement instruction within their classroom. It may be unlikely that a district is willing or able to staff a classroom for a teacher while that teacher is conducting a functional analysis with just one student.

A closely related criticism of the standard FA is that Iwata et al. (1982/1994) used therapy rooms to conduct their sessions, instead of a naturalistic setting. Lang et al. (2008) suggested that because FAs are not conducted in naturalistic settings, the individual's behavior may be uncharacteristic until he or she has adapted to the conditions. Although the utility of the standard FA has been replicated in hundreds of studies, a modification to the standard FA that would allow it to be conducted in childrens classrooms with familiar individuals as therapists would be welcome.

Regarding the criticism about the training required to conduct an FA, although researchers have shown that it is possible to quickly train novices to conduct FAs, including undergraduates (Iwata et al., 2000), caregivers (Najdowski et al., 2008), and educators (Wallace, Doney, Mintz-Resudek, & Tarbox, 2004); most teachers and school personnel are not trained to conduct FAs. Recruiting a behavior analyst to conduct an FA

can be costly and time-consuming. The process of obtaining skilled personnel to conduct an FA is a difficult process for many regular education teachers. Even in school districts employing a behavior analyst, the wait time and prerequisite information and data before that person can appear in the classroom can be daunting.

Given these two feasibility concerns about the FA (limited access to controlled environments and trained personnel), methodologies that adapt the FA in ways that address these concerns are potentially beneficial. Specifically, an adaptation that would allow an FA to be conducted without access to a separate, controlled environment, would make the FA more accessible in educational settings. Also, demonstrations that classroom personnel are able to conduct these assessments would lend support to the idea that classroom personnel can conduct FAs without waiting for district behavioral specialists.

Trial-Based Functional Analysis

Trial-based functional analysis (Bloom, Iwata, Fritz, Roscoe, & Carreau, 2011) is a recently developed FA method that is an attempt to bridge the gap between research and educational application. The trial-based FA is derived from Sigafoos and Sagers (1995) in which researchers used a discrete trial format in a classroom setting to determine whether aggressive behavior had an attention or escape function. In a trial-based FA, teachers conduct brief trials during the child's daily routine in their natural environment. For example, a demand trial may be run when the child attends a teacher-directed activity that is not preferred by the child. Different types of trials (i.e., conditions) include specific features that are designed to test for different functions.

These may be presented quickly in the context of ongoing classroom activity rather than in isolated therapy settings. For example, in the Bloom et al. (2011) study, each trial lasted a maximum of 6-min and was broken into three segments: 2-min control, 2-min test, 2-min control. Moreover, these trials were presented in the child's classroom.

Preliminary findings on trial-based FA accuracy showed that trial-based FA and standard FA obtained the same function in 60% of initial assessments, suggesting that the trial-based functional analysis may be an appropriate alternative assessment when it is not possible to conduct a standard functional analysis (Bloom et al., 2011). Alternatively, the procedure might be considered a first attempt at conducting a functional analysis in school settings, followed by more extensive analyses as needed (Bloom et al., 2011).

This method, if proven effective and feasible, may make FA's more accessible to classroom teachers. This may result in more FAs being conducted and increase the efficiency with which a function-based intervention is identified and implemented.

One argument for the trial based FA is that it requires less time to implement than a traditional FA. However, in Bloom and colleagues' study the testing period was comparable to a traditional FA because many trials needed to be re-run due to interference during a trial segment, which negated the trial. If all of the adults in the class are participants, or are at least involved in the trial-based FA, it may be possible to decrease the number of negated trials (trials that needed to be re-run because of interference). Bloom et al. (2011) suggested others ways that could decrease the time it takes to conduct a trial-based FA. One is to reduce the number of trials per condition to ten. In the Bloom et al. (2011) study, 20 trials per condition were tested. In four out of six cases, 10 trials would have been sufficient to identify the function for the behavior.

Another way to decrease time is to shorten the FA from a 6-min trial (2-min control, 2-min test, 2-min control) to a 4-min trial (2-min control, 2-min test). This shortened FA trial duration may also reduce the number of trials that need to be rerun because of interference from another individual, because the trial duration (and the opportunity for interference) is reduced by one third.

Although this method has great potential, some additional adjustments to streamline procedures and increase their efficiency may be useful. Also, the Bloom et al. (2011) study was a preliminary exploration and additional replications with teachers as therapists, with different age groups, and including function-based interventions are necessary before this methodology can be adopted in a widespread manner in educational settings.

PURPOSE STATEMENT

A limitation of each of the studies cited in the sections above, whether with early childhood or with older populations, is that none of these studies used teachers as assessors or data collectors. Rather, the studies described above employed behavior analysts and graduate students to obtain FA results. Because behavior analysts and graduate students may have advanced training in applied behavior analysis, the generality of these findings to typical educational settings with teachers as therapists is unknown. If a teacher cannot replicate the procedures due to inadequate staffing, lack of appropriate materials, lack of experience, space to conduct the assessment, or other resources, research in this area is less helpful to teachers than it could be.

Although many studies have been conducted on the utility of FA, there are a limited amount of studies that focus on early childhood and/or preschool children, even fewer that examine target behavior in the child's routine environment. A limitation of the Wilder et al. study (2006) is that the results were not obtained in a natural environment for the child, though household routines were used as transition activities. Although Iwata and Dozier (2008) reported that FAs conducted in places other than the natural environment are typically able to identify the function of the behavior well enough to develop effective treatment, others have countered that because a controlled environment may lack stimuli that are present in a natural setting, the functional analysis in a controlled environment may produce incorrect results (Lang et al., 2008). Regardless of the outcome of this debate, it would be beneficial for teachers to have access to an FA methodology that they can use even if they don't have access to a controlled

environment. Additionally, it is crucial to demonstrate its efficacy with teachers as therapists.

The current study had two different phases. In phase one, a trial-based FA was conducted to determine a function for the problem behavior. In phase two, a function based intervention was used to decrease problem behavior based on the results of the trial-based FA. The following research questions were addressed:

1. To what extent does a trial-based FA, conducted in an early childhood classroom by teachers, determine the function of problem behavior for pre-school aged children?
2. To what extent does a function-based intervention on pre-school aged children, when conducted by current teachers, validate the results of a trial-based FA?

METHOD

Participants

Three preschool aged children who engaged in problem behavior and required a functional analysis were included. Two children were female, one male. Child 1 and 2 were three years of age during the study. Child 3 was four years of age during the study. All had a current educational classification of developmental delay. A classroom team consisting of regular education teacher(s), speech therapist, special education teacher and classroom coordinator determined the need for an FA (functional analysis). Each child was recruited from an early childhood preschool setting, where they attend a preschool class two days a week for three hours each day, a total of six hours per week. The classrooms were located in neighborhood elementary schools. All three children were receiving special education services during the study. All children had an active Individualized Education Plan (IEP) that did not include a behavior intervention plan.

Setting

All trials and sessions occurred at the children's school. The trial-based FAs all occurred in a self-contained classroom, whereas the function-based intervention occurred in both the self-contained classroom and a general education classroom. The self-contained classroom included one teacher and three assistants with an average of six children per day, all with some type of educational disability. The general education classroom contained one teacher and one assistant, with an average of 12 children per day. In the general education classroom, an itinerant special education teacher would

come one day per week to work with the children. Five children in the general education classroom had been classified with a disability. The trial-based FA and function-based intervention took place during classroom routines, including free play and small group instruction of between three and four children. Each class is three hours long, however, the children integrated into the regular education classroom for approximately 45-min each day. Both the self-contained and general education classroom uses a district wide preschool curriculum, which dictated that the children transition between activities in approximately 15-min increments. Approximately 50% of these activities were teacher directed, though in the self-contained room the classroom aides worked with the children in the free choice areas as well.

Response Measurement

The itinerant special education teacher was the primary data collector and conducted the trial-based FA in the classroom. During the trial-based FA, occurrence/non-occurrence recording was used to measure whether the target behavior of the student occurred at any time during the test and/or control segment of the trials. The target behavior varied depending on the child and was determined by the team of individuals that worked with the child in the school setting. The two behaviors targeted in this study were aggression and tantrums. Aggression was defined as any hit, punch, push, bite, scratch or pinch to another individual that was not in retaliation to aggression from another individual. Tantrum was defined as 5 s or longer period of time including one or more of the following: screaming, shouting, whining, stomping or kicking feet,

throwing things, or going under tables. Child 1 and 3 displayed aggression in the classroom, whereas Child 2 exhibited tantrums.

Throughout the function-based intervention, researchers measured the frequency of problem behaviors and the frequency of an alternative response during 5-min sessions. Definitions of problem behavior were the same as the definitions used for the trial-based FA.

Experimental Procedures

Trial-based FA

Trial-based FA is a version of a functional analysis that is broken down into trial types, such as attention, demand, ignore, and tangible and occurs throughout the daily routine of the child. Trials were run during corresponding points of the child's day. For example, demand trials were conducted at times when a child needed to engage in work, whereas attention trials were run when a child could be engaging in play activities.

If the target behavior occurred at any time during the test segment, the segment of the trial in which the subject is being exposed to a potential antecedent for problem behavior, the test segment was discontinued and the control segment began (except during ignore trials). The control segment, the segment in which the child is not exposed to any suspected antecedent for problem behavior, was also stopped if the target behavior occurred. Segments were discontinued if problem behavior occurred, because for the purposes of this study the researchers were tracking whether or not the behavior occurred within certain contexts, not how frequently or for how long the behaviors occurred. Data were graphed to show the conditions under which the targeted behaviors occurred.

Trial-based FA conditions

Attention. During the control segment, the teacher sat with the child, and a moderately preferred activity item was available. Researchers identified preferred items by talking with classroom teachers and doing a preference based assessment. The teacher delivered attention continuously throughout the segment. At the end of the control segment, the test segment began. The teacher initiated the segment by stating that she “had to do some work” and turned away from the child. If the child engaged in problem behavior, the teacher faced the subject, issued a statement of concern, and delivered brief and gentle physical contact and the segment was terminated.

Demand. During the control segment, the child was seated without access to leisure or task materials. The teacher was close enough to the child to be a potential target for problem behavior (if the problem behavior was aggression), but was facing away from the child. Problem behavior produced no consequences except for trial segment termination. At the beginning of the test segment, the teacher initiated instructional trials using a three-step prompting sequence (vocal prompt, modeled prompt, and physical prompt). If the subject engaged in problem behavior, the teacher terminated the segment and said, “Okay, you don’t have to work.”

Tangible. During the control segment, the teacher was seated with the child, who was consuming a preferred food/drink or playing with a preferred item. Problem behavior produced no consequences except segment termination. At the beginning of the test segment, the teacher removed any preferred items from the child’s reach, but within view, and kept items out of the child’s reach for 2-min. If problem behavior occurred, the teacher gave the item to the child immediately and the segment was terminated.

Ignore. Instead of a control and test segment, the ignore trials consisted of two consecutive 2-min test segments in which the child was seated away from others, without leisure or task materials. Problem behavior produced no consequences and did not terminate that segment of the trial.

Trial-based FA procedure

Ignore trials were not conducted with Child 1 or Child 3 with aggression as the target behavior, because aggression is unlikely to be automatically reinforced. Tangible trials were only conducted with Child 1 (because a tangible function was remotely suspected to be a possible function for the behavior, based on observation and anecdotal reports from classroom staff). Each type of condition, i.e., attention, ignore, etc., included for the child was conducted a total of 10 times throughout a 2-week period (in contrast to the Bloom et al. [2011] study which included 20 trials of each condition). A maximum of 12 trials per child were conducted per week. Conditions each day were varied so that more than one type of trial was tested each day. Opportunities to run each type of trial presented themselves during the course of the preschool routine within free play and instructional activities. In order to shorten the length of the assessment making the procedure more accessible to teachers in a classroom setting, the trials in this study consisted of 4-min trials (2-min control, 2-min test).

Data were graphed to determine the function of the behavior in order to develop an effective function-based intervention. Researchers identified which test condition elicited the most problem behavior in each of the children. The function isolated in the test segment in which the child showed the most problem behaviors during the trial-based

FA was selected for the function-based intervention. In the case of the ignore condition, researchers looked at whether or not behavior persisted across both test segments.

In order to validate the results of the trial-based FA, it is necessary to conduct an intervention based on the function of the behavior gathered from the results. This may establish whether a teacher has the ability to conduct a trial-based FA within a classroom setting and achieve effective results from the assessment.

Function-based Intervention

After the function of the behavior was determined, a function-based intervention was developed for each of the children based on the results of the trial-based FA. The function-based intervention was based on best-practices of early childhood education and special education fields. Researcher and classroom staff agreed on which intervention was implemented in order to ensure the ability to implement the intervention in the classroom by staff. If a child's problem behavior was maintained by multiple functions, the researcher and classroom staff chose the function that looked the strongest as the targeted function for the study. The interventions were reinforcement based. Interventions for each student were developed using differential reinforcement of an alternative response (DRA) and extinction (EXT). The researcher selected interventions based on which treatments were most appropriate for each child (i.e., most likely to reduce problem behavior safely and effectively, most appropriate for the topography of the problem behavior, and most acceptable to the child's caretakers). Interventions were implemented in contexts that contained environmental variables which may have altered the reinforcing effects of some stimuli and altered the frequency of behavior being

reinforced by those stimuli, otherwise known as motivating operations (Cooper et al., 2007). Children received a physical prompt to ask for a break or high five before a problem behavior occurred. These prompts occurred at the discretion of the researcher, based on signs that problem behavior was likely to be imminent. These signs consisted of the child shaking head, waving arms, verbal grunts, or looking to other items or areas of the room. During the physical prompt, the teacher moved the child's hand to the picture card and stated "you asked for a break/high five, you can have a break" so that the child learned how to initiate a break/high five. After he or she had been taught with a physical prompt, the researcher pointed to the PECS card and stated "Do you need a break/high five?" thus providing a verbal prompt before the problem behavior occurred. During the first couple of sessions for each child, prompts were given between 3 and 5 times per session. Initially prompts were physical, and then they were faded to verbal prompts across the 3 to 5 sessions that included prompting.

Function-based intervention sessions were conducted 3-6 times per week, 1-3 sessions occurred each day the child attended class, and were 5-min each. Sessions were conducted in the child's class during different types of activities, free play and small group instruction, where the researcher ensured that the motivating operations were in place. Sessions were conducted in the classroom, in a recess area, or with an alternate teacher (after initial training). Baseline sessions were run for a three-day period up to a two-week time period, depending on when a stable baseline was reached, and where the child was on the multiple baseline (short or long baseline). After baseline sessions were completed, treatment sessions ran for up to a three week time period or until stable behavior was reached (whichever came first) to determine if the intervention was

effective. If the problem behavior did decrease during the intervention phase, based on the outcome of the trial-based FA, it was assumed that the trial-based FA conducted by teachers accurately determined the function of the problem behavior. All staff were subsequently trained to implement the intervention.

DRA

This intervention involves delivering reinforcement for a behavior that serves as a desirable alternative to the behavior targeted for reduction and withheld following instances of the problem behavior (Cooper et al., 2007). Children 1 and 2 were taught to ask for a break using PECS cards or with vocalizations, which resulted in a 30 second break from a demand. Child 3 was taught to ask for attention using PECS cards or vocalizations, which resulted in a high five and the researcher stating “Good job, you got a high five.”

EXT

This intervention consists of discontinuing any reinforcement of a previously reinforced behavior (Cooper et al., 2007). Extinction was used with all children. If the problem behavior was exhibited during the intervention, the demand did not stop for Child 1 and 2, nor was attention given for Child 3.

Observer Training

Before collecting data on this study, observers were required to review definitions of target behavior, take data in mock scenarios in which the target behavior was introduced, and observe the natural setting in which the sessions will be taking place. In

order for the observer to be qualified to take data, they needed to score at least 90% inter-observer agreement (IOA) during mock scenarios.

Inter-Observer Agreement

IOA data were taken during 35% of trial-based FA sessions. The IOA during the trial-based FA was 100%. For Child 1, IOA was collected on 30% of the trials during the attention condition, 40% of the trials during the demand condition and 30% of the trials during the tangible condition. For Child 2, IOA was collected 30% of the trials across all conditions. For Child 3, IOA was collected on 40% of the trials during the attention condition and on 50% of the trials during the demand condition. This was calculated with the trial-by-trial method (Cooper et al., 2007), which consisted of dividing the number of trials with which both observers recorded the same outcome for the trial by the total number of trials and multiplying that score by 100% to obtain an inter-observer agreement percentage.

IOA was taken during 28% of sessions during the function-based intervention. IOA during the function-based intervention was an average of 93% ranging between 83% and 100%. For Child 1, IOA was collected on 26% of sessions. For Child 2, IOA was collected on 29% of sessions. For Child 3, IOA was collected on 28% of sessions. IOA was calculated using percentage of intervals. Each 5-min function-based intervention session, when IOA was being recorded, was broken down into five 1-min intervals. The number of intervals in which both observers recorded the same behavior was divided by the total number of intervals in a session and multiplied by 100% to obtain the percentage agreement.

Treatment Integrity

To ensure correct implementation of the trial-based FA procedures, the data collectors and researcher viewed and practiced trial-based sessions with colleagues. An independent observer who was trained by the researcher recorded data during at least 25% of sessions across all conditions to determine if problem behavior during the trial-based FA resulted in the discontinuation of the segment, if the segment was supposed to be discontinued according to control and test conditions. Treatment integrity data were taken for 30% of all conditions for each student during the trial-based FA. Trial-based FA treatment integrity ranged between 88% and 100%, with an average score of 92%. Treatment integrity for the function-based intervention was measured to observe whether or not the alternate behavior produced a break or attention for the student. Another aspect measured was that if the problem behavior occurred, the researcher placed it on extinction by not ceasing demands or providing attention (depending on the function of the problem behavior). Treatment integrity data were taken during 26% of the function-based intervention sessions. Function-based intervention treatment integrity ranged between 93% and 100%, and the average score was 96%. Treatment integrity was found by dividing the number of attempts in which the researcher was correct in execution of a break/attention and of extinction by all attempts.

Design

A multi-element design was used during the trial-based FA. The children were exposed separately to different test and control conditions to explore which condition would result in the highest level of problem behavior for each child. After all conditions

were completed, data was graphed separately for each child to examine the results of the trial-based FA.

A multiple baseline across participants design was used to determine the efficacy of the function-based intervention based on information gained from the trial-based FA. The children were all in baseline conditions with no intervention until a steady baseline was established for the first child. After the baseline was steady, the intervention was applied to one of the children while the other children stayed under baseline conditions. Once a steady rate of behavior had been observed for the first child in the intervention phase, the intervention phase began on the second child. This continued until all children reached steady responding in the intervention phase.

RESULTS

Figure 1 shows the results of the trial-based FA for each of the children. For each child, the researcher consulted with classroom staff as well as other professionals in the field to determine the function of the behavior that would be used for the function-based intervention in phase two.

The problem behavior targeted for Child 1 was aggression. Child 1 engaged in the most problem behavior during test segment of the demand trials. Problem behavior was recorded during the test segment for 70 percent of the demand trials and during the test segment during 30 percent of the attention trials. The test segment during tangible trials only yielded problem behavior during 10 percent of the trials. No behavior was recorded for Child 1 during any of the control segments of the trials. Given that more problem behavior occurred in the test segment of the demand trials compared to the control segment (or any other trial types), we concluded that problem behavior was maintained by escape from demands. Researchers were aware that problem behavior occurred in more than the escape function, however chose to function on only one function at a time to verify results during a function-based intervention.

The problem behavior targeted for Child 2 was tantrumming. Child 2 engaged in the most problem behavior during the test segment of the demand trials. Tantrums were recorded during the test segment for 60 percent of demand trials. During ten percent of the test segments of the attention trials, Child 2 engaged in tantrumming. No tantrums were recorded during ignore trials. No tantrums occurred during the control segments of attention or demand trials. Because tantrumming occurred during the test segment for

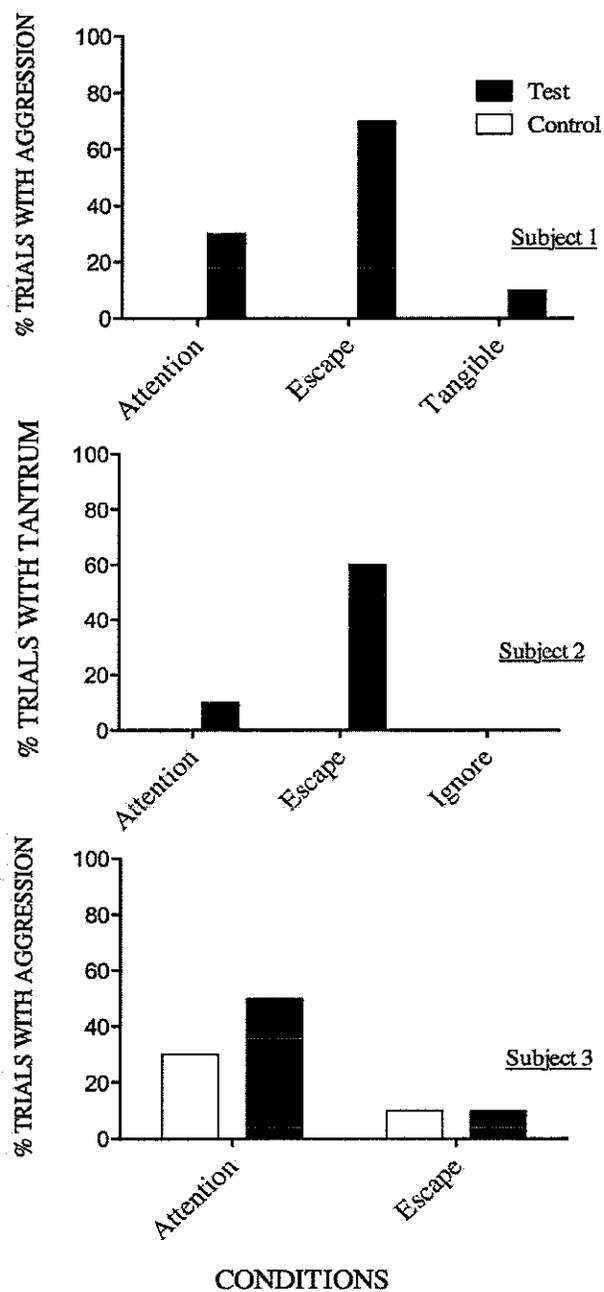


Figure 1. Percentage of trials with aggression and tantrums. Top panel shows the percentage of aggression during control and test conditions of trial-based FA for Child 1. Middle panel shows the percentage of tantrums for Child 2 during control and test conditions of the trial-based FA. Bottom panel shows the percentage of aggression during control and test conditions of the trial-based FA for Child 3.

escape more than the control segment (and more than other conditions), we determined that the problem behavior was maintained by escape from demands.

Aggression was the problem behavior targeted for Child 3. Child 3 engaged in the most problem behavior during the test segment of the attention trials. Child 3 exhibited aggression during 30 percent of control segments and 50 percent of test segments during the attention trials. Aggression occurred in 10 percent of both control and test segments of demand trials. Given that more aggression occurred during the test segment of attention trials than during the control segment, or either segment of the demand trials, we concluded that problem behavior was being maintained by attention. Although problem behavior occurred in the control segment of the attention trials, we still accept these results because this could be due in part to a small number of trials, or due to the child wanting to receive more or different attention than was occurring during the control segment.

Figure 2 shows the problem behaviors for each child during baseline and intervention sessions during the function-based intervention. All children showed a decrease in problem behavior following implementation of the function-based intervention confirming that a function-based intervention, developed with results obtained from a trial-based FA, which was conducted by teachers in the child's classroom setting, is an effective strategy to use with preschoolers. This also provides evidence that the trial-based FA successfully determined the function of a problem behavior in children between the ages of 3 and 4.

In baseline sessions, Child 1 had six to seven instances of aggression and zero instances of independently asking for a break during the five min sessions. Once the

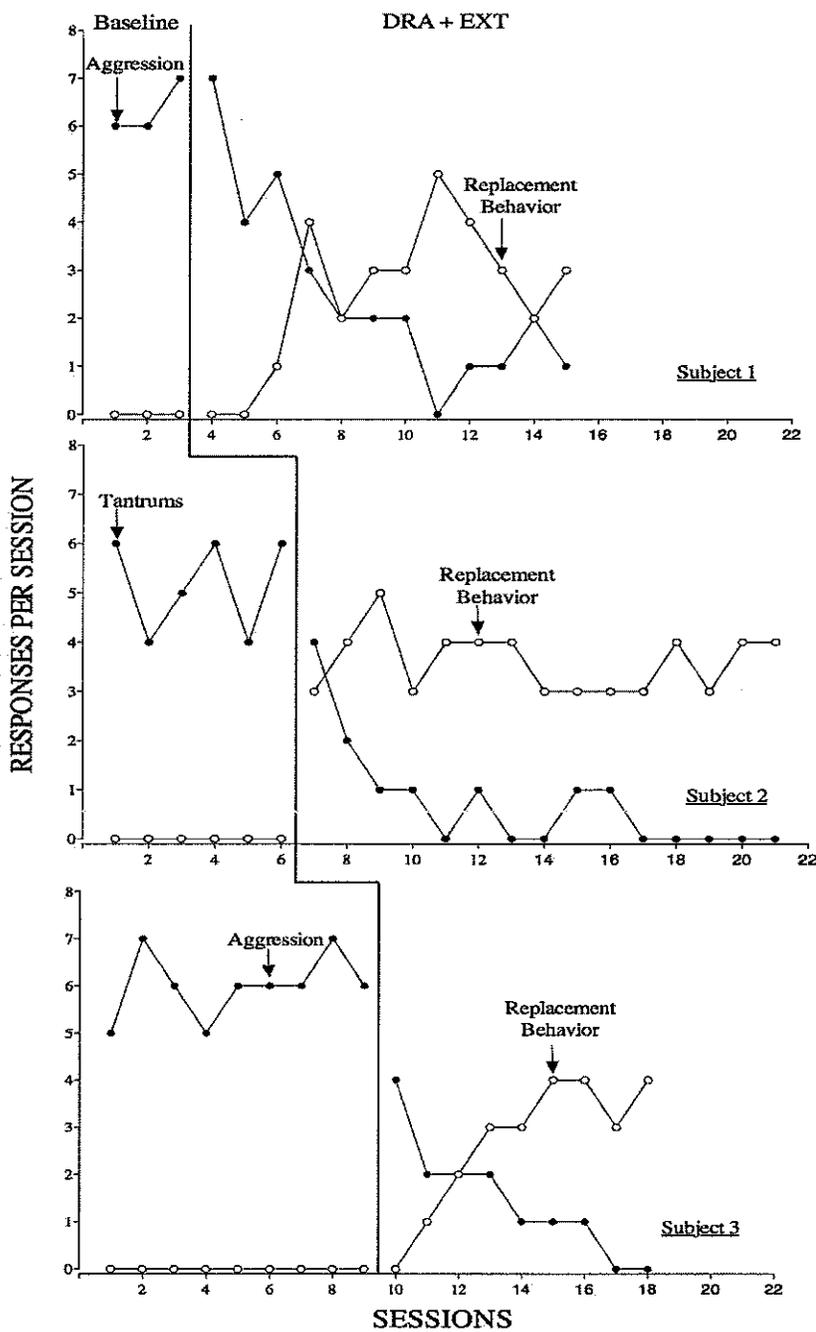


Figure 2. Multiple Baseline Design showing the frequency of occurrence of targeted problem behavior and replacement behavior, when used independently, during baseline and function-based intervention for all children.

intervention was implemented, aggression decreased rapidly and instances of independently asking for a break increased. The intervention stabilized at between zero and two instances of aggression per five min session and between two and five instances of independently asking for a break per session. Child 1 left school early due to an injury (unrelated to participation in the study) and therefore was unable to complete the study, however, data had shown a trend in the reduction of aggression up until that point. During baseline, Child 2 displayed between four and six instances of tantrumming during the five min session when presented with a task, and made zero attempts to independently ask for a break. During the implementation of the function-based intervention, Child 2 reduced instances of tantrums to zero and increased the occurrences of independently asking for a break between 3 and 4 per 5-min session. Child 3 engaged in between five and seven instances of aggression per 5-min session during baseline and zero instances of requesting attention from data collectors. During intervention, aggression dropped to between zero and one instances per 5-min session, with between three and four self initiated requests for high five.

DISCUSSION

This study demonstrated the efficacy of trial-based FA to establish the function of a behavior with preschool aged students when performed in an early childhood setting by classroom special education personnel. This study also suggests that function-based interventions are successful with early childhood students when completed by classroom teachers. In view of this evidence, early education professionals may be able to benefit from this more “teacher-friendly” assessment method, in comparison to a traditional FA.

Teachers may be able to gain pertinent knowledge about student behaviors without the need for school psychologists or district behavior specialists who could interrupt child class time. Utilizing a trial-based FA in the class may diminish the time that the targeted student is outside of the classroom potentially ensuring that he/she is present for more instructional time. Because a trial-based FA suggests a reduction in assessment time, the teacher may be able to implement an intervention more swiftly and the problem behavior may be addressed sooner. Decreasing the amount of time that the problem behavior occurs may be beneficial to the entire class. Eliminating the problem behavior may decrease interruption of instruction time and enable the teacher to assist all students. Therefore this method of discovering the function of behavior is possibly beneficial to both students exhibiting problem behaviors and their classmates.

The children in this study were between 3 and 4 years of age and different results may have been obtained with older individuals. Children in this study did not have fully developed speech repertoires and therefore a PECS system was used to ensure that a child could gain access to their functional reinforcer without relying entirely on vocalizations. If this study were conducted with children with more advanced speech function, it may

still be a good practice to have a PECS card or other picture to serve as a visual cue to remind the child of options available. Because a picture/symbol is continuously present, unlike a vocal reminder, the student is always in the presence of the discriminative stimulus for the availability of reinforcement for the replacement behavior. Although it may be beneficial to fade any type of prompt, it may be more beneficial to the class to fade out vocal prompting first, so that the teacher is not interrupting teaching time while advising students on behaviors. A picture/symbol on the wall can be pointed to by a teacher without having to stop instruction, but will still remind the student of the availability of reinforcement for the replacement behavior.

During the trial-based FA, Child 3 exhibited relatively high levels of aggression during the attention condition, compared to behaviors in escape condition, in both the test and control segments of the trials. While it is possible that another motivating operation was in place, results from the function-based intervention suggest that attention was the function of Child 3's behaviors. It may also be possible that during control segments Child 3 engaged in aggression in order to maintain the attention that he was receiving. These results suggest that it may be possible to choose a function of behavior based on results that seem to have multiple functions or behavior during both control and test segments. Because this study conducted 10 trials of each condition chosen for the child, results may have changed if a child was exposed to more of each assessment condition.

The children in this study were part of a self-contained special education class that has integration time into regular education classrooms where the teacher to student ratio is much higher. During the weeks when trial-based FA was being conducted, it was interesting to note that when students entered the regular education classroom with other

peers, they had less problem behavior, regardless of the student to teacher ratio. The children had to abide by a similar schedule and rules that were found in their primary classroom. Most demands were given classroom wide first, then a one-on-one prompt was given if needed. This is the same prompting sequence as their primary class.

Because there are no regular education students in the primary class, it is possible that the students, when given the opportunity to integrate with regular education peers, used these children as models. There were no children exhibiting aggression or tantrums in this general education class, so they may have attempted to imitate other behaviors seen throughout their time in this classroom. This environment was not new, as integration had occurred throughout the child's school year. In terms of attention in the regular education classroom, it may be possible that the child gained attention through peers in the regular education setting without needing to use aggression, thereby reducing the motivation for problem behavior in this environment. Although it did not impact the results of this study because experimental trial-based FA sessions did not happen in the regular education class, the lower rates of problem behavior in the general education classroom were of interest. Whether the effect was due to peer models or other factors is unknown, but future researchers may wish to examine the influence of peer models or other features of the general education setting on problem behavior.

It is interesting to note that Child 2 was moved into a general education preschool classroom at the beginning of the next school year. The classroom has an average of 17 children per day with 5 kids per day receiving special education services. Child 2 has had one tantrum since moving to the regular education classroom. This implies that

children may exhibit fewer behaviors when given access to regular education peers in order to model appropriate behaviors.

The trial-based functional analysis was completed in less than two and a half hours for Child 1 and Child 2, and roughly one and a half hours for Child 3, over a period of approximately two weeks. By ensuring that all classroom personnel were aware of the circumstances of the analysis, no trials needed to be re-run, in contrast to the Bloom et al. (2011) study wherein many trials needed to be repeated due to staff interference. Running only one control and one test segment, instead of two control and one test segments, and running 10 trials instead of 20 of each type also helped reduce assessment time substantially as compared to the Bloom et al. study.

Further research may include using children representing other age or demographic groups and using familiar staff to implement analyses, especially including both regular education and special education teachers. The researcher in this study was a special education teacher within the school in which this study was conducted. Researchers should note that if the procedure is planned to occur in classrooms, then the procedure should be able to be implemented by the staff that currently works in those conditions in order to bridge the gap between research and practice.

If the classroom staff will be implementing trial-based FA's and function-based interventions it will be important to find what type of training those teachers will need before implementation. The time it takes to train a teacher in these methods was small in this study, but may be seen by teachers as one more thing on their plate. In this case, the thought of conducting the actual trial-based FA or function-based intervention may be overwhelming as well. It would be interesting to conduct a survey of what teachers

thought of these methods and if they would use these methods if they had received training on them. It would also be interesting to see if teachers who had been given the training were using it in their classrooms on a regular basis within the next few months or even the next school year.

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APPENDIX

Preference-Assessment Data Sheet

Participant #:

Target Behavior:

Date:

Time:

Primary Data Collector:

Reliability Data Collector:

Materials:

1.	Selected	/	=	*100=	%
2.	Selected	/	=	*100=	%
3.	Selected	/	=	*100=	%
4.	Selected	/	=	*100=	%
5.	Selected	/	=	*100=	%
6.	Selected	/	=	*100=	%
7.	Selected	/	=	*100=	%

Trials ⇒ Selections ↓	1	2	3
1.			
2.			
3.			
4.			
5.			
6.			
7.			

Use the 2 materials with the highest percentages in the tangible trials (if used):

Use 2 materials with moderate percentages in the attention trials.
