

SCHOOL PERSONNEL ESTABLISHING FUNCTIONAL COMMUNICATION TRAINING
BASED ON A FUNCTIONAL ANALYSIS WITH AUTISTIC STUDENTS IN A PUBLIC
SCHOOL SETTING TO REDUCE PROBLEM BEHAVIORS

A Dissertation

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ABSTRACT

School Personnel Establishing Functional Communication Training Based On A Functional Analysis With Autistic Students In A Public School Setting To Reduce Problem Behaviors

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Autism is subset of the special education population that seems to be growing at an alarming rate. According to the American Psychiatric Association (2000), one of the three main deficits found in someone diagnosed with autism is a “qualitative impairment in communication”. However, language skills are very difficult for autistic children to learn and are often associated with disruptive behaviors. Research has shown a strong correlation between problem behaviors and difficulties with communication. This study uses techniques (i.e. functional analysis and functional assessment) to determine the function of these problem behaviors and their communicative intent. This study also demonstrates that an experimental approach such as a functional analysis can be done in a public school setting by public school personnel. Once the function is determined, treatments incorporating Functional Communication Training (FCT) can be applied to reduce these problem behaviors while increasing communication. Research has shown that FCT that replaces each function of a problem behavior will reduce problem behaviors in autistic children. Therefore, functional analysis results allow for the reduction of problem behaviors while identifying optimal situations/settings to teach language.

Three male autistic students, attending a public school, were involved in the study. All subjects exhibited one or more problem behaviors that interfered with their everyday functioning at school. Initially, functional assessment data were collected via a descriptive analysis using Antecedent-Behavior-Consequence (A-B-C) data. The A-B-C data were taken throughout each subject's school day in various environments. The data for each subject were graphed and analyzed by a school psychologist. Based on the results, the school psychologist developed a hypothesis for each subject regarding the function of his problem behavior. Subjects were exposed to various functional analysis conditions using a single subject multielement manipulation design based on the A-B-C data. These functional analysis sessions were conducted in each student's current public school placement. Functional analysis conditions were implemented until stable levels of problem behaviors were obtained or a clear pattern provided evidence as to the function of the problem behavior. Data from all sessions were graphed in a multiple baseline across subjects and visually assessed. Based on the data from the functional analysis, the function of the student's problem behavior was hypothesized. The experimenter, who was also a school psychologist, designed and implemented a function based treatment package to successfully reduce each student's problem behaviors. The treatment for each subject was individually designed based on that subject's functional analysis. Each treatment also incorporated a FCT component. As a result, problem behaviors were successfully reduced for each subject using functional assessment methodology by a school psychologist in a public school setting.

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CHAPTER 1

INTRODUCTION

Context

This study used the strategies incorporated in functional analysis and Functional Communication Training (FCT) to reduce problem behaviors with students diagnosed with autism in a public school setting. Specifically, this investigation used functional analysis methodology and a single subject research design in a public school setting to assess the function of an individual student's problem behavior. Research has shown a strong correlation between problem behaviors and difficulties with communication (Durand, 1990). By knowing the function of a behavior, it was possible to determine the communicative intent of the behavior (Carr & Durand, 1985a; Durand, 1993). In this study, when the functional analysis indicated communicative intent, an intervention incorporating FCT was implemented. Through FCT, the student learned to appropriately communicate his or her needs while reducing his or her problem behaviors. Since the functional analysis provided evidence regarding the student's high motivation to communicate in order to access reinforcement in a specific condition, that condition provided an ideal situation to improve his or her communication (Durand & Kishi, 1987).

This study targeted students with autism as it is an ever growing subset of the population of special education in public schools. However, it was first necessary to be familiar with the diagnosis of autism. According to the American Psychiatric Association (2000), there were three main criteria to consider when diagnosing someone with autism. First the person must have a "qualitative impairment in social interaction". Secondly, they must display "restricted repetitive and stereotyped patterns of behavior, interests, and activities". This study addressed the third and

final criterion, which was a “qualitative impairment in communication as manifested by at least one of the following”.

- A. Delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime)
- B. In individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others
- C. Stereotyped and repetitive use of language, or idiosyncratic language
- D. Lack of varied, spontaneous make-believe, or social imitative play appropriate to developmental level

Language skills are very difficult for autistic children to learn (Carr, 1982; Carr & Durand, 1985a; Charlop & Milstein, 1989; Garfin & Lord, 1986; Koegel & Traphagen 1982; Lovass, 1977; Shah & Wing, 1986) and are often associated with disruptive behaviors (Koegel, Koegel, & Surratt, 1992). In fact, most non-verbal or language delayed children have some type of a behavior problem (Carbone, 2003a). One example would be disruptive behaviors that are often exhibited by students with autism in order to escape something (Carr & Durand, 1985a; Carr, Newsom & Binkoff, 1976; Koegel *et al.*, 1992).

To compound the situation, these problem behaviors often limit the child’s ability to benefit educationally in a public school setting. Due to these problem behaviors, the act of teaching language to autistic students is often challenging (Durand, 1990). For example, research has shown that school personnel are often less likely to attempt mainstreaming with non-disabled peers when the student with the disability also exhibits problem behaviors (Arceneaux & Murdock, 1997). Problem behaviors also take time away from the student’s overall access to teaching and

thus from learning. At times, these behaviors become so severe that they may necessitate an out of district educational placement or even residential placement. Some problem behaviors are tolerable or manageable when students are young and small. However, as the student grows, the same behaviors may be considered inappropriate or even dangerous.

There are various treatments discussed throughout the literature to reduce problem behaviors. However, some studies do not analyze the variables responsible for the behavior (Mace, Lalli, Lalli & Shea, 1993). Instead, behavior plans are based on strategies that have been successful in the past to reduce a similar type of problem behavior (Crone & Horner, 1999). This can be a potentially dangerous pattern. Research has demonstrated that if treatments are not based on the specific variables controlling the problem behavior, interventions can have no effect or even worsen that behavior (Ervin, Ehrardt & Poling, 2001).

Therefore, when working with autistic students, educators are often faced with two main challenges. The first is to teach communication, while the second is to eliminate any problem behaviors that the student may have developed. There are some researchers who have marketed techniques to teach communication to students with autism while incorporating methodology for reducing problem behaviors. One such technique is often referred to in the field as verbal behavior. This technique stems from Skinner's use of the term "verbal behavior", which he used to describe any type of communication (1957). Researchers such as Sundberg and Partington (1990, 1991, 1993, 1996, 1998, 2000, 2001, & 2002) have applied some of Skinner's analysis of verbal behavior to create methodologies based on applied behavior analysis to teach communication.

Current verbal behavior proponents acknowledge that when working with most non-vocal or language delayed children, it is essential to address their behavior problems (Carbone, 2003a).

Carbone (2003b) documents specific techniques based on skinner's analysis of verbal behavior. He stipulates that these techniques should be based on the function of the student's problem behavior. Carbone (2003b) advocates treatments such as "Walk and Peel" and "Count and Mand" if the function is tangible. However, it is unclear how the function of the behavior is determined before implementing such techniques.

"All functional approaches to assessment involve identifying functional relationships" (Cone, 1997). However, the literature is not always consistent on the terminology. The term 'function' is used throughout the literature when discussing the reduction of problem behaviors. Hanley *et al.* (2003) reviewed the literature and reported the word 'function' is used in two main ways. Function may describe the "effect that a behavior has on the environment" or the "purpose the behavior serves for an individual". The second use of the word function conveys a "relationship between two variables in which one varies given the presence of absence of the other". Hanley *et al.* (2003) states that both definitions relate to a functional analysis. However, the literature is also not always consistent on the distinctions between a functional analysis and a functional assessment.

Some researchers describe three categories within a functional assessment for identifying behavior functions: (a) indirect assessment, (b) descriptive analysis, and (c) functional analysis (Iwata, et al., 1993). Other researchers such as Carr *et al.* (1994) describe functional assessments as involving the following three stages: (a) description, (b) hypothesis forming, and (c) verification. Yet, other researchers divide functional assessment methods into the following three categories: (a) informant assessments, (b) direct observations, and (c) functional or experimental analysis (Crawford, Brockel, Schauss, & Miltenberger, 1992). Cone (1997) clarifies the distinction between functional assessments and functional analysis. Functional assessments

“involve activities in describing and formulating hypotheses about potentially controlling variables” (Cone, 1997). Functional analyses involve “testing or verifying those hypotheses via the systematic manipulation of environmental events” (Cone, 1997). According to Cone (1997), the functional analysis includes the activities in the functional assessment. However, functional assessments that do not include systematic manipulation do not include a functional analysis (Cone, 1997). For the purpose of this paper, the distinction made in Cone (1997) will be used documenting a functional analysis (systematic manipulation) as a suggested but not necessary subset within a functional assessment.

When the function of a behavior is known, it is possible to create a functional match between the behavior and treatment (Iwata, Vollmer, Zarcone, & Rodgers, 1993; Pelios, Morren, Tesch, & Axelrod, 1999). Therefore, functional assessments help determine what treatments will be effective before they are even implemented (Iwata, *et al.*, 1993). Many studies have shown that functional assessment results have been used to design successful interventions to reduce problem behaviors (Day, Rea, Schussler, Larsen, & Johnson, 1988; Hanley, Iwata, & McCord, 2003; Pelios, *et al.*, 1999). Specific techniques to determine the function of a problem behavior may include descriptive analysis (Iwata *et al.*, 1993) such as Antecedent-Behavior-Consequence (ABC) data and scatter plots (Durand, 1990; Touchette, MacDonald, & Langer, 1985) or indirect methods like questionnaires (Cone, 1997; Durand & Crimmins, 1988; Iwata *et al.*, 1993) and interviews (Durand, 1990). Staff may also take a more experimental approach such as a functional analysis (Iwata *et al.*, 1993).

Some researchers such as Iwata *et al.* (1993) believe a functional analysis is the optimal method to identify a functional relationship. Some researchers believe the true function of behavior can only be identified via a functional analysis (Northup *et al.*, 1991). In his study,

Northup *et al.* (1991) demonstrated that the true functions demonstrated by the functional analysis were not predictable based on any other method of data collection or assessment. The advantage of the functional analysis over a functional assessment is based on the concept that the results from a functional analysis are causal while the results from a functional assessment are correlational with poor internal validity (Iwata *et al.* 1993).

If a functional analysis yields the most accurate findings regarding the function of a student's problem behavior, one may assume that they would be commonly conducted in school settings. However, this is not the case. A literature review by Hanley *et al.* (2003) indicates the breakdown of where functional analyses are most often conducted. According to that review, 32.5% are conducted in hospital (inpatient) facilities, 31.4% are done in schools, and 25.3% are done in institutions, while an additional 17.4% are done in other settings.

Statement of Purpose

The Individuals with Disabilities Education Act (IDEA) (1997, 2004) stipulates the need for a Functional Behavioral Assessment (FBA) as part of the federal special education law. However, the law does not specify how to conduct the assessment (Ervin, *et al.*, 2001). Some researchers have pointed out that since the applied behavior analytic field has not agreed on the optimal procedure for conducting a functional assessment, it will be difficult to establish guidelines for them to be done in schools (Cone, 1997; Ervin, *et al.*, 2001). The U.S. Department of Education describes FBA as a systematic process for describing problem behavior and identifying the environmental factors and surrounding events. Based on this federal law, functional assessments should be occurring frequently in public school settings.

There have been many studies demonstrating the effective use of functional assessment methodologies in public school settings (Ellingson, Miltenberger, Stricker, Galensky &

Garlinghouse, 2000; Ervin, Radford, Bertsch, Piper, Ehrhardt, & Poling, 2001; Radford & Ervin, 2002). However, most studies using direct methods with observations and recording of antecedents and consequences have been done by researchers and not by teachers, teaching assistants, or other school personnel (Ellingson, *et al.*, 2000). In fact, in a literature review of 148 studies that conducting functional assessment's in a school setting; only 21.2% were done by school personnel alone (Ervin, *et al.*, 2001). According to that study, 13.7% were done by an experimenter in conjunction with school personnel, while 51.8% were done solely by an experimenter without any involvement of school personnel. Furthermore, it is unclear how many of the functional assessment's mentioned in the literature review incorporated a functional analysis component to experimentally validate the function of the problem behavior (Ervin, *et al.*, 2001).

There have been a small number of studies that demonstrated the ability to teach various school personnel how to go beyond a functional assessment to conduct a functional analysis. One study by Wallace, Doney, Mintz-Resudek, and Tarbox (2004) successfully taught a school psychologist how to conduct a functional analysis using a small group workshop. Another study by Moore (2002) successfully taught teachers to conduct a functional analysis (demand and attention conditions) following extensive training involving reading materials, video demonstrations, written assessments, and feedback. These studies suggest that school personnel are able to learn the skills to conduct an experimental functional analysis in a school setting with training. However, critics of these studies point out that the experimenters did not train all of the components of conducting a functional analysis. Specifically, the trainees in those studies were not taught essential skills such as data analysis and interpretation, as well as the ability to develop interventions based on the results of the functional analysis (Wallace, *et al.*, 2004).

Another survey study demonstrated that the majority of school staff who were directly responsible for the assessment and treatment of problem behaviors claimed to know the importance of conducting a functional assessment (Ellingson, Miltenberger, & Long, 1999). Yet, only 64% of those staff correctly identified information that could be obtained via a good functional assessment (Ellingson, *et al.*, 1999). In fact, 28% of the respondents provided information that was actually inconsistent with descriptions of functional assessment information (Ellingson *et al.*, 1999).

If a functional analysis is successfully implemented in a school setting by school personnel, information will be available to design a function based treatment. In the present study, a functional analysis will be used to determine the function of problem behaviors exhibited by students diagnosed with autism. As stated earlier in this paper, students diagnosed with autism exhibit problem behaviors to a large extent because they do not possess the ability to appropriately express their wants and needs to access reinforcement (Carr & Durand, 1985a). Since the student exhibited problem behaviors to access reinforcement, the experimenter can hypothesize that the subject's motivation to obtain that reinforcement is high. Therefore, a treatment can be developed for the student to learn an appropriate way to access the same reinforcement that he or she previously received contingent on the problem behavior. Interventions incorporating FCT, designed to address the individual student's specific desire to access reinforcement, should reduce his or her problem behaviors. It is essential to ensure that the communicative response being taught is functionally equivalent to the communicative intent of the subject's problem behaviors. In other words, FCT procedures require a functional analysis of the problem behavior to ensure that the response is functionally equivalent to the communicative intent of the person (O'Neill & Sweetland-Baker, 2001). Research has shown that FCT that replaces each function of a problem

behavior will reduce problem behaviors in autistic children (Sigafoos & Meikle, 1996). Based on the results of the functional analysis, FCT can teach students to communicate appropriately in situations that previously evoked problem behaviors rather than engaging in problem behaviors to access the same reinforcement. Therefore, functional analysis results allow for the reduction of problem behaviors while identifying optimal situations/settings to teach language.

Hypotheses

This study will be based on the following hypotheses:

Hypothesis 1

A functional analysis can be reliably conducted in a public school setting by school personnel to provide information about the function of an autistic student's problem behavior.

Hypothesis 2

Based on the results of a functional analysis, a function based treatment package, incorporating FCT, can be designed and implemented by school personnel in a public school setting to successfully reduce a student's problem behaviors.

Significance of the Study

There are several differences between this and other similar studies. One main distinction is the use of the population of autism exclusively. Other differences include the public school setting as well as the involvement of school district personnel only. The present study will use only public school personnel that are available in all public school districts. The results of the functional analysis will lead to a function based intervention incorporating FCT. Although there is a lot of research on reducing problem behaviors through functional analysis, most research has not been done in a public school setting by school personnel without the help of outside support. Furthermore, most existing studies do not include a full functional analysis involving data

collection, data analysis, as well as designing and implementing successful interventions.

Researchers have stated that functional analyses are difficult to implement in public schools due to the lack of trained school personnel and lack of additional necessary resources (e.g. space and extra personnel) (Ervin *et al.*, 2001). Additionally, researchers state that because functional analysis sessions are usually conducted several times a day, they may deprive students of access to an appropriate learning environment (Ervin *et al.*, 2001). Yet, other researchers such as Northup *et al.* (1991) demonstrated the ability to conduct a functional analysis yielding a clear function in a 90 minute time frame.

Furthermore, when research articles address problem behaviors while teaching communication to autistic students, they often fail to delve into the importance of determining the function of the problem behavior. The results of the functional analysis will reveal situations in which the autistic student is highly motivated to access some type of reinforcement. Therefore, these situations provide ideal teaching opportunities. This study will address using those opportunities to teach communication while reducing problem behaviors.

Definitions

Analogue functional analysis manipulates various antecedents and consequences that are presumed important and observes their effects on the problem behavior (Durand, 1990).

Descriptive analysis examines behavior directly under natural conditions to provide information to help form a hypothesis as to the function (Bijou, Peterson, & Ault, 1968; Bijou, Peterson, Harris, Allen, & Johnson, 1969; Kohler & Greenwood, 1969).

Discriminative Stimulus (S^D) is an antecedent that serves as a cue for occasioning a response, resulting in reinforcement (Alberto & Troutman, 1999).

Establishing operation (EO) “is an environmental event, operation, or stimulus condition that affects an organism by momentarily altering: (a) the reinforcing effectiveness of other events (reinforcer establishing) and (b) the frequency of occurrence of that part of the organism’s repertoire relevant to those events as consequences (evocative)” (Michael, 1993). EO’s describe a class of antecedent events that alters the effectiveness of reinforcement and changes the frequency of behaviors that provide reinforcement (Michael, 1982).

There are two types of EO’s: Unconditioned EO (UEO) and Conditioned EO (CEO)

Unconditioned EO (UEO)-unlearned reinforcer (Michael, 1988)

Conditioned EO (CEO)-effects of reinforcer are already established/learned (Michael, 1988) so they are based on the individuals history (Michael, 1993)

Extinction pertains to eliminating the reinforcement for an undesirable behavior (Iwata, *et al.*, 1993).

Functional Analysis involves direct observation and measurement of problem behavior under test and control conditions in which some environmental variable is manipulated (Hanley, Iwata, & McCord, 2003). It often tests or verifies hypothesis generated by the functional assessment via the systematic manipulation of environmental events (Cone, 1997).

Functional Assessment is a process of gathering information to develop hypothesis about causal relationships (Cone, 1997). It includes “activities involved in describing and formulating hypotheses about potentially controlling variables” (Cone, 1997). Ervin *et al.* (2001) states that functional assessments relate external conditions to specific behaviors so those behaviors can be predicted and controlled. The results reveal antecedent variables and consequences that control the behavior, which provide information to develop interventions to change the behavior (Ervin, *et al.*, 2001).

Functional Communication Training involves identifying the function of a problem behavior and teaching an alternative communicative response to produce the same outcome of that problem behavior (Carr & Durand, 1985a; Carr *et al.*, 1994; Durand, 1990; Sigafoos & Meikle, 1996)

Functional equivalence occurs when “two or more response classes are maintained by the same reinforcer class (Carr, 1988).

Functional match is the term used to emphasize that interventions are more effective when matched to individual’s target behavior in its environmental context. Ideally, treatments should be based upon at least a hypothesis regarding the function of a student’s problem behaviors (Repp, Felce, Barton, 1988).

Generalization is the occurrence of a behavior in a non-training condition (e.g. across subjects, settings, people, behaviors, and/or time) (Stokes & Baer, 1977).

Mand is “a verbal operant in which the response is reinforced by a characteristic consequence” (Skinner, 1957). Mands require motivation on the part of the speaker that evokes a behavior that is followed by a consequence delivered by a listener that is directly related to the motivation (Sundberg, 2005).

Maintenance means the “initial intervention effects are durable” (Carr *et al.*, 1994)

Punishment is the contingent presentation of a stimulus immediately following a response, which decreases the future rate and/or probability of that response (Alberto & Troutman, 1999). Removing reinforcers or providing aversive consequences contingent on a behavior to override the benefits achieved through that behavior (Axelrod, 1987).

Reinforcement is a consequent stimulus that increases or maintains the future rate and/or probability of occurrence of a behavior (Alberto & Troutman, 1999).

Response Class encompasses two or more topographically different behaviors, which all have the same effect on the environment (Carr, 1988).

Response Generalization is a change that occurs in one class of responses (R1) when another class of responses (R2) is manipulated (Carr, 1988).

Scatter plots provide general information about the distribution of behaviors across time (Durand, 1990; Touchette, *et al.*, 1985).

Sensory or perceptual reinforcement are primary reinforcers that are not based on prior conditioning, but on the stimulation in the central nervous system (Lovaas, Newsom, & Hickman, 1987).

Tact refers to naming or identifying objects, actions, events, relations, properties, etc. (e.g. tendency to say candy when you see candy) (Sundberg, 2005).

Verbal behavior refers to behavior that is reinforced through the mediation of another persons' behavior (Skinner, 1957).

CHAPTER 2

REVIEW OF SELECTED LITERATURE

Problem Behaviors

Problem Behaviors as Communication Acts

There are two basic functional classes that all problem behaviors fall into: positive and negative reinforcement (Iwata, *et al.*, 1993). Positive reinforcement means that something is given while negative reinforcement means something is removed or taken away. If a problem behavior results in attention, which in turns reinforces the behavior, the attention is a form of positive reinforcement, making it a social contingency (Mace *et al.*, 1986). If a problem behavior results in the removal of something aversive, it is a socially mediated negative reinforcer (Iwata *et al.*, 1993). There are also two ways for this reinforcement to take place. Reinforcement can be socially mediated or automatic (Iwata, *et al.*, 1993). Skinner (1969) coined the term automatic reinforcement, which occurs when behaviors are reinforced by the stimulation they produce making them independent of the action of others. They are often referred to as stereotypic, mannerisms, or self-stimulation (Iwata, *et al.*, 1993). Other varieties of automatic reinforcers include primary reinforcers (e.g. food) or perceptual reinforcement (Lovaas *et al.*, 1987).

Within the developmental disability and psychiatric population, there is an inverse relationship between level of communicative skill and frequency of problem behaviors (Carr & Durand, 1985a; Foxx & Livesay, 1984; Shodell & Reiter, 1968; Talkington, Hall, & Altman, 1971). The Communication Hypothesis states that behavior problems may function like non-vocal communicative acts to request (i.e. mand) specific reinforcers that are socially mediated (Carr, 1985; Carr & Durand, 1985a; Donnellan, Mirenda, Mesaros, & Fassbender, 1984; Sigafos & Meikle, 1996). According to the communication hypothesis, all aggressive behaviors have a

common “demand characteristic” because they require a reaction from the environment and the consequences are often reinforcing (Patterson, Littman, & Bricker, 1967). Therefore, the focus of the intervention becomes the differential reinforcement of alternative behavior (DRA) using the original consequence as reinforcement (Iwata *et al.*, 1993). Examples of this would be teaching a child who is seeking attention to say, “I want attention”, “Am I doing good work” or “I need help”.

Iwata *et al.* (1993) notes the benefits of using this model over previous models because it does address using the function of a specific person’s problem behaviors when establishing an intervention. However, Iwata *et al.* (1993) also identifies limitations to the communication model. One criticism is the fact that the model describes the cause of behavior as a mental process (i.e. requiring intention) within a subject rather than the result of an environmental contingency (Iwata *et al.*, 1993). This description of behavior does not take into account automatically reinforced behaviors that serve no communication function nor require a reaction from the environment (Iwata *et al.*, 1993). In other words, it does not account for other reinforcement contingencies that are independent of the environment (Iwata *et al.*, 1993).

Iwata *et al.* (1993) also believes that one of the model’s strength is also a weakness. The model focuses on communication training to access reinforcement. However, if all behavior were a result of an inability to communicate, how could that account for other interventions not based on teaching the person to communicate that have been proven to be effective? For instance, by setting up a plan of Differential Reinforcement for Other Behavior (DRO), the person can access the original reinforcement without engaging in a problem behavior. An example would be a child who hits someone to gain attention. In that situation, a DRO plan may provide attention if he or she does not hit someone for ten minutes. As a result, the plan will likely produce a reduction in

the frequency of the child hitting someone. However, the child has not learned how to communicate in any way.

Iwata, *et al.* (1993) also points out that the model does not specifically address extinction or the elimination of the original reinforcing contingency while teaching communication. So, if a child has a long history of being provided attention contingent on hitting someone, it is unlikely that they will completely stop hitting if that behavior continues to provide them with attention. His last criticism is the fact that the model does not teach the subject how to independently control his or her environment (Iwata, *et al.*, 1993). For example, if a child is taught to mand “I am hurt” to seek relief from pain, the communication model includes no provisions to teach the child to learn to relieve his or her own discomfort.

Although Iwata *et al.* (1993) criticizes aspects of the model, there is acknowledgement that the communication model is better than establishing arbitrary interventions because it focuses on the function of the behavior. If someone were to follow the communication model’s theory that problem behaviors are the result of a subject attempting to communicate his or her needs, it would be essential to try to determine what he or she was trying to communicate (Durand, 1993). In other words, the communication model requires an assessment of the specific behavior to determine the function. Although it is possible to eliminate the subject’s problem behaviors via reductive techniques, those techniques would provide the subject no way of communicating his or her wants and needs (Durand, 1993). As a result, the subject will likely engage in other problem behaviors to continue to try to access the original reinforcement (Durand, 1993).

Reducing Problem Behaviors

Behavioral principles are often used to develop treatments to reduce problem behaviors. Behaviorists have developed various treatment strategies to reduce problem behaviors. The

effectiveness of such techniques can vary based on characteristics of the subject or of the treatment. Foxx and Livesay (1984) demonstrated that the characteristics of the subjects impacted the effectiveness of the treatment. Their study indicated that higher functioning individuals who have more expressive language showed the longest and best suppression of problem behaviors, while the lowest functioning individuals evidenced the weakest long term suppression.

An important variable regarding the technique is whether the treatment is reinforcement based or punishment based. Different researchers point out advantages to using both techniques. For example, an advantage of using punishment procedures is that they are often effective with a large number of behaviors and often work quickly, minimizing damage (Axelrod, 1987). Examples of some commonly used punishment treatments include: time-out (Durand & Carr, 1992; Mace, Page, Ivancic & O'Brien, 1986), response cost (Iwata & Bailey, 1974), overcorrection (Foxx. & Livesay, 1984), and extinction (Billingsley & Neel, 1985; Carr & Newsom, 1985; Carr, Newsom, & Binkoff, 1980; Durand *et al.*, 1993; Durand & Carr, 1987; Favell, McGimsey, & Schell, 1982; Fisher *et al.*, 1993; Hagopian, Fisher, Sullivan, Acquisto, & LeBlanc, 1998; Iwata *et al.*, 1993; Iwata, Dorsey, Slifer, Bauman, & Richman, 1994; Lalli, Casey, & Kates, 1995; Lovass, Freitag, Gold, & Kassorla, 1965; Mace *et al.*, 1993; O'Neill, & Sweetland-Baker, 2001; Rincover, 1978; Shirley *et al.*, 1997; Wacker *et al.* 1990). Some examples of reinforcement based behavior techniques that have been demonstrated to be effective to reduce problem behaviors include: errorless teaching (Weeks & Gaylord-Ross, 1981), frequent and immediate reinforcement (Durand, 1993), identifying strong reinforcers (Sundberg, 2005), ecological interventions (Durand, 1983), enriched environment (Horner, 1980; Iwata *et al.*, 1993; Iwata *et al.*, 1994), eliminating the establishing operation/ altering the access of the behavior to reinforcement (Iwata, *et al.*, 1993),

differentially reinforcement procedures (Carr & Durand, 1985b; Durand, & Merges, 2001; Iwata, *et al.*, 1993) and Non-Contingent Reinforcement (NCR) (Iwata, *et al.*, 1993).

Carr *et al.* (1989) reviewed the literature on interventions based on reinforcement while Cataldo (1989) examined the literature that used punishment techniques to reduce problem behaviors. The results of these literature reviews suggested that reinforcement based interventions were less effective than punishment based interventions (Iwata *et al.*, 1993). Although Iwata *et al.* (1993) reported weaknesses with many of the reinforcement studies included in the literature review, he concluded that if both interventions were randomly selected, reinforcement procedures will usually be less effective than punishment procedures. Other researchers believe punishment procedures can be used only as a temporary treatment until alternate effective procedures are available (Axelrod, 1987). Interventions based on hypotheses from the functional assessment usually involve treatments that are positive in nature because they rely on identifying and interrupting reinforcement contingencies that maintain maladaptive patterns (Mace *et al.*, 1993). These interventions often involve identifying and strengthening replacement behaviors. Thus, aversive treatments are often not needed (Mace *et al.*, 1993).

The idea behind most treatments is to minimize the reinforcement contingent on the problem behavior by altering the environment (Mace *et al.*, 1993). Ideally, reinforcement is provided for adaptive behaviors, which will compete with the problem behavior (Mace *et al.*, 1993). In the past, some applied behavior analytic (ABA) researchers have cited a trend in some studies that developed and evaluated interventions without analyzing the responsible variables (Hayes *et al.*, 1980; Mace *et al.*, 1993; Pierce & Epling, 1980). When these treatments were ineffective in those studies, there was not an identified procedure to suggest interventions that would be more effective (Mace *et al.*, 1993). Mace *et al.* (1986) stated that many unsuccessful

attempts to reduce problem behaviors were due to the fact that the specific variables maintaining those behaviors were never identified.

Function based assessment research has shown that different behaviors may be maintained by various functions. In fact, similar behaviors may serve different functions both within and across subjects (Mace *et al.*, 1986). The optimal experimental method to determine the true function of a problem behavior is through a functionally analysis (Iwata, *et al.*, 1993; Northup *et al.*, 1991). If a functional analysis is conducted and the function of the problem behavior is identified, the treatment can be tailored to meet the needs of the child (Pelios, *et al.*, 1999). In fact, the results of a functional analysis should indicate what treatment should work or should not work before they are even implemented (Hanley, *et al.*, 2003).

A literature review done by Pelios *et al.* (1999) indicated that when a treatment was designed without conducting a functional analysis, the experimenter's choice of including a reinforcement based treatment versus a punishment based treatment was about the same. However, when a functional analysis was conducted, the experimenter was more likely to choose a reinforcement based treatment (Pelios, *et al.*, 1999). In other words, when the function of an problem behavior is known, reinforcement procedures can be set up to specifically address that function without the need for any punishment procedures.

A study by Foxx and Livesay (1984) examined the long term outcomes of effective treatments. Foxx and Livesay (1984) reported that punishment procedures (e.g. overcorrection) were hard to maintain due to their complexity, time required to implement the procedure and train staff, the fact that a trained staff must be present, and because of the physically intrusive nature of the procedure. According to Foxx and Livesay (1984), in order to ensure interventions are

maintained, they should be as simple and short as possible, contain a maintenance program, and any overcorrection or manual restraints should be limited to young subjects.

Functional Assessment

There are several indirect and direct methods to assess behaviors, which all have the common goal of using the information obtained to develop an intervention (Mace *et al.*, 1993). Indirect methods include questionnaires, scales, and interviews. Direct methods include descriptive analysis and functional analysis. Within most methodologies, there are variations. For instance, some interviews are unstructured while others are structured (Durand, 1990). There are specific functional analysis interviews, which may provide preliminary information to structure direct observation (Mace *et al.*, 1993). Furthermore, there are advantages and disadvantages to the different techniques. A criticism of using questionnaires is based on the fact that they are very subjective and after the fact accounts (Iwata *et al.*, 1993).

Indirect Methods

According to Iwata *et al.* (1993), questionnaires are frequently so far removed from the situation being assessed that their reliability and validity are often questionable. Mace *et al.*, (1993) states that questionnaires rely on the account of someone who knows the subject well and are not formal analyses. The Motivation Assessment Scale (MAS) is an example of a scale designed to assess the function of problem behaviors. The MAS, a seven point likert rating scale, identifies which of four possible contingencies maintain a specific behavior. The four contingencies include social, tangibles, escape and automatic/sensory (Durand & Crimmins, 1988; Iwata, *et al.*, 1993). There have been some studies that demonstrate adequate test-retest, inter rater reliability and validity of such scales (Durand & Crimmins, 1988). Yet, other studies have indicated that these indirect methods can not reliably provide information about the function of

such behaviors (Iwata *et al.*, 1993). Researchers such as Durand and Crimmins (1988) acknowledge the weaknesses of the MAS, but also noted the benefits of such a tool in comparison to no measure or clinical intuition. Iwata *et al.* (1993) expresses a similar view acknowledging that questionnaires should not be used independently to determine what treatment to implement. However, they do specify that they can be useful as a screening device (Iwata *et al.*, 1993). In general, indirect methods such as scales may provide useful information, but may be best used in addition to a formal analysis (Mace *et al.*, 1993). There are also various direct types of analyses such as a descriptive analysis and functional analysis.

Direct Methods

Descriptive Analyses

Descriptive analyses examine behavior under natural conditions (Bijou *et al.*, 1968) and can be repeated across time or settings (Iwata *et al.*, 1993). Descriptive analyses typically involve poor environmental control, which may not demonstrate a true function (Iwata *et al.*, 1993). As a result, descriptive analyses only suggest a relationship, which one would need to verify via experimental methods (Bijou *et al.*, 1968). However, some researchers believe that descriptive analyses are often preferable to indirect methods because the behavior is actually being observed (Iwata *et al.*, 1993). Examples of descriptive analyses include: time sampling (Bijou *et al.*, 1968; Iwata, 2002), ABC data (Durand, 1990), and scatter plots (Durand, 1990; Touchette, *et al.*, 1985).

Functional Analyses

Functional analyses are forms of direct analysis that use experimental techniques to evaluate behavior (Iwata, *et al.*, 1982). In an analogue functional analysis, various antecedents and consequences that are presumed important are manipulated to observe the effects on the problem behavior (Durand, 1990). Iwata *et al.* (1993) states that the “most direct way to identify a

functional relationship between behavior and another event is to expose an individual to the event and a suitable control condition”. According to Iwata *et al.* (1993), an analogue functional analysis will identify: (a) conditions that promote behavior, (b) the source of reinforcement, (c) a general contingency and reinforcing events to provide a basis for treatment, and (d) information on what treatments would address the above. Some limitations of direct analysis include the time required (Iwata *et al.*, 1993), possible failure to isolate and manipulate controlling variables (Mace, *et al.*, 1986; Iwata *et al.*, 1993) and the necessary level of expertise (Ervin, *et al.*, 2001).

“The cardinal rule to any experimental analysis is to hold constant or eliminate as many extraneous variables as possible in the experimental setting, and to the extent feasible, to vary one factor at a time in each experimental condition” (Mace *et al.*, 1993). Analogue functional analyses can test for a single variable or test multiple functions using either a reversal (Carr, & Durand, 1985) or multi-element design (Iwata *et al.*, 1982). In order to devise an effective treatment, it is often necessary to find antecedents or consequences that control the problem behavior (Reichle & Wacker, 1993). In fact, it is possible to vary the consequences or antecedents only depending on the hypotheses one is testing (Mace *et al.*, 1993). It is also possible to manipulate one variable in different ways (e.g. types of demands or attention, difficulty of demands) (Mace *et al.*, 1993). To do any of the above, the experimenter would need to manipulate suspected variables systematically to demonstrate functional relationships (Reichle & Wacker, 1993).

Four commonly identified functions for problem behavior include: (a) escape from demands, (b) access to tangibles, (c) social attention, and (d) automatic or internal (Iwata, *et al.*, 1994). However, there are situations that complicate the assessment process even more. For example, the same person may exhibit two different behaviors with two different functions (Mace *et al.*, 1986; Sigafos & Meikle, 1996). Yet, similar behaviors may also serve different functions

(Mace, *et al.*, 1986). In fact, other studies demonstrated that one specific problem behavior can be maintained by more than one function (Day, Horner, O'Neill, 1994; Durand, 1982; Iwata *et al.*, 1994; Sigafos & Meikle, 1996). Other studies have shown that two behaviors may differ in form, but serve the same function (i.e. functional equivalence) (Carr & Durand, 1985a). As a result, in some situations it may be necessary to conduct separate functional assessments for each topography of problem behavior (Sigafos & Meikle, 1996). If more than one function is identified, it is essential to develop treatments that address each function (Day *et al.*, 1994). Otherwise, the behavior will likely continue in situations where the additional function is not addressed (Day *et al.*, 1994).

There are also situations where the results of the standard analogue functional analysis are inconclusive or unclear. For instance, the subject may not exhibit any problem behaviors during the analysis. This is likely to happen when the problem behaviors occur sporadically or at very low rates (Hanley, *et al.*, 2003). In these cases, the experimenter may have to vary the experimental conditions to better reflect the person's natural environment (Mace *et al.*, 1986). One such study by Mace *et al.* (1986) modified the social attention condition to include three to four adults because that was similar to the environment where the behaviors were naturally occurring (Mace *et al.*, 1986).

Another study by Hagopian, Wilson, and Wilder (2001) encountered difficulty when the subject's problem behaviors occurred in the control condition (play). The experimenters hypothesized that the attention provided in the control condition was actually aversive to the subject. As a result, the subject was exhibiting problem behaviors as a direct response to receiving the adult's attention. They successfully tested out this theory by adding a condition where the subject's behaviors were negatively reinforced (i.e. attention was removed) (Hagopian, *et al.*,

2001). As a result, they were able to conclude that the subject's problem behaviors were maintained by escape from attention. Another difficulty occurs when a problem behavior is maintained by something in an experimental condition, but not in the natural environment (Mace *et al.*, 1993). When this happens, interventions based on the results of an analogue functional analysis may not be effective in the natural environment (Mace *et al.*, 1993).

Although there is not an established set of rules to conduct a functional analysis, there are best practices that are indicated in the literature (Hanley, *et al.*, 2003). To demonstrate control, it is necessary to examine the various types of research designs. When discussing research designs, "A" generally stands for baseline while "B" stands for treatment or an alternate second condition (Agnew & Pyke, 1994). Additional letters (e.g. "C", "D", etc) are used to reflect any additional phases or conditions. An AB design would be a study with two phases: Baseline (A) and treatment (B). An AB design does not demonstrate a functional relationship between two variables (Alberto & Troutman, 1999).

Single subject research designs have not always been fully respected in the field of psychology and research (Agnew & Pyke, 1994). This is because they are often associated with poor experimental approaches such as "after the fact methods" or case studies (Agnew & Pyke, 1994). Many researchers also doubt their reliability because they do not include any statistical tests (Agnew & Pyke, 1994). However, the reliability in single subject designs is demonstrated by the replication of results, not statistical significance (Agnew & Pyke, 1994). Therefore, reliably replicating any achieved effects between conditions meets the standards for good research (Agnew & Pyke, 1994).

One single subject design is the reversal design, which is also referred to as a "withdrawal" design or an "ABA" design (Hanley, *et al.*, 2003). A reversal design demonstrates control by

comparing two experimental conditions (Carr & Newsom, 1985; Carr *et al.*, 1980). In this design, a behavior is changed when a variable is introduced or changed. However, once that variable is taken away, the behavior should go back to baseline, which is the way it was before the variable was introduced (Baer *et al.*, 1968). If the results are able to be replicated by once again introducing the variable (ABAB design), then valid conclusions can be made (Carr & Newsom, 1985; Carr *et al.*, 1980; Durand & Carr, 1987). Reversal designs account for only 15.3% of the published studies on functional analysis (Hanley, *et al.*, 2003).

There are situations in which reversal designs are not always feasible depending on the setting and the behavior in question (Baer *et al.*, 1968). For instance, some behaviors are inherently irreversible because once taught they can not be taken away. In other situations, reverting back to a baseline condition is undesirable or even unethical due to the intensity or severity of the behavior. When reversal designs are not practical, a multielement (e.g. alternating treatment) design may be more appropriate. Multielement designs involve the random introduction of experimental conditions (Barlow & Hayes, 1979; Durand & Carr, 1987; Iwata, *et al.*, 1982; Iwata *et al.*, 1994; Shirley *et al.*, 1997; Mace *et al.*, 1986; Mace, Bowder, & Lin, 1987; Mace *et al.*, 1993; Thomas *et al.*, 1968).

Durand & Carr (1987) used both a reversal and a multielement design in one study. Initially, they used a multi-element design (“ABACACABA” & “ACABABACA”) to compare two experimental conditions and then used a reversal design (“ABABAB”) to compare treatment and baseline. Other researchers have used a multi-treatment design to assess the effectiveness of treatments after the function was determined (Day, Rea, Schussler, Larsen, & Johnson, 1988). A literature review by Hanley *et al.*, (2003) of 277 published journal articles involving functional analysis revealed the use of an “AB” design in 20.2% of the studies and an “ABC” (multi-element)

design in 87.0% of the studies. However, some studies (7.2%) used both methodologies (Hanley, *et al.*, 2003).

Beyond determining the ideal design, the researcher must also establish what conditions they will use in their study. Iwata *et al.* (1994, 2002) promote the use of four conditions: attention, demand, alone (i.e. automatic reinforcement) and play (i.e. control). Researchers such as Day *et al.* (1988) and Shirley *et al.* (1997) expanded on these four conditions, adding a tangible condition. Descriptions of those conditions can be found below.

Attention/Social Reinforcement. Several researchers have demonstrated attention as a controlling variable of problem behavior (Ayllon & Michael, 1959; Brown, Wacker, Derby, 2000; Hunt, Alwell, & Goetz, 1988; Mace *et al.*, 1993). Thomas, Becker, and Armstrong (1968) were the first to demonstrate this experimentally. Mace *et al.* (1986) labeled the concept of providing attention for inappropriate behaviors as “social disapproval”. A literature review by Hanley *et al.*, (2003) indicated 85.6% of studies conducting a functional analysis assessed the impact of social positive reinforcement (attention). Of those studies, 96.6% examined the specific effect attention had on problem behaviors (Hanley, *et al.*, 2003). When a problem behavior is maintained by attention, it is usually a form of positive reinforcement. However, some researchers have demonstrated situations where the subject engages in problem behaviors to escape attention (negative reinforcement) (Hagopian, *et al.*, 2001). Some researchers have demonstrated that even when a problem behavior starts as a direct result of a biological condition; it may also become socially controlled (Anderson, Dancis, & Alpert, 1978). For instance, one of the first studies to assess attention demonstrated an increase in psychotic patient’s speech following attention from nurses (Ayllon & Michael, 1959).

To assess attention as the function of a problem behavior, Mace *et al.* (1986) simulated situations where problem behaviors were positively reinforced by adult attention. In that study the parent or caregiver instructed the child to play with toys while providing no attention along with minimal eye contact (Mace *et al.*, 1986). The adult only provided attention (disapproving comment) when the child engaged in a problem behavior (Mace *et al.*, 1986). In some circumstances, researchers were unsuccessful at demonstrating attention as the function of a problem behavior by providing attention contingent only on problem behaviors. Therefore, Mace *et al.* (1986) expanded on their original design in hopes of better simulating the natural environment. They created an experimental condition, which they referred to as “divided attention”. In this condition, two adults intentionally engaged in activities that diverted their attention from the subject (a child) in the room. Again, the adults only provided attention in the form of a disapproving comment contingent on a problem behavior. As a result, the subject who did not exhibit any behaviors in the original alone condition, exhibited problem behaviors in the divided attention condition (Mace *et al.*, 1986). Therefore, the function was revealed as divided attention rather than just attention (Mace *et al.*, 1986).

Demand/Escape. There have been numerous studies indicating problem behaviors as the result of a type of escape from a demand or an aversive condition (Day *et al.*, 1994; Hagopian *et al.*, 2001). Iwata (2002) refers to an escape function as a type of negative reinforcement. Studies have demonstrated that escape can negatively reinforce a variety of specific problem behaviors including: self injury (Iwata *et al.*, 1982), stereotypy (Durand & Carr, 1987; Mace *et al.*, 1987), reluctant speech (Mace & West, 1986), psychotic speech (Durand & Crimmins, 1987) as well as aggressions and disruptions (Mace *et al.*, 1986). A literature review revealed 89.2% of functional analysis studies included an escape/demand condition (Hanley, *et al.*, 2003). According to

Michael (1988), escape based behaviors are based on the following concept. “Any form of aversive stimulation, whether unlearned or learned, will momentarily increase the reinforcing effectiveness of its removal or attenuation, and momentarily increase the frequency of any behavior that has preceded such removal or attenuation” (Michael, 1988). In these situations, the problem behaviors are due to negative reinforcement (Iwata *et al.*, 1993; Mace *et al.*, 1993; Skinner, 1969). A problem behavior would fit into this category if it is maintained by the avoidance, delay, or termination of an aversive stimuli or a decrease in the strength or severity of an aversive stimuli (Mace *et al.*, 1993).

In order to test whether a behavior is maintained by escape, it is necessary to compare the problem behavior in both a demand and non demand situation (Weeks & Gaylord-Ross, 1981). However, studies have shown that there is often a need to examine the specific features of the demands used in a demand condition. For example, studies have examined the difficulty level of the demands, revealing that some problem behaviors occurred more frequently when the demands were more difficult for the subject (Mace, *et al.*, 1993; Sailor, Guess, Rutherford, & Baer, 1968; Weeks & Gaylord-Ross, 1981). Researchers have also examined other features of demands, such as the novelty of a task (Mace *et al.*, 1987), type of task (Gaylord-Ross, Weeks, & Lipner, 1980), and experimenter’s requests (Gaylord-Ross, Weeks, & Lipner, 1980). Yet, in some situations, variables associated with the specific demand did not account for the occurrence or non-occurrence of problem behaviors. For example, Iwata *et al.* (1993) demonstrated that the prompt to work can become an establishing operation (EO), which can evoke problem behavior. If there is no aversive demand, there is no need to escape (Iwata *et al.*, 1993). Therefore, to differentiate these variables, it is necessary to examine and manipulate the antecedent to the particular demand (Gaylord-Ross *et al.*, 1980).

Alone/Automatic reinforcement. Behaviors that are automatically reinforced involve some sort of sensory reinforcement, which may increase problem behaviors (Iwata *et al.*, 1994; Rincover, 1978). Iwata (2002) refers to sensory stimulation as a type of automatic positive reinforcement. Stereotypic behaviors can be reinforced by visual, auditory, tactile, or kinesthetic stimuli in animals as well as typically developing and handicapped people (Lovaas *et al.*, 1987). In the literature conditions to assess automatic reinforcement (Rincover, 1978; Rincover & Devany, 1982) are referred to as alone or ignore conditions (Hanley, *et al.*, 2003). Alone conditions were included in more than half (59.6%) of published journal articles involving functional analyses (Hanley, *et al.*, 2003). Sensory or perceptually reinforced behaviors are not socially mediated, but are controlled by the individual (Lovaas *et al.*, 1987). These include stereotyped and repetitive behaviors often referred to as self stimulatory behaviors, which usually occur at high rates (Lovaas *et al.*, 1987). Stereotypic behaviors are highly consistent and repetitive with no apparent adaptive function (Durand & Carr, 1987). According to Lovaas *et al.* (1987), most stereotypic behaviors exhibited by the developmentally disabled population are maintained by sensory or perceptual reinforcement. When assessing a stereotypic behavior, it is more important to examine the type of sensory stimulation that the behavior provides rather than the amount of stimulation it provides (Rincover, 1978). Stereotypic behaviors are problematic and can interfere with the person's ability to integrate into the community as well as with his or her education (Durand & Carr, 1987). If self stimulatory behaviors occur in high rates, they may prevent or delay learning alternative behaviors (Lovaas *et al.*, 1987).

Tangible/Positive Reinforcement. Problem behaviors may also be the result of the subject's attempt to gain access to something tangible (Brown *et al.*, 2000; Day *et al.*, 1994; Day *et al.*, 1988; Durand & Crimmins, 1988; Durand & Kishi, 1987). However, in a literature review of 277

published articles involving functional analyses, only 38.3% included tangible as a condition (Hanley, *et al.*, 2003). According to Hanley *et al.* (2003), the use of a tangible condition seems to be growing in the literature. When functional analysis studies conducted within the past five years were teased out, 47% included a tangible function (Hanley, *et al.*, 2003). Day *et al.* (1988) published the first demonstration of this function by assessing the consequences of taking away a subject's positive reinforcers only to return them contingent on a problem behavior (Self Injurious Behavior: SIB). Their study resulted in an increase in SIB, demonstrating the function as tangible (Day *et al.*, 1988). Shirley *et al.* (1997) also successfully demonstrated a tangible function by adding it as a condition to a multielement design for two subjects based on reports of when behaviors were occurring.

Control Condition. As in any good experiment, a control condition helps provide a comparison when implementing a functional analysis. Iwata (1982/1994) coined this condition as “play”. In this condition, the experimenter typically engages the subject in unstructured play throughout the entire session (Mace *et al.*, 1986). The control condition should be an enriched environment with positive adult attention and reinforcing activities (Mace, *et al.*, 1986). The condition should not involve any instructions, demands, or academic tasks (Hanley, *et al.*, 2003; Mace *et al.*, 1986). Due to the nature of the play condition, there are often low rates of problem behaviors (Mace *et al.*, 1986). However, if they occur, problem behaviors should be ignored (Hanley, *et al.*, 2003). Reproducing a play condition as a treatment is impractical because it is not feasible to provide almost continuous adult attention in the absence of demands (Mace *et al.*, 1986). Control conditions were used in 91.7% of journal articles involving functional analyses (Hanley, *et al.*, 2003).

Treatments

Treatments Based on Function

Attention

As mentioned throughout this study, treatments should be designed specifically to address the function of the problem behavior. Research has shown many treatments that are effective to address various specific functions. For instance, extinction (i.e. planned ignoring), and Differential Reinforcement of Other Behavior (DRO) have been shown to be effective if the function is attention (Iwata *et al.*, 1994; Iwata, 2002). However, there are situations in which the problem behavior can be too severe to ignore (extinction). In those circumstances, time out from reinforcement has been an effective treatment for attention (Iwata *et al.*, 1994; Mace *et al.*, 1986). In one such study, Mace *et al.* (1986) paired a reprimand with a time out procedure to establish it as an aversive event rather than a reinforcing event.

Escape

There are specific interventions that are more effective if a behavior is maintained by escape. These include eliminating the possibility of escape (Carr & Newsom, 1985; Carr *et al.*, 1980; Catania, 1984), guiding compliance/prompt hierarchy to eliminate escape (Iwata *et al.*, 1994; Mace *et al.*, 1987), strengthening compliance (behavioral momentum) (Iwata, 2002), consistently presenting the task until compliance occurs (Mace & West, 1986; Repp, Felce, & Barton, 1988), providing a signal indicating termination of demands (Carr & Newsom, 1985; Carr *et al.*, 1980), using preferred reinforcers to lessen the aversiveness of the demands (Carr & Newsom, 1985; Carr *et al.*, 1980), reinforcing early (Iwata, 2002); teaching socially acceptable escape responses if escape does not interfere with child's educational setting (Carr & Newsom,

1985; Carr *et al.*, 1980; Iwata, 2002), non-contingent task removal (Iwata, 2002), task alteration (Iwata, 2002), and using errorless learning (Weeks & Gaylord-Ross, 1981).

Researchers have tried to teach subject's appropriate methods of accessing the positive reinforcement (i.e. escaping the demand), rather than engaging in a problem behavior. In some circumstances, positive reinforcement can outweigh the negative reinforcement of the escape (Mace, *et al.*, 1993). However, the procedures used in these situations must address the specific nature of the situation. For example, teaching a socially acceptable method for the subject to escape is more likely to work if the alternative response is easier for the subject to produce than the problem behavior (Carr *et al.*, 1980). Another suggestion to help the success of reducing or lessening a problem behavior by using an alternate response is to reinforce that response on a richer schedule than the problem behavior is being reinforced (Myerson & Hale, 1984). If a subject is escape maintained, fading techniques can ensure that the subject is not completely escaping the demand. For instance, Hagopian *et al.* (2001) added a delay with the reinforcement fading to help the subject tolerate waiting after a request. Sometimes the subject's requests for reinforcement can stabilize within a few weeks, without specific fading procedures (Durand, 1990). This stabilization of requests may be due to the subject's satiation of the reinforcement (Durand, 1990).

A treatment may involve changing some aspect of the demand to produce a change in behavior (Iwata *et al.*, 1993). One example of this type of treatment involved the experimenter placing demands while reading a simple entertaining story that contained familiar objects or events (Carr *et al.*, 1976). The results demonstrated that the demands presented in this type of positive context decreased problem behaviors in comparison to the same demands that were not presented in this context (Carr *et al.*, 1976). Another effective method relating to the reduction of the

aversiveness of demands was reducing the complexity of the demands (Weeks & Gaylord-Ross, 1981). However, Iwata *et al.* (1993) caution that treatments that rely solely on modifying qualities of the demand, do not address the original contingency between the problem behavior and the escape from the demand. As a result, reinforcement (i.e. escape) may eventually reoccur (Iwata *et al.*, 1993). According to Iwata *et al.* (1993), this can be resolved by implementing extinction while modifying the demands.

Some researchers have demonstrated that some sensory behaviors are not automatically reinforced, but are instead escape maintained (Durand & Carr, 1987). Some of these behaviors may have started as a result of automatic reinforcement, but over time they were negatively reinforced, resulting in an escape function (Durand & Carr, 1987). If a behavior that appears to be sensory based is truly escape maintained, FCT can be used to reduce the sensory based behavior (Durand & Carr, 1987). In other words, if a child initially moves his or her hands rapidly to gain sensory stimulation, the behavior may prevent or limit his or her inclusion in academic demand. If the child learns this contingency, he or she may continue to exhibit the behavior to escape the demand rather than for the sensory feedback. Knowing this contingency allows staff to teach the child an alternative way to appropriately request to escape the demand.

Automatic

There are also treatments that have proven to be effective for behaviors that are automatically reinforced. For example, the perceptual reinforcement gained from self stimulatory behaviors can be used as a very accessible and predictable reinforcer for severely impaired children (Lovaas *et al.*, 1987). Another line of research used self stimulatory behaviors to decrease other more problematic behaviors. For example, some studies reduced SIB by providing alternative equivalent sensory feedback (Durand, 1982; Mace *et al.*, 1993). Favell *et al.* (1982)

demonstrated that self-stimulation and self injurious behaviors (e.g. pica, hand mouthing, & chewing on toys; visual self-stimulation & eye poking) can be functionally equivalent. They were then able to successfully use the functional alternative of visual self stimulation or chewing on toys to reduce the original and dangerous SIB. However, the study cautioned that the treatment effects were only observable when the functional equivalents (e.g. chew toys) were accessible and did not generalize (Favell *et al.*, 1982).

Other studies used the actual sensory stimulation as a treatment. For example, some studies provided contingent opportunities for the child to engage in the self stimulatory behavior, which was effective in producing an overall reduction in the self stimulatory behavior (Mace *et al.*, 1993). Other researchers replicated the sensory stimulation to use as a positive reinforcer (Rincover, 1978; Wolery, 1978). Treatments that include other reinforcement techniques to reduce self stimulatory behavior were frequently not very effective because the reinforcement that the person received independently was so strong that that any extrinsic reinforcers controlled by someone else were ineffective (Lovaas *et al.*, 1987). This was referred to as the “blocking effect” (Lovaas *et al.*, 1987).

Tangible

To treat problem behaviors maintained by access to tangible, Day *et al.* (1988) used a type of FCT to train subjects to request a reinforcer rather than engaging in SIB. Day *et al.* (1988) called these trainings “reinforcer request sessions”. In these sessions, the trainer would say to the subject, “Tell me what you want” while blocking the SIB’s. If the subject responded, he or she was given access to the reinforcement. Once the subject was 90% successful during the training trials, the experimenter lowered the reinforcement schedule in an attempt to thin reinforcement. On trials when the subject’s behavior was not reinforced, he or she was instructed to “wait”. Once

this was successful, Day *et al.* (1988) started “denial training”. During denial training sessions, the subject was occasionally told that he or she could not have access to the item following a request, but was instead provided with a list of alternatives. If the subject did not choose an alternative within three seconds, he or she was prompted to do so (Day *et al.*, 1988).

Commonly Used Treatments

Extinction

Extinction requires the discontinuation of reinforcement that is provided contingent on a behavior (Mace *et al.*, 1993; Skinner, 1969). It does not mean the problem behavior is ignored (Iwata *et al.*, 1993). Extinction procedures can be used with behaviors maintained by positive or negative reinforcement. Extinction of negative reinforcement requires the discontinuation of the delay or termination of the aversive stimuli (Carr & Newsom, 1985; Carr *et al.*, 1980; Mace *et al.*, 1987). Regardless of the nature of the reinforcement (positive or negative), the essential component of extinction involves breaking the contingent relationship. Thus, in order to implement an intervention involving extinction, it is essential to determine what is reinforcing the behavior (Iwata *et al.*, 1993).

When implementing extinction as part of a treatment package to address escape maintained behaviors maintained, it is essential that the reinforcement of escaping the demand is extinguished (escape extinction). In these situations, using a technique that withdraws attention (i.e. planned ignoring) would most likely result in an increase of the behavior (Iwata *et al.*, 1994). This occurs because the attention would probably allow the subject to delay engaging in the demand. An example of escape extinction would include a guided compliance procedure. Horner and Keilitz (1975) demonstrated this procedure by using a graduated three-prompt procedure where the student was initially provided a verbal instruction. If the student did not comply, the request was

demonstrated in conjunction with the repetition of the verbal instruction. If the student still did not comply, the verbal instructions were repeated while the student was physically guided, ensuring that the student did not escape the demand (Horner & Keilitz, 1975; Iwata *et al.*, 1994).

Some studies have successfully treated automatically reinforced behaviors by reducing or eliminating the sensory feedback (i.e. sensory extinction) (Durand & Carr, 1987; Rincover, 1978). Sensory extinction does not require withholding attention or eliminating escape, but instead requires the elimination of the sensory stimulation contingent on the behavior (Dorsey *et al.*, Iwata, *et al.*, 1994; Rincover, 1978; Rincover *et al.*, 1979; Rincover & Devany, 1982). Sensory reinforcement is often unique to the individual and the specific sensory feedback provided by the behavior. Therefore, various self stimulatory behaviors require different and individualized sensory extinction procedures (Rincover, 1978).

There has been a great deal of research on using sensory extinction techniques to reduce SIB maintained by sensory reinforcement (Favell *et al.*, 1982). Rincover and Devany (1982) evidenced often immediate and substantial reductions of SIB following the implementation of sensory extinction. Rincover and Devany (1982) also point out that sensory extinction procedures do not disrupt other children in the class and require little training to implement. Moreover, teachers found sensory extinction procedures to be ethically acceptable, resulting in an overall decrease in anxiety and tension observed in the children (Rincover & Devany, 1982). Some of the sensory extinction procedures implemented by Rincover and Devany (1982) included using a helmet, padded floors and/or padded walls for students who engaged in head banging. Other procedures used rubber gloves for students who scratched (Rincover & Devany, 1982). Rincover and Devany (1982) were able to gradually fade out the sensory extinction equipment in their study. Specifically, the rubber gloves took 27 days to fade and the helmet took 24 days to successfully

fade. The reduction of SIB continued for several months for both students after the successful fading of the sensory extinction equipment (Rincover & Devany, 1982). It is important to note that extinction and antecedent manipulation work best when combined with methods to also reinforce adaptive behavior (Mace *et al.*, 1993; Iwata *et al.*, 1993) such as described below.

Differential Reinforcement Procedures

Differential Reinforcement of Other behavior (DRO) procedures provide reinforcement for specific behaviors other than the target problem behavior. For a DRO treatment to be effective, it is essential that the reinforcement must be at least as strong as the original reinforcement (Iwata *et al.*, 1993). Differential Reinforcement of Low Rates of Behavior (DRL and Differential Reinforcement of Alternative Behavior (DRA) are also differential reinforcement procedures. DRA procedures teach alternative responses that directly produce their own reinforcers (Iwata, 2002). Another variation is the Differential Reinforcement of an Incompatible Behavior (DRI). Unlike other differential reinforcement procedures, DRI procedures involve the reinforcement of a behavior that is physically incompatible with the target problem behavior (Durand & Merges, 2001). Unlike extinction procedures, DRA and DRI procedures strengthen a replacement alternative behavior (Iwata *et al.*, 1993). Therefore, Iwata *et al.* (1993) recommends using any extinction procedures in conjunction with these procedures.

Functional Communication Training

FCT can be thought of as a method of replacing problem behaviors with more appropriate forms of communication (Sigafos & Meikle, 1996). In FCT, the examiner needs to determine the function of the problem behavior and teach the subject an alternative communicative response to replace the problem behavior (Durand, & Merges, 2001). Attempting to reduce problem behaviors

without teaching communication as a replacement behavior often results in the emergence of other problem behaviors (Durand, & Merges, 2001).

“FCT training places the children in active roles during treatment by teaching them to control the delivery of reinforcement, rather than teaching them to be passive recipients of consequences delivered by an experimenter on a DRO schedule” (Carr & Durand, 1985b; Wacker *et al.*, 1990). Unlike other methods, FCT allows the subject to be in control of his or her own reinforcement in an efficient manner (Bird *et al.*, 1989; Wacker *et al.*, 1990). The reinforcement type is determined by the specific request of the subject at the exact time and situation in which he or she wants the reinforcement, resulting in a strong reinforcer (Bird *et al.*, 1989). The availability of choice making opportunities is often linked with FCT success (Durand, & Carr, 1991; Durand, & Merges, 2001; Wacker *et al.*, 1990). Research has shown that allowing individuals to make choices about their day to day activities increases the likelihood of the success of FCT (Durand, & Carr, 1991; Durand, & Merges, 2001).

Ideally, if a child is successfully taught a communicative response via FCT, he or she should be able to access a wider variety and better reinforcers as a result of less effort than he or she would exert engaging in problem behaviors (Carbone, 2003a). Shirley *et al.* (1997) phrased this concept stating that subjects are less likely to engage in a problem behavior if they can access the same reinforcement with an alternative response. The new response must result in the same consequences and serve the same function as the initial problem behavior or it will not replace it (Carr, 1988; Durand *et al.*, 1993; Durand, 1993; Durand, & Merges, 2001). This concept is referred to in the literature as “response match”. A response match is necessary, but not sufficient for success (Durand, & Merges, 2001). In other words, FCT will not be effective if there is not a response match. However, having a response match does not mean that the plan will be

successful. In summary, FCT is most likely to be successful if the new response is under the same stimulus control as the problem behavior, produces the same outcome that maintains the problem behavior, and is more efficient than problem behavior (Horner & Day, 1991).

The “Matching Law” states that “if the rate of reinforcement for the adaptive target response exceeds that for the aberrant class of behaviors, adaptive responding should increase, whereas rates of aberrant behavior should decrease” (Hernstein, 1961). “Response Efficiency” refers to the idea that the adaptive response must not only serve the same function as the problem behavior, but must be more effective and efficient in getting reinforced (Durand *et al.*, 1993; Durand, 1993; Durand, & Merges, 2001; Horner & Day, 1991). If it is difficult to make the adaptive response more efficient, the trainer should attempt to make the problem behavior less efficient (Durand, 1990).

Researchers have documented three components that affect the efficiency of a response (Horner & Day, 1991; Horner *et al.*, 1990). The first component compares the amount of physical energy the person exerts for the problem behavior in comparison to the communicative response. If it is easier to use a communicative response, it will replace the problem behavior (Durand, 1993; Horner & Day, 1991). Horner and Day (1991) demonstrated this in a study where problem behaviors were not reduced after they taught a subject to sign an entire sentence as an FCT for an escape based behavior. However, when the FCT was modified to a one word phrase, it was effective (Horner & Day, 1991). The second component is the schedule of reinforcement, which determines how effectively each response is reinforced (Durand, 1993). If the FCT is reinforced on a richer schedule than the problem behaviors, it is more likely to be effective (Durand, 1993; Horner & Day, 1991). The third component is the delay in time between the S^D for a response and the delivery of reinforcement for that response (Horner & Day, 1991). If the reinforcement for the

FCT is delayed, it will not be able to compete with the problem behavior (Durand, 1993; Horner & Day, 1991; Horner *et al.*, 1990).

There have many studies that have demonstrated that FCT can independently reduce problem behaviors by developing new communication skills (Bird *et al.*, 1989; Buschbacher & Fox, 2003; Carr *et al.*, 1994; Carr & Durand, 1985a; Day, Horner & O'Neill, 1994; Durand, 1993; Durand & Carr, 1991; Durand & Carr, 1992; Carr & Durand, 1985a; Durand *et al.*, 1993; Durand & Carr, 1987; Durand & Crimmins, 1987; Durand & Kishi, 1987; Hagopian *et al.*, 1998; Hagopian *et al.*, 2001; Horner & Day, 1991; Lalli *et al.*, 1995; Meyer & Evans, 1989; Sigafoos & Meikle, 1996). However, some studies have combined FCT with other techniques such as extinction or punishment to successfully reduce problem behaviors (Billingsley & Neel, 1985; Durand *et al.*, 1993; Hagopian *et al.*, 1998; Shirley *et al.*, 1997; Wacker *et al.*, 1990). It is essential that any additional treatments implemented in conjunction with FCT would also need to address the function of the behavior as demonstrated by the functional assessment.

There have been studies suggesting that it is not necessary to include aversive techniques in conjunction with FCT even when working with severe problem behaviors (Bird *et al.*, 1989; Durand & Kishi, 1987). Yet, other researchers have indicated that FCT success required adding punishment in some cases (Hagopian *et al.*, 1998; Wacker *et al.*, 1990; Winborn, 2004). These researchers believe that certain children need punishment contingencies in addition to positive reinforcement as part of their treatment plan (Wacker *et al.*, 1990). In these circumstances, there is usually a long history of the child getting reinforcement for inappropriate behavior. Researchers believe if those behaviors are not suppressed, the child may revert to them, even if infrequently (Hagopian *et al.*, 1998; Wacker *et al.*, 1990).

Additional studies have revealed specific circumstances that necessitate the need for a punishment as part of the treatment plan. For instance, Hagopian *et al.* (1998) demonstrated that punishment was needed in situations where it was necessary to delay access to reinforcement. Reinforcement may need to be delayed if the frequency of the subject's mands were high enough that it would be impractical to reinforce every time. An example of this situation would be a subject who constantly asks for attention (Hagopian *et al.*, 1998).

As mentioned, some researchers believe that FCT success is linked to withholding reinforcement of a problem behavior via extinction (Billingsley & Neel, 1985; Durand, Berotti, & Weiner, 1993; Durand & Carr, 1992; Fisher *et al.*, 1993; O'Neill, & Sweetland-Baker, 2001; Shirley *et al.*, 1997; Wacker *et al.*, 1990). In fact, there has been research that has shown that FCT without extinction was not effective (Hagopian *et al.*, 1998). A study done by Hagopian *et al.* (1998) evidenced that FCT without extinction was effective in most but not all cases. In those cases, FCT was only effective once extinction procedures were added (Hagopian *et al.*, 1998). Shirley *et al.* (1997) also claimed that the extinction component "was a prerequisite for both the reduction of problem behavior (SIB) and the acquisition of an alternative response". In that study, the subject's SIB were reinforced after FCT with extinction was demonstrated to be a successful treatment (Shirley *et al.*, 1997). The treatment resulted in one subject increasing his or her rate of SIB while two other subjects' behaviors were unchanged (Shirley *et al.*, 1997).

FCT can be done with low and high functioning subjects (Durand, 1990). FCT can also occur with any type of communicative modality. For example, FCT has been demonstrated to be effective with varying types of mands such as verbalizations, manual signs, word/picture cards, gestures, and micro switches (Brown *et al.*, 2000). However, the strongest modality should be the one chosen for the training (Durand, 1990). A study done by Winborn (2004) demonstrated that

subjects can have a preference for one type of communication over another. Winborn (2004) conducted a functional assessment to determine what maintained two subjects' problem behaviors. The subjects were then taught to use two different response topographies to mand. Both subjects demonstrated a clear preference for one type of response topography (Winborn, 2004).

Durand (1990) created a checklist to help determine what modality would work best for an individual student. According to Durand (1990), the chosen response form should be simple enough to teach in a short amount of time. If the chosen form takes more than a few weeks of training, a simpler form of communicating should be used (Durand, 1990). The underlying concept is that the quicker the subject can learn the appropriate response, the quicker he or she can access reinforcement. Durand (1990) also points out the importance of making sure that others will be able to understand the response.

FCT should include teaching a communicative response that is functionally equivalent to a targeted unwanted behavior. The response taught should be directly related to what the person is trying to achieve from the original problem behavior (Bird *et al.*, 1989). Thus, in order to begin FCT, it is first necessary to identify the reinforcers that maintain the problem behavior (Shirley *et al.*, 1997). Once the reinforcers are identified, a socially acceptance response can be taught to the subject to provide him or her access to reinforcement in the exact context in which the problem behavior typically occurs (Shirley *et al.*, 1997). In other words, the mands taught in FCT must be functionally equivalent to the specific situation in which the original problem behavior occurred (Carr & Durand, 1985a).

“Response mastery” is also a necessary component of FCT success (Durand, & Merges, 2001). Response mastery is the ability of the trained communicative response(s) to successfully and efficiently produce the desired outcome (Durand *et al.*, 1993; Durand, & Merges, 2001). If a

person makes a request that does not result in an appropriate response from someone else, FCT will not be successful (Durand, 1993). Sometimes, success is only reached when the staff working with the person changes his or her own interaction patterns to respond appropriately (Durand & Kishi, 1987). Durand and Kishi (1987) demonstrated that positive changes in staff behavior can correlate with positive change in student's behavior. However, it is first necessary for the trainer to understand that an individual's response to another person's attempt to communicate depends on response recognizability, acceptability, and the responsiveness of the environment (Durand, & Merges, 2001). If others do not recognize the subject's response, they will not reinforce it and the communication will not be successful (Durand, 1993; Durand *et al.*, 1993; Durand, & Merges, 2001).

Durand and Carr (1991) demonstrated the importance of response recognizability. In their study, FCT was used to successfully reduce a subject's problem behavior. However, when the subject switched teachers the following year, the new teachers didn't understand what the subject was trying to communicate. As a result, the subject reverted to exhibiting problem behaviors. The experimenters worked on improving the subject's articulation, which improved the interaction between the student and his new teachers. Ultimately, the problem behavior was once again reduced. Furthermore, when the student had a new teacher the third year, he was able to generalize the FCT, which was now recognizable. The results were maintained one year after this treatment successfully generalized.

If a communicative response is not acceptable to those around them, people will not respond appropriately, preventing the FCT from being successful (Durand, 1993; Durand *et al.*, 1993; Durand, & Merges, 2001). Durand and Kishi (1987) conducted a study where they taught a subject to raise her hand to get attention. Eventually staff verbalized they could not respond each

time the subject raised her hand because of other job obligations. Instead of trying to have staff accept the current plan as written, it was modified. The modified plan still addressed the same attention function. However, the communicative intent of the mand was modified. When the subject raised her hand, the staff were instructed to interpret the request as the subject asking “Can I help you?”. Following this modification, when the subject raised her hand, the staff took her with them to do his or her regular job duties. This was more feasible and thus acceptable to the staff. As a result, the subject still received attention and the staff were receptive to the plan (Durand & Kishi, 1987). The trainer also needs to ensure that the response will not disturb other children in the environment (Durand, 1990).

“Response Milieu”/Context refers to the optimal environment for FCT (Durand *et al.*, 1993). FCT should start with only one response (Durand, 1990). That response should be the one that would be the most useful in the most settings (Durand, 1990). Once the response is chosen, training should be done as often as possible (Durand, 1990). In order to do this, the experimenter may have to arrange the environment to create opportunities to train communication (Durand, 1990). If the training is done in the natural setting, the subject will not need extensive generalization programming (Durand, 1990). Initially, FCT requests must be responded to each time they are made (Durand, 1990).

FCT must ensure that the request can be provided and that someone is always available to respond to the request during training (Durand, 1990). For example, making sure the reinforcement is available is paramount when the subject’s problem behavior is maintained by access to a tangible (Durand, 1990). If the student wants something that can never be available, the experimenter should try to provide a functionally equivalent response (Durand, 1990). Similar to the concept of attention being difficult to have available at all times, tangible objects are not

always available at the exact moment the child wants for them. Once FCT occurs, successfully fading the reinforcement may be essential for subjects whose behaviors are maintained by access to a tangible (Durand, 1990). Fading the reinforcement teaches the subject to learn to wait. However, if it is necessary to teach this delay of gratification, it should be based on reasonable decisions and not just the convenience of staff or parents (Durand, 1990). Durand (1990) demonstrated a technique to fade reinforcement by using a traffic light to signal that the request would only be granted while it was on green. Although staff are commonly concerned that students will abuse the request taught to them in FCT, the research shows that with almost all functions, students do not usually abuse the request (Bird *et al.*, 1989).

Although it is a common error with many staff, teachers, and parents, it is important that the trainers do not anticipate the needs of the person when teaching FCT (Durand, 1990). Instead, the trainer must wait for the subject's response before providing reinforcement (Durand, 1990). If this is not done, the subject may become prompt dependent (Durand, 1990).

FCT can be successful regardless of the function or topography of behavior (Wacker, *et al.*, 1990). However, specific FCT techniques should vary depending on the function of the problem behavior. FCT plus extinction has been proven to be a successful treatment for escape maintained behavior (Lalli *et al.*, 1995). It is possible to teach a subject appropriate methods to get attention or request help during a demand, which will in turn reduce problem behaviors (Carr & Durand, 1985a; Durand & Carr, 1987; Durand & Kishi, 1987). For escape maintained behaviors, it is imperative to fade prompts quickly enough so that the student does not become prompt dependent (Durand, 1990).

Lalli *et al.* (1995) conducted a study demonstrating effective FCT with fading techniques to reduce problem behaviors. In their study, subjects were taught a communicative response to

request an escape. Once successful, the subjects were required to complete a specified number of steps in a task (response chaining) before their communicative request was reinforced. The experimenters continued to modify the plan (i.e. fade reinforcement) by increasing the amount of work that the subject needed to complete before receiving reinforcement (i.e. escape).

Eventually, the subjects completed the entire task before receiving a break (Lalli *et al.*, 1995).

Durand (1990) warns against fading prompts too quickly, which may result in errors that ultimately increase the problem behaviors. When training FCT for students with escape maintained behaviors, it is ideal to do so in a one to one setting. Additionally, the trainer needs to make sure the training is not aversive, especially when working with students who have escape maintained behaviors (Durand, 1990). One way to do this is to use errorless learning. In errorless learning, the teacher attempts to minimize or eliminate the possibility of errors on the part of the student (Alberto & Troutman, 1999; Touchette, 1971). When errorless learning occurs, the child's risk of making errors is diminished, which decreases the value of escape (Carbone, 2003b). When errorless learning is used, prompts should be faded as soon as possible (Carbone, 2003b).

FCT can be done with individuals functioning at the low and high range of cognitive abilities (Durand, 1990; Shafer, 1993). Durand (1990) used FCT training with a high functioning subject whose behaviors were maintained by attention. That subject was highly communicative, but lacked social skills. Therefore, the trainer taught the subject social skills that would most likely provide her with the types of attention that her current problem behaviors were providing (Durand, 1990).

It is also possible to use FCT with subjects who are cognitively impaired. Some research has demonstrated that it is not necessary to address a subject's cognitive deficiencies before starting FCT (Durand & Kishi, 1987). Durand and Kishi (1987) recommend prompting a response

and reinforcing successive approximations of that response if the subject is having difficulty. However, Durand and Carr (1992) claim it may be necessary to train FCT systematically before using it as an intervention. Shirley *et al.* (1997) also state that FCT “may require extensive training for individuals who do not have extensive verbal repertoires”. Due to the inherent variability between subjects, the time frame needed to teach FCT can vary significantly. For example, FCT can occur in as quickly as six to eighteen minutes (Durand & Carr, 1992) or one session (Carr & Durand, 1985a; Wacker *et al.*, 1990). Yet, other studies required three to nine sessions (Horner & Day, 1991; Wacker *et al.*, 1990) to successfully teach FCT. There were even some studies that required more than twenty sessions to teach FCT (Horner & Day, 1991; Shirley *et al.*, 1997).

When working with individuals with severe disabilities, recognizability is very important (Durand, 1993). One criticism of signed speech is the fact that it is not easily recognized by most audiences. As a result, only a select few can understand the person’s communicative intent (Durand, & Merges, 2001). There are alternatives to sign that increase the likelihood of recognizability. For instance, assistive technology can help subjects who have severe communication difficulties (Durand, & Merges, 2001). The benefit of assistive technology devices is that the listeners do not need specific training to understand the subject’s communication (Durand, & Merges, 2001).

There are obstacles to using FCT. One such obstacle is that most caregivers are not trained to teach communication (Durand, 1990). Another obstacle reflects the intensity of the problem behavior. For example, if a behavior is very severe or challenging, it can actually impede the teaching process (Durand, 1990). As previously stated, punishment techniques can be used to reduce problem behaviors before teaching communication (Durand, 1990; Shirley *et al.*, 1997).

However, successfully reducing problem behaviors via a punishment technique can take up to six months (Durand, 1990). If problem behaviors are successfully reduced quickly with a punishment technique, the subject would no longer be in a state of crisis (Durand, 1990). Once there is no longer a crisis, the effort placed into modifying the treatment typically declines (Durand, 1990). In other words, effective punishment procedures reduce the desire for staff to put forth additional effort to teach new skills (i.e. an appropriate functionally equivalent response). Therefore, Durand (1990) suggests teaching communicative alternatives prior to reducing problem behaviors. Durand (1990) believes that challenging behaviors should not be a barrier to teach communication.

When using FCT, it is important to make sure the subject does not chain the problem behavior with the prompts used in the training. This happens when a trainer waits until the subject exhibits a problem behavior before prompting him or her to use the communicative response. When this happens, the child may learn to chain the two behaviors (problem behavior and communicative response) (Sigafoos & Meikle, 1996). For that reason Lalli *et al.* (1995) included a criterion in their study that the subject must not exhibit a problem behavior for ten seconds before providing a break contingent on the communicative response. Another way to avoid the chaining is to prompt and reinforce the communicative response before a problem behavior occurs (Sigafoos & Meikle, 1996).

There are also specific advantages to using FCT. Research has shown that reinforcement provided contingent on the communicative response can be provided by untrained individuals (Durand & Carr, 1991, 1992). This is unique because many other treatments require the presence of trained staff. Another advantage of FCT is the likelihood of the communicative response generalizing across settings, resulting in additional positive gains (Billingsley & Neel, 1985). Generalization of the response is likely to occur by blocking the subject's access to reinforcement

contingent on the problem behavior in a novel setting (Billingsley & Neel, 1985). If the problem behavior is not being reinforced, the subject will need another method of communicating his or her wants and needs (Billingsley & Neel, 1985). Billingsley and Neel (1985) demonstrated this by blocking a subject's attempts to grab food in a new setting. As a result, the subject began to point, which was the communicative response taught in the original setting. If the subject was allowed to continue grabbing food in the second setting, he or she would not need to point (Billingsley & Neel, 1985). In one study, Durand and Carr (1992) compared the generalizability of two communicative responses in comparison to time out. The results revealed that only the communicative responses generalized to untrained individuals (Durand & Carr, 1992). However, there has not been a lot of research examining the generalized effects of FCT (O'Neill, & Sweetland-Baker, 2001).

One study used FCT to produce substantial decreases in problem behaviors for escape maintained behaviors during a training phase (Bird *et al.*, 1989). However, the most significant reduction in the subject's problem behavior (almost completely suppressed) occurred once he or she was able to spontaneously use this new communication (i.e. generalize) rather than relying on the teacher's prompt. Even when the subject was allowed free access to mand for a break from a demand, he or she increased his or her productivity and did not take advantage of it (Bird *et al.*, 1989).

Another study by O'Neill and Sweetland-Baker (2001) conducted a functional assessment before implementing FCT with escape extinction as a treatment for escape maintained behaviors in a specific demand situation. To evaluate the effects of the individual components of the treatment, probe sessions were then conducted without escape extinction. In these sessions, the FCT card was present, but the subject was not prompted to use it. The subject's request was still reinforced

if he or she used the FCT card independently. However, the subject was also provided an escape contingent on a problem behavior. The experimenters modified their treatment once more including a prompt for the subject to use the FCT card for all demand situations. The probes provided mixed results with some evidence of generalization. However, once escape extinction was once again incorporated and the entire treatment package was implemented across all settings, the problem behaviors were almost completely extinguished. In summary, this study demonstrated that stimulus generalization may occur without training. However, generalization may not occur with all demands and may not be as effective. This study also demonstrated the need for reinforcement and extinction to be incorporated with FCT.

Establishing Operations (EO's)

According to Brown *et al.* (2000), FCT packages need to include EO's as part of a treatment component. EO's describe a class of antecedent events that alters the effectiveness of reinforcement and changes the frequency of behaviors that provide reinforcement (Michael, 1982). Sundberg (1993) believes that EO's are so important to the analysis of problem behaviors that he proposed changing the standard contingency of Antecedent (stimulus)-Behavior (response)-Consequence (ABC) to EO-Antecedent-Behavior-Consequence. EO's involve "any change in the environment which alters the effectiveness of some object or event as reinforcement and simultaneously alters the momentary frequency of the behavior that has been followed by that reinforcement" (Michael, 1982). Since the EO is momentary, the experimenter must either capture or contrive the reinforcing effectiveness of an event (Sundberg 1993). A trainer can capture the EO by using it as it naturally occurs. In order to contrive an EO, the trainer must manipulate a variable that alters the value, another object or event as a form of reinforcement (Sundberg 1993).

For example, the experimenter can create a period of deprivation where the subject is restricted access to something (Michael, 2000).

Some unconditioned EO's (UEO) such as physiological needs lend themselves to being captured because over time the subject's motivation for them increases (Sundberg 1993). Therefore, the experimenter can wait in the subject's natural environment until the EO is strong. However, it is also possible to contrive an UEO by manipulating the environment (e.g. salty chips increase value of liquids, cold room increases value of warmth) (Sundberg 1993).

Reducing the frequency of EO will not cause a permanent improvement in a subject's behavior because the behavior will return when the EO returns (Michael, 2000). Therefore, Michael (2000) suggests using the time when the EO is weak or absent to "generate a repertoire that interferes with the problem behavior". FCT is a method to create such a repertoire.

Brown *et al.* (2000) examined the relevance of the EO when teaching communication. The study taught subjects two different requests, which were both in the form of sign. One of the requests was directly related to the EO while the other was not related to the EO. When the EO was present, all of the subjects consistently signed to access reinforcement. Interestingly, most of the subjects did not use the irrelevant sign in the presence of the EO. Moreover, when the EO was not present, the subjects rarely produced either request. In summary, problem behaviors that occurred most often when the EO was present were replaced with a relevant request (Brown *et al.*, 2000). The irrelevant requests were not functionally equivalent to the occurrence of problem behavior and thus were less likely to be used (Brown *et al.*, 2000). This study highlights how a communicative response must be relevant and match the function of a problem behavior.

Forms of Communication

When trying to teach a non-verbal child how to speak, it is necessary to first determine what type of communication will work best for him or her (Durand, 1990). Studies have shown that different subjects have clear preferences for a specific type of communication (Winborn, 2004). The most desired form of communication is oral speech (Sundberg, 1993). This is because of the large availability of people who can model, prompt, and reinforce oral speech without the need for specific training (Lovaas, 1977; Sundberg, 1993). Oral speech is also completely portable and often paired with strong reinforcers (Lovaas, 1977). However, some individuals may not be able to establish oral speech, even with direct intensive speech therapy (Sundberg, 1993).

Luckily, oral speech is not the only form of communication that can be taught. In fact, there are actually four main response forms (i.e. response topographies) including: (a) speech (oral), (b) sign, (c) picture pointing or picture exchange, and (d) independent writing, typing (Sundberg, 1993). With the exception of speech, the other types of communication are all forms of “Augmentative Communication” or “Alternate Communication” (Shafer, 1993). Often the decision to use one technique is based on the personal preference of the trainer instead of being based on the child’s individual abilities/needs or any empirical evidence (Sundberg, 1993). However, different communication techniques have various advantages and disadvantages. Therefore, the decision regarding which one to choose should be based on research and the characteristics of the learner (Carbone, 2003a). Regardless of the specific technique to establish communication, the ultimate objective should always be the establishment of vocal response forms (Sundberg, 1993).

Interestingly, signing and pointing systems both have the benefit of avoiding any negative emotional history associated with vocal speech (Sundberg, 1993). Sundberg (1993) promotes sign

language over picture systems, stating that sign language is the most similar to vocal speech while having the most advantages and fewest disadvantages. According to Sundberg and Sundberg (1990a), sign also facilitates receptive language (mand stimulus selection) better than picture systems. Furthermore, Sundberg and Sundberg (1990a) point out that sign language is acquired quicker and with more accuracy than picture pointing systems.

Researchers have evidenced that teaching a nonverbal child to sign will generate communication (Clarke, Remington, & Light, 1988; Partington, Sundberg, Newhouse & Spengler, 1994). Furthermore, sign language can actually improve oral speech (Sundberg, 1993). For example, some children use signs to prompt their own vocalizations (Carbone, 2003a). This technique of combining signs with spoken words (total communication) has led to improved vocalizations with some children. This is especially true with children who already possess some vocal imitation (Brady & Smouse, 1978; Casey 1978; Fulwiler & Fouts, 1976; Konstantareas, Webster & Oxman, 1979; Layton, 1988; Layton & Baker, 1981; Yoder & Layton, 1989). Therefore, sign language is ideal for autistic children who are vocal, but engage in frequent delayed echolalia or scripting, because it helps them develop more abstract verbalizations (e.g. adjectives, propositions) (Barrera & Sulzer-Azaroff, 1983; Konstantareas, 1984).

For those students who do not already have vocalizations, research has suggested that teaching sign language is easier than teaching vocal speech. This is because many nonvocal children who cannot echo sounds or words can imitate some fine/gross motor movements (Sundberg, 1993). In fact, some signs are already strong in a child's repertoire because the sign itself is similar to the item or act (e.g. eat) (Carbone, 2003a; Sundberg, 1993). Carr (1979) believes that almost all children with autism can learn to sign despite motor imitation difficulties.

Due to the large deaf community, there are also a lot of materials and trainers to help facilitate the acquisition of sign (Sundberg, 1993).

Another advantage to sign language is that it is topography based, making it conceptually similar to speech (Michael, 1985; Shafer, 1993; Sundberg, 1993; Sundberg & Sundberg, 1990; Wraikat, Michael, & Sundberg, 1991). Sign is topography based because there are different signs for each reference and it is free from any environmental support (Sundberg, 1993). Therefore, researchers claim that sign language is more similar to speech than any other augmentative communication (Carbone, 2003a). In summary, sign language is topography based (i.e. individual signs for each referent) and thus does not require any environmental support (i.e. no equipment) making it completely portable in any environment (Carbone, 2003a).

However, there are also disadvantages of using sign language. One such criticism is based on the fact that sign language is topography based, which necessitates each sign to be individually shaped (Michael, 1985). Some additional disadvantages are directly related to training. In order for a subject to be able to communicate with someone (teacher, staff, or peers), that person must have special training in sign language (Sundberg, 1993). In other words, in order for someone to learn sign, there must already be a signing community. Furthermore, when trainers are proficient enough to teach sign, many do not start teaching basic mands, but instead begin with more complex mands (Carbone, 2003b). These complex mands (e.g. more, please, toilet, finished) are more difficult for subjects to acquire because they are often multiply controlled by complicated motivators and stimuli that change frequently (Carbone, 2003b). Researchers have historically documented the need for a large number of daily trials in early language learning (Lovaas, 1977). Yet, trainers often fail to provide enough training trials when teaching sign language, which compromises the subject's acquisition (Carbone, 2003a). Another reason many fail to teach sign is

that trainers often start by teaching signs that may resemble each other too much (e.g. eat & drink) or are too physically demanding due to their complex response form (Carbone, 2003a). In some situations, there is no requirement for the subject to sign outside of the training sessions, which leads to a failure to generalize (Carbone, 2003a). When teaching sign language, there needs to be a progressive curriculum or the child will be stuck at a level too long, which is also problematic (Carbone, 2003a). Finally, if the training involves a single verbal operant without also training other types of communication (e.g. tacts, but limited intraverbal or mand training) this will impede the process (Carbone, 2003a).

Alternatives to sign language include various picture pointing and picture exchange systems, which are the most commonly used techniques by language intervention specialists (Shafer, 1993). Sundberg (1993) and other researchers point out advantages to picture pointing systems. One such advantage is the simple matching to sample responses, which are easily acquired (Sundberg, 1993). Furthermore, the response topography (pointing) is the same for each word (Carbone, 2003a) and may already be strong in a person's repertoire (Sundberg, 1993). Unlike sign language, pointing systems are less difficult for speakers who have muscle control problems (Carbone, 2003a). Lastly, the listener does not have to be familiar with an additional language or require additional training such as sign language (Bondy, 2001; Charlop-Christy *et al.*, 2002; Sundberg, 1993).

There are also disadvantages to picture pointing systems. Unlike sign language, these systems require environmental support (Sundberg, 1993). For example, it is necessary to have the pictures wherever or whenever the speaker needs to communicate, which is not always feasible. There is also typically a space limitation to how many pictures are available at any given time (Sundberg, 1993). As a result, the speaker cannot always emit the response when his or her

motivation and stimuli are strong in the natural environment. Unlike sign, there may not be a naturally existing community that uses the same pictures as a speaker may use as part of his or her picture system (Sundberg, 1993). Therefore, there may be little to no opportunity for the person to observe competent speakers using the same system (Carbone, 2003a). Another difficulty is trying to portray complex words in symbol form (Carbone, 2003a). Thus, the symbols/ icons become increasingly abstract as the complexity of words increase (Sundberg, 1993). When pointing to a picture, the pointer needs the listener to be in close proximity, which is not always feasible (Sundberg, 1993). Furthermore, the picture response is often slow and can often result in a loss of the listener's attention (Sundberg, 1993). Unlike vocal speech and sign language, which are both topography based, picture systems are selection based communication systems (Michael, 1985). Stimulus selection verbal behavior may be more difficult to acquire than topography based (Carbone, 2003a; Sundberg, 1993). Sundberg (1993) also documents that picture systems typically result in no improvement in speech.

However, Bondy and Frost (1993) reported substantial improvements in the vocal behavior of a number of children as a result of a specific picture system called Picture Exchange Communication System (PECS). PECS require the speaker to scan, select, and hand a picture to a listener (Bondy & Frost, 1993). Bondy and Frost (1993) describe PECS as a "communication system in which very young autistic children are taught to mand for significant reinforcers without substantial preliminary training". PECS use pictures and behavior principals such as shaping, differential reinforcement, and transfer of stimulus control to teach communication (Charlop-Christy, Carpenter, Le, LeBlanc, & Kellet, 2002). PECS requires the subject to approach the listener and initiate interaction prior to emitting a communicative act, making it unique from other systems (Bondy, 2001). This eliminates the need for a listener to be in close proximity like other

picture systems. Furthermore, it requires adults to interact with the speaker as they are handed the picture (Sundberg, 1993). Another advantage of PECS is that it requires the speaker to make very few complex motor movements (Charlop-Christy *et al.*, 2002). Furthermore, PECS are portable and relatively inexpensive (Charlop-Christy *et al.*, 2002). Lastly, PECS can also be taught quickly (Charlop-Christy *et al.*, 2002).

One potential difficulty with PECS is the likelihood of pictures being lost (Bondy, 2001). However, this can be resolved by having backups of essential pictures (Bondy, 2001). Another possible difficulty with PECS occurs when the child wants to communicate for something that he or she does not have a picture of in his or her communication book (Bondy, 2001). If a child continues to progress with PECS, but does not acquire speech, the total number of pictures needed in his or her book may be large. In these situations, it may be necessary to change to an electronic system (Bondy, 2001).

However, despite its common clinical use over the past decade, Charlop-Christy *et al.* (2002) claim to be the first to devise a well controlled empirical investigation as to the effectiveness of PECS. Their study demonstrated increases in vocal speech as three children with autism learned to use PECS. The study also evidenced increases in all three children's social-communicative behaviors as well as decreases in their problem behaviors (Charlop-Christy *et al.*, 2002).

There are some general good teaching practices to facilitate communication regardless of the technique. For example, sporadic training is not effective so teaching trials should occur as much as possible (Lovaas, 1977). Also, it is essential that the chosen reinforcement is not accessed freely outside of the training or the subject's motivation (establishing operation) will weaken (Carbone, 2003a). Reducing the learner's errors and thus ensuring high levels of correct

responding also helps teach communication (Carbone, 2003b; Carr & Durand, 1985; Carr, Newsome & Binkoff, 1980; Durand, 1990; Horner & Day 1991; Sailor *et al.*, 1968; Weeks & Gaylord-Ross, 1981).

Overview of Study

The present study provided evidence that a functional analysis could be conducted in a public school setting by public school personnel. Furthermore, unlike other similar studies, the data analysis and interpretation was also conducted by school personnel to create and implement a function based intervention. Once the function of the student's problem behavior was determined, an intervention incorporating FCT addressed the student's specific communicative intent. Through FCT, students learned to appropriately communicate their needs while reducing their problem behaviors. Furthermore, the study addressed the specific population of autism.

CHAPTER 3
METHODOLOGY

Experiment 1

Participants

Three male subjects were involved in the study. All subjects previously carried an axis I diagnosis of autism. All three subjects attended one of the five elementary self contained autistic support classrooms located in the Cherry Hill School District. All students have received speech therapy since early intervention. All three subjects continued to receive speech and language therapy due to significant language delays. All subjects exhibited one or more problematic behaviors that interfered with their everyday functioning at school as reported by their teacher. Prior to each student's participation in the study, a variety of behavior interventions had been attempted to reduce problem behaviors. All three students had a one on one educational assistant assigned to them throughout the school day. Adaptive levels of the students were determined by a school psychologist with assistance from each student's special education teacher using the Vineland Adaptive Behavior Scales: Second Edition Teacher Rating Form.

In order to obtain and identify participants, initial information regarding the study was sent to each teacher who taught a self contained elementary autistic class within the Cherry Hill School District. The child study team case managers were also informed about the study. The teachers and child study team case managers were asked to identify students that were exhibiting problematic behaviors that were interfering with that child's educational progress. After the initial information was sent, two student names were identified. Those names were written down and one name was chosen randomly to be the first participant.

The first participant, Tim, was a six year-eight month old autistic male. His overall adaptive functioning score on the Vineland school form was in the low range (68, 2nd percentile) (Appendix A, Figure 50). When the experimenter was ready to recruit her next subject, she decided to wait until the following school year rather than potentially running out of time during the current school year or continuing over the district's Extended School Year (ESY) program. The decision not to conduct any sessions over the summer was based on the fact that student's teachers, assistant, class setting, classmates, and even school were typically different during the ESY program. As a result, participants two and three were obtained the following school year. Interestingly, the district added a fifth autistic class for the following school year. Previously, there were only four autistic self contained elementary classes. Furthermore, the location of the classes within the district, the assigned teachers, as well as the case managers assigned to those classes were changed from one year to the following year.

Case managers and teachers were contacted again and asked to identify names of students in their respective classrooms who were engaging in problematic behaviors. This time only one name was provided as a potential subject, Kevin. Kevin was a six year-eleven month old male. His overall adaptive functioning score on the Vineland school form was in the low range (67, 1st percentile) (Appendix A, Figure 51). The procedure was once again repeated to identify a third subject. This time, two names were provided and one was randomly chosen by the examiner. However, the parents of that student chose not to have their son participate in the study. Therefore, the second student who was referred at that time, Larry, was chosen as the third and final participant in the study. Larry was a nine year-two month old male. According to the Vineland Adaptive Behavior Scale school form, his overall adaptive functioning score was in the moderately low range (79, 8th percentile) (Appendix A, Figure 52). A school psychologist

working in the school district conducted the functional analysis sessions with the help of various school personnel, including special education teachers and one on one support staff. The above personnel also participated in the functional assessment portion of this study by collecting descriptive data (A-B-C).

Setting

Ultimately, the three subjects involved in this study were students in two of five elementary autistic support classrooms located in two different public elementary schools within the Cherry Hill School district, located in a suburban section of southern New Jersey. Tim's functional analysis initially took place in a classroom in his school that had been converted into a child study team office. However, his sessions were later moved to a more naturalistic setting, his self contained classroom. Based on their specific A-B-C data as well as space limitations, Kevin and Larry's functional analysis primarily took place directly in their self contained classrooms. When needed, sessions also expanded to other familiar settings within the student's school building such as the gymnasium, lunch room, hallway, play ground, and library.

Procedure

Once each subject was chosen and consent was obtained, the school psychologist met with each student's special education teacher to identify specific problem behaviors in which the subject was engaging. Operational definitions for all target behaviors were created and documented. Functional assessment data were initially collected via a descriptive analysis (A-B-C data), a direct data collection method. The A-B-C data sheets were modified by the school psychologist based on the individual characteristics of the subject (Appendix B. Tim: Figure 53, Kevin: Figure 54, Larry: Figure 55). The A-B-C data were taken by each subject's special education teacher as well as his

assigned educational assistant. Data were taken throughout the subject's school day in various environments.

Once enough data were taken to allow for an accurate representation of each student's problem behaviors, the school psychologist entered the data into an excel spreadsheet. Therefore, the specific behavior, total number of behaviors recorded, and the total number of days data were collected was specific to each subject. Tim's data were taken over 17 school days and consisted of 56 different occurrences of behavior. Tim's problem behaviors included: tantrums, non-compliance, and pushing with his hands into his mouth. Kevin's data were taken over 16 school days and consisted of 82 different occurrences of behavior. Kevin's behaviors consisted of non-compliance, property destruction, flopping, attempting to leave the room, crying, hitting objects, screaming, running from staff, self injurious behavior, shaking his fist, and falling asleep. Larry's data were taken over ten school days and consisted of 137 different occurrences of behavior. Larry's problem behaviors consisted of non-compliance, sensory stimulation, socially inappropriate behaviors, inappropriate use of materials, turning away from speaker, interrupting teacher, crying, laying his head down, saying something not friendly, putting hands in his pants, and acting silly. Some of Larry's specific behaviors were later combined into more general categories to assist with the analysis of his data. Therefore, the final analysis examined the following problem behaviors for Larry: non-compliance, sensory stimulation, socially inappropriate behaviors, inappropriate use of materials, turning away from speaker, interrupting teacher, and crying. The data for each subject were graphed and analyzed by the school psychologist. Based on the results, the school psychologist developed a hypothesis for each subject regarding the function of his problem behavior.

Based on the results of the descriptive analysis (i.e. A-B-C data), specific conditions were chosen to be part of the functional analysis for each subject. Subjects were exposed to the various conditions using a single subject multielement manipulation design (Barlow & Hayes, 1979; Durand & Carr, 1987; Iwata, *et al.*, 1982; Iwata *et al.*, 1994; Shirley *et al.*, 1997; Mace *et al.*, 1986; Mace *et al.*, 1987; Mace *et al.*, 1993; Thomas *et al.*, 1968). The order of presentation for each series of sessions was randomized for all conditions and subjects except one of Kevin's conditions, which will be discussed below. To do this, all conditions were written on a piece of paper and picked randomly to designate the session order. In addition to the specific session conditions established based on the A-B-C data for each subject, a control (i.e. Toy Play) session was also included. Due to the involvement of other students in one of Kevin's functional analysis conditions, that condition was not able to be randomly conducted. Instead, it took a great deal of coordination of scheduling and therefore was implemented when feasible.

Research has shown that the actual duration of time needed for a functional analysis session can range from 15 minutes (28.2%) to 10 minutes (52.0%) to 5 minutes (11.1%) (Hanley, *et al.*, 2003). There have also been studies with sessions as brief as 1 minute and others as long as 30 minutes (Hanley, *et al.*, 2003). For the purpose of this study, sessions were always five minutes in duration for all three subjects, which was sufficient time to determine the function of each student's problem behavior. Previous research also evidenced variability regarding the total number of sessions needed to conduct a functional analysis. Most studies conducted a functional analyses until the results were stable (Hanley, *et al.*, 2003), which was the criteria used in this study.

Sessions were conducted at various times for each student depending on the student's schedule as well as the schedule of the examiner. The total number of sessions for each student

varied. Tim's sessions were done over six days for a total of 35 sessions. Kevin participated in 29 sessions over five days. Larry's assessment took four days and required 17 sessions. Sessions were conducted between zero and two days a week depending on the therapist and student's availability. The total number of sessions for any given day also varied with some days involving only two sessions and no days involving more than nine sessions. In between sessions within any given day, staff remained in close proximity to the child. When necessary, the student was provided a sensory break (e.g. walk, swing, or trampoline) between sessions.

In the sessions, the student's one on one educational assistant or the school psychologist acted as the therapist. No other staff were involved in the functional analysis portion of the study. The school psychologist was the data collector for all sessions. Research indicated five standard session conditions in order to conduct functional analyses: 1) Control (i.e. Toy Play), 2) Tangible, 3) Demand, 4) Attention, 5) Alone. However, specific conditions were chosen based on the results of each subject's descriptive analysis and modified as needed based on the ongoing results of the functional analysis. Tim's sessions included the following conditions: Demand, Tangible, Modified Tangible, and Control (i.e. Toy Play). Kevin's sessions involved the following conditions: Demand, Tangible, Attention, Modified Demand, Modified Tangible/Attention, and Control (i.e. Toy Play). Larry's sessions included the following conditions: Demand, Attention, and Control (i.e. Toy Play). A general description of each condition was described below. Since none of the data for any subject indicated an automatic function, the alone was never used as a condition as part of this study.

Control (Toy Play)

This served as a control for all other conditions. The session room contained preferred toys, leisure materials, known reinforcers, and a therapist (Iwata, 2002). No demands were placed

on the student at any time. The student had free and easy access to all items. Throughout the session, the therapist maintained close proximity to the subject. At approximate 30 second intervals, the therapist provided 5 to 10 seconds of attention. The therapist also used this time to prompt engagement with any of the reinforcers or activities available in the classroom. All problem behaviors were ignored unless it was unsafe to do so, which was never the case in this study. Data were collected via paper and pencil for all problem behaviors. Control sessions provided an enriched environment (Iwata *et al.*, 1994).

Tangible

The student was in the session room with the data collector and therapist along with preferred toys or objects. The student was allowed free access to all items in the room for approximately one minute. After one minute, the therapist took away any object that the student had access to at that time. If the student exhibited any problem behaviors, he was immediately given access to the object once again and a timer was set for 30 seconds. At the end of the 30 second interval, the object was taken away again. This was repeated for the entire session. Data were collected via paper and pencil or for all problem behaviors.

Demand

The student was in the session room with the data collector and therapist. A list and supplies of the student's typical school demands was provided before the session. The therapist began the session by issuing a demand to the subject. Depending on the demand, the therapist at times utilized a graduated three-prompt procedure (Horner & Keilitz, 1975; Iwata *et al.*, 1994) for compliance. This method consisted of a verbal instruction, allowing the subject five seconds to respond. If the subject failed to respond after five seconds, the therapist repeated the instruction, modeled the correct response and waited another five seconds. If there was still no response, the

therapist repeated the instruction and physically guided the subject through the response using the least amount of physical contact possible. Social praise was provided if the student responded during the verbal or gestural prompts. Contingent upon any problem behavior, the therapist immediately vocalized that the demand was terminated (e.g. “You don’t have to”) and physically removed the demand from the subject’s immediate environment. The examiner also reduced attention by turning away from the subject for 30 seconds. The tasks were somewhat challenging for the specific student according to a report from the student’s teacher and based on the A-B-C data. The therapist continually placed demands on the student unless he engaged in a problem behavior. If the student exhibited a problem behavior at any time, he was provided with a 30 second escape. At the end of the 30 seconds, another demand was placed on the student. This was repeated for the entire session. Data were collected via paper and pencil for all problem behaviors.

Attention

The therapist and subject were in a room where a variety of moderately preferred toys was available. The therapist provided approximately one minute of attention before telling the subject that she needed to do some type of activity (e.g. read the paper, talk to someone). The therapist did not provide any additional attention following that statement. For example, the experimenter directed the student to “Play with the toys while I do some work”. To ensure the subject understood the directions, the items were placed in close proximity to the student. The data collector was also present in the room. The therapist provided no attention to the student while pretending to be engaged in an alternate task. Contingent on any occurrence of a target response, the therapist stopped what she was doing and provided attention by specifically addressing the behavior (e.g. “Don’t hit me Tim. It hurts”). Attention took the form of concern and disapproval, lasting approximately five seconds. If the subject continued to engage in a targeted behavior, the

examiner continued to provide attention. All other responses by the subject were ignored. The therapist had no other interactions with the subject unless that subject exhibited a problem behavior. Data were collected via paper and pencil for all problem behaviors.

All functional analysis conditions were implemented until stable levels of problem behaviors were obtained in all sessions or a clear pattern provided evidence as to the function of the problem behavior. If the initial assessment data were unclear after the sessions were consistently conducted, consideration was made as to the systematic alteration of assessment conditions (Iwata, 2002). As a result, additional modified sessions were added for Tim and Kevin. These sessions were based on information provided during the functional analysis, through the A-B-C data, as well as anecdotal information provided by the student's teacher and educational assistant. Specifically, a modified tangible session was added for Tim. Additionally, a modified tangible session and a modified demand session were added for Kevin. It was not necessary to add any additional session types to Larry's functional analysis. Although the names of the sessions were similar at times, the modified sessions were individualized for each subject.

Modified Tangible (Tim)

Tim's modified tangible session was designed as a combination of his demand and tangible conditions. During this condition, demands were still being placed on Tim. However, instead of being provided with escape contingent on a problem behavior, he was allowed to "get his way". For example, when Tim was corrected after inaccurately identifying an answer to a specific question, he began engaging in problem behaviors. Allowing him an escape did not reduce his problem behaviors. However, telling him that his answer was correct would frequently result in an immediate termination of the problem behavior. The hypothesis was that Tim did not seem to escape the demand completely. Instead, he seemed to want to be told that his answer was correct.

It appeared that Tim was not trying to escape the demand, but was instead was trying to control some aspect of the demand.

Modified Demand (Kevin)

Kevin's modified demand session was created to assess the specific demand of him being asked to leave his classroom, which was reportedly an antecedent based on the A-B-C data as well as anecdotal information. Specifically, Kevin was in his classroom with the data collector and therapist. The therapist began the session by issuing the demand for Kevin to leave the room. The therapist presented the demand by repeating the verbal direction, allowing Kevin five seconds to respond. If he failed to respond after five seconds, the therapist repeated the instruction. Social praise was provided if Kevin complied. Contingent upon any problem behavior, the therapist immediately terminated the demand and turned away from him for 30 seconds. The therapist continued to repeat the demand unless Kevin engaged in a problem behavior or complied by leaving the room. If Kevin exhibited a problem behavior at any time, he was provided with a 30 second escape from the examiner providing the demand to leave the room. At the end of the 30 second the demand to leave the room was repeated.

Modified Attention/Tangible (Kevin)

This session was created as a modification of Kevin's modified demand session. However, instead of Kevin being asked to leave the room, his classmates were asked to leave the room without him. Specifically, Kevin was in his classroom with the data collector and therapist along with his classmates. Kevin was allowed free access to engage with his peers for one minute. A timer was set to go off after one minute. When the timer went off, another staff member escorted his classmates out of the room. No explanation was provided to Kevin. If Kevin exhibited a problem behavior, the plan was to bring his classmates back into the room or Kevin would be

allowed to join them outside the classroom. However, when the sessions were conducted and Kevin engaged in a problem behavior, he was consistently too upset to join his classmates and too aggressive to allow his classmates back into his immediate vicinity. Therefore, data were taken for the remainder of the session without Kevin being provided with access to his classmates.

Data from all sessions were graphed in a multiple baseline across subjects and visually assessed. Visual analysis of data allowed the examiner to detect changes in behavior, analyze data on a continual basis, and assess effects of experimental variables without relying on inferential statistics (Hanley, et al., 2003). However, some studies have demonstrated that the visual interpretation of functional analysis data may not be reliable (Hagopian, *et al.*, 1997). Therefore, some researchers have suggested other methods of analyzing data. Hagopian *et al.* (1997) was able to establish higher rates of inter-rater agreement by setting up criteria for the visual inspection of multielement functional analysis data. The structured criteria set up by Hagopian *et al.* (1997) compared each test condition with the control condition. Specifically, upper and lower criterion lines were drawn based on one standard deviation above and below the mean of the control condition (Hagopian, *et al.*, 1997). Differentiation occurred when at least five more data points within a specific condition were above the upper criterion line than below the lower criterion line (Hagopian, *et al.*, 1997). Hagopian *et al.* (1997) also set up specific criteria for other results such as automatic reinforcement, trends (upwards, downwards, and overall), low rates of behavior, low magnitude effects, and multiple maintaining variables. This study used the visual inspection of the data. Based on the data from the functional analysis, the function of the student's problem behavior was hypothesized.

Staff Training

The examiner provided training to each one on one educational assistant and special education teacher regarding the collection of A-B-C data. All involved staff also received written instructions describing the functional analysis sessions. Training procedures were conducted by creating simulated sessions to ensure that the one on one educational assistants were able to reliably observe behavior and respond accordingly. Each assistant practiced conducting sessions with the experimenter/school psychologist for each condition being assessed.

Experiment 2

Participants and Setting

The subjects were the same as in experiment 1.

Procedure

Once the function of each subjects' problem behavior was determined, a function based treatment plan was created by the school psychologist. The treatments always incorporated FCT. In order to determine the optimal modality or form of communication to use, the Communicative Response Modality Checklist (Durand, 1990) and Communicative Response "FORM" Checklist (Durand, 1990) were completed as needed. FCT was implemented in the condition in which the problem behavior occurred at the highest rates. That condition was conducted consecutively while applying the intervention. Sessions were continued until reduced rates of the problem behavior were evident or no change was apparent. The same methodology was used to collect data as in experiment 1. The treatment was implemented until three descending data points were achieved. If there was little to no effect after the intervention was implemented for approximately three sessions, the intervention was modified as needed. This was continued until a successful treatment

was developed for each subject. The same procedure was followed for all three subjects. Data were presented in a multiple baseline across subjects.

Staff Training

Once the assessment phase was complete and a treatment was designed, staff were trained in the procedure for each and every treatment phase. Once again staff practiced implementing the procedure with the experimenter. The experimenter was part of each session and provided ongoing feedback as needed.

CHAPTER 4

RESULTS

Experiment 1

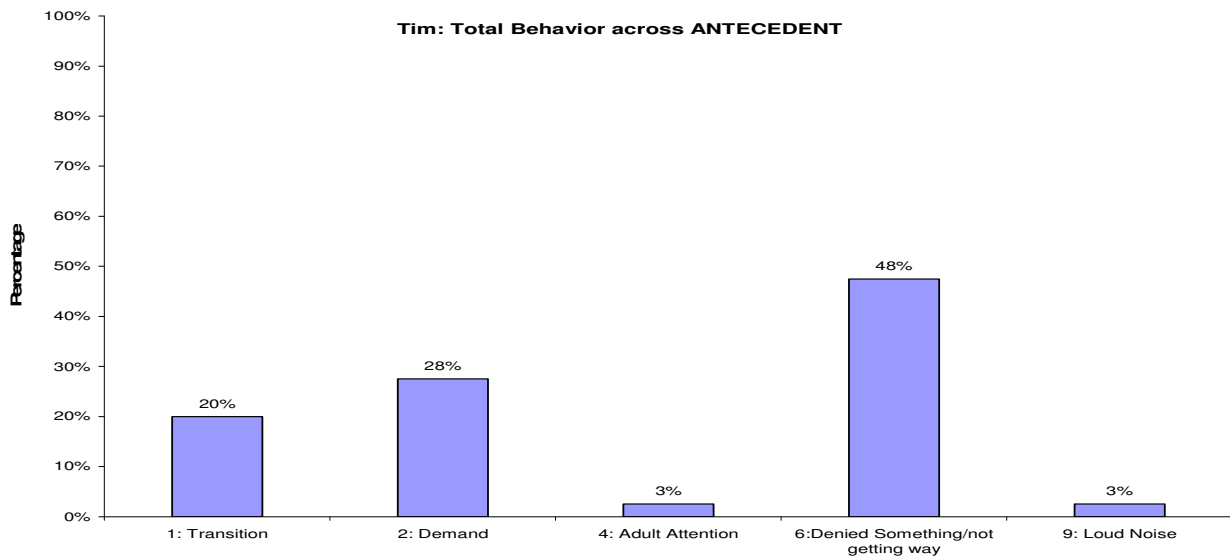
A-B-C Data and Functional Analysis Results

A-B-C data were taken on three autistic students enrolled full time in a public elementary school. Based on that data, hypotheses were formed regarding the function of each subject's problem behaviors by a school psychologist employed by the district. Based on those functions, functional analysis sessions were set up to experimentally test those variables. Those sessions were modified as needed based on ongoing analysis of the data. The functional analysis sessions provided valuable information regarding the function of each student's problem behavior. The results of the functional analysis for each subject are described in detail below.

A-B-C Results for Subject 1: Tim

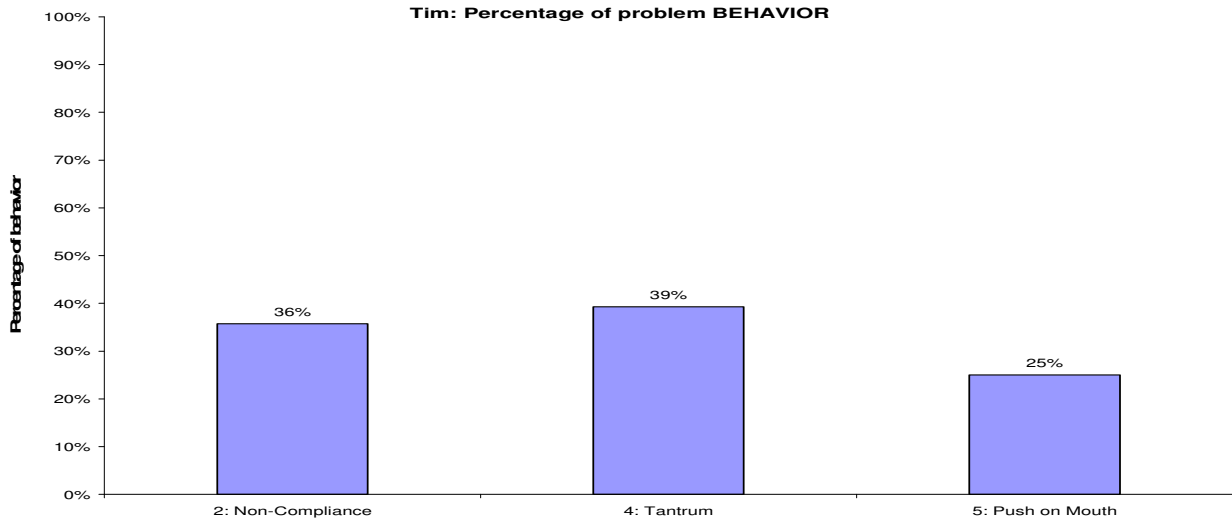
The results of Tim's A-B-C data were as follows: Antecedent: Tangible (Denied Something)-48%, Demand -28%, Transition- 20%, and Alone-0% (see Figure 1).

Figure 1. Tim A-B-C Data: Total Problem Behavior by Antecedent



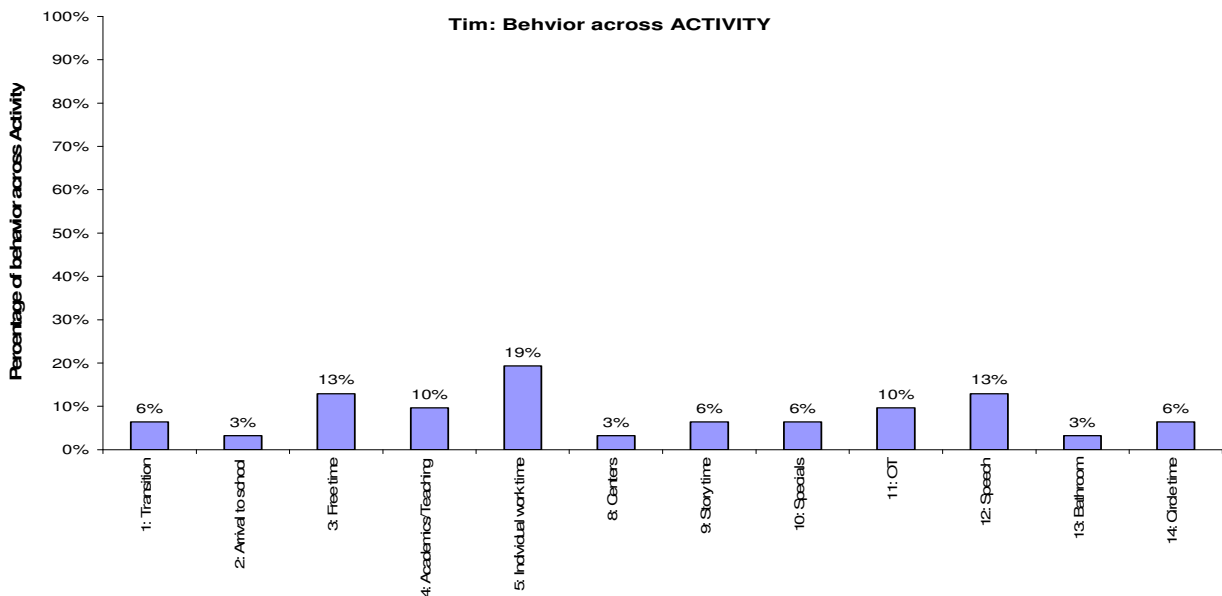
Behavior: Tantrum- 39%, Non-Compliance- 36%, and Pushing with Hands onto Mouth- 25% (see Figure 2).

Figure 2. Tim A-B-C Data: Percentage of Each Problem Behavior



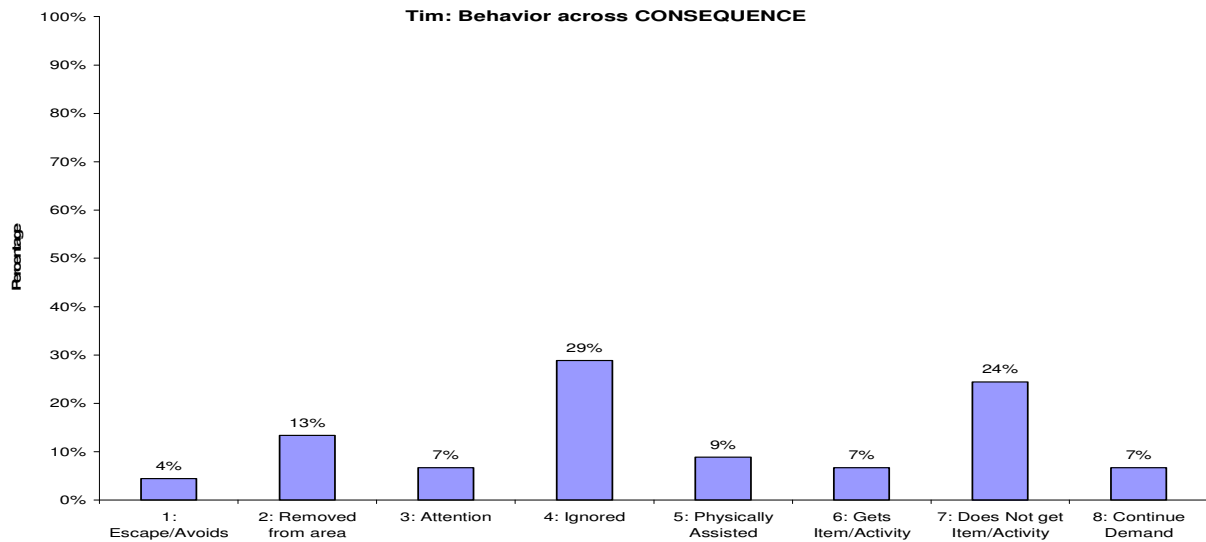
Activity: Individual Work Time-19%, Free Time- 13%, Speech- 13%, Academics- 10%, Occupational Therapy-10%, Transitions- 6%, Circle time- 6%, Story Time- 6%, Special Class-6%, Arrival to School- 3%, Bathroom-3%, and Centers-3% (see Figure 3).

Figure 3. Tim A-B-C Data: Total Problem Behavior by Activity



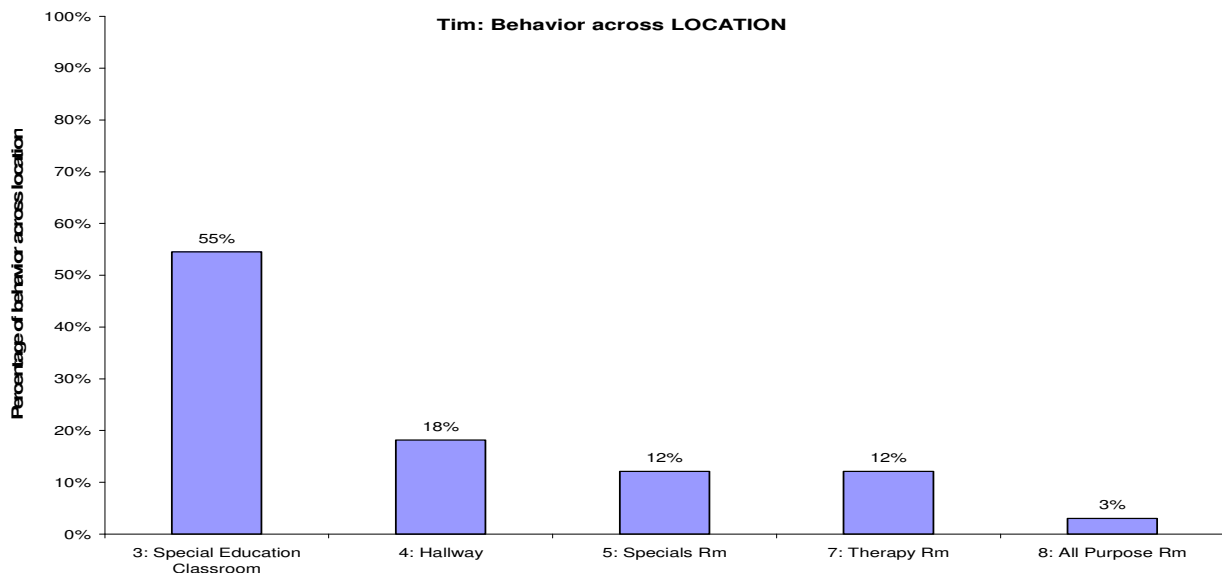
Consequence: Ignored-29%, Does Not Get Item or Activity-24%, Removed From Area-13%, Physically Assisted- 9%, Gets Item or Activity- 7%, Continue with Demand- 7%, Attention- 7%, and Escapes or Avoids Demand- 4% (see Figure 4).

Figure 4. Tim A-B-C Data: Total Problem Behavior by Consequence



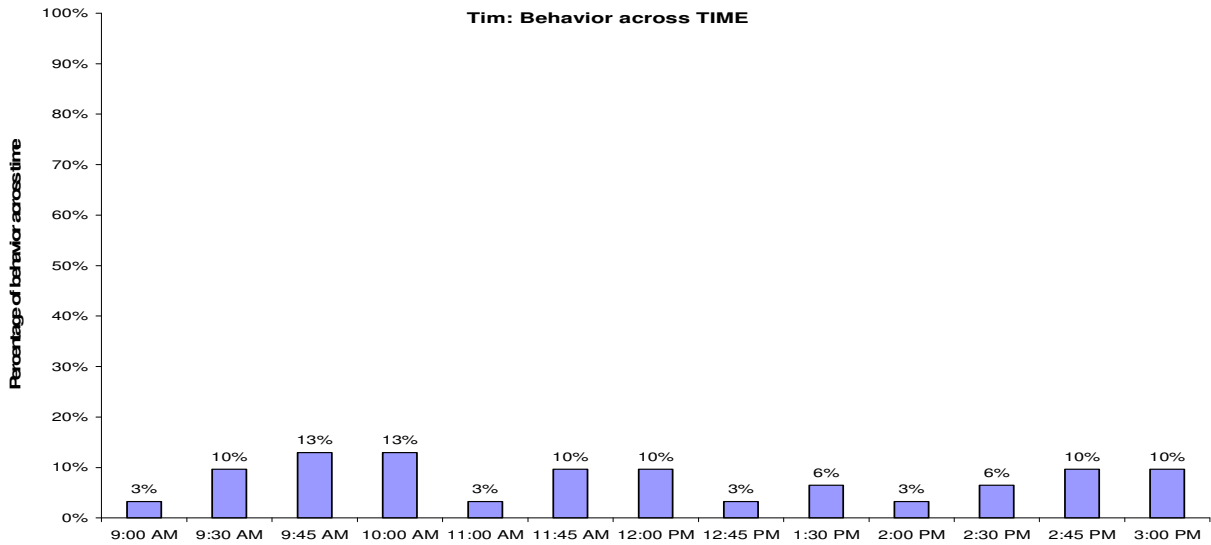
Location: Special Education Classroom-55%, Hallway- 18%, Special Classroom-13%, Therapy Room-12 %, and All Purpose Room- 3% (see Figure 5).

Figure 5. Tim A-B-C Data: Total Problem Behavior by Location



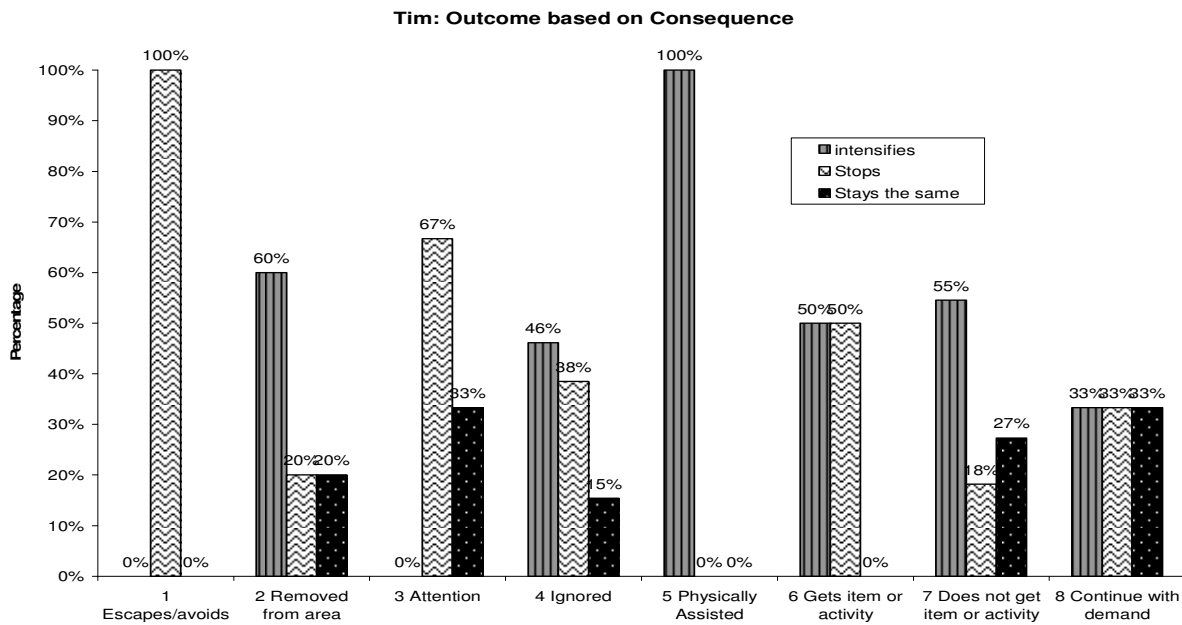
Time: Evenly distributed across school day (see Figure 6).

Figure 6. Tim A-B-C Data: Total Problem Behavior by Time



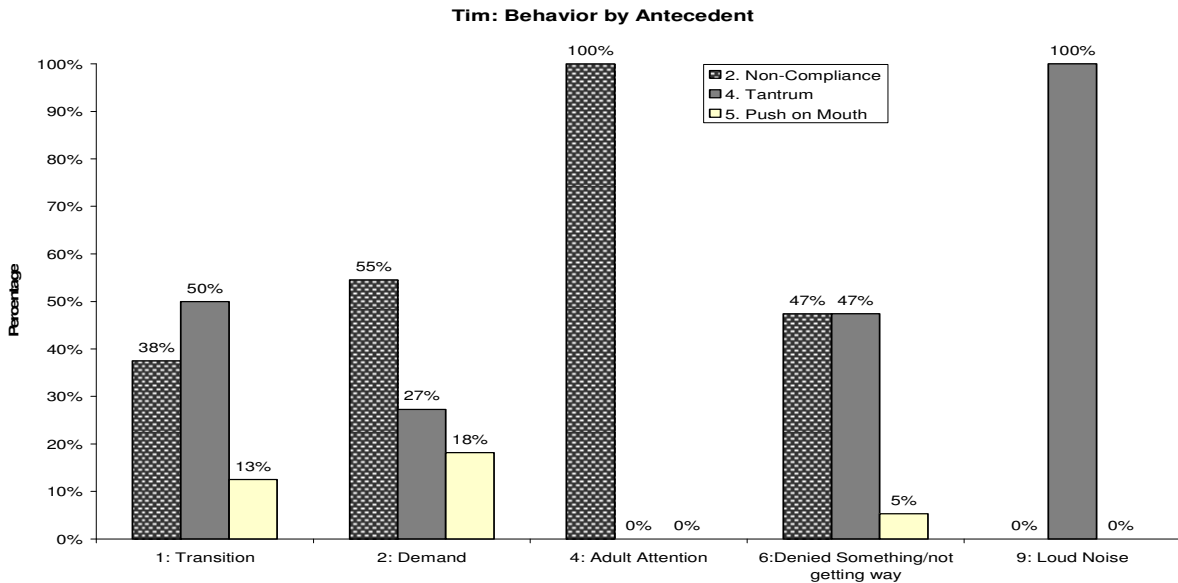
The following graphs outlines the outcome of each of Tim’s problem behavior according to each consequence (see Figure 7).

Figure 7. Tim A-B-C Data: Outcome Data by Consequence



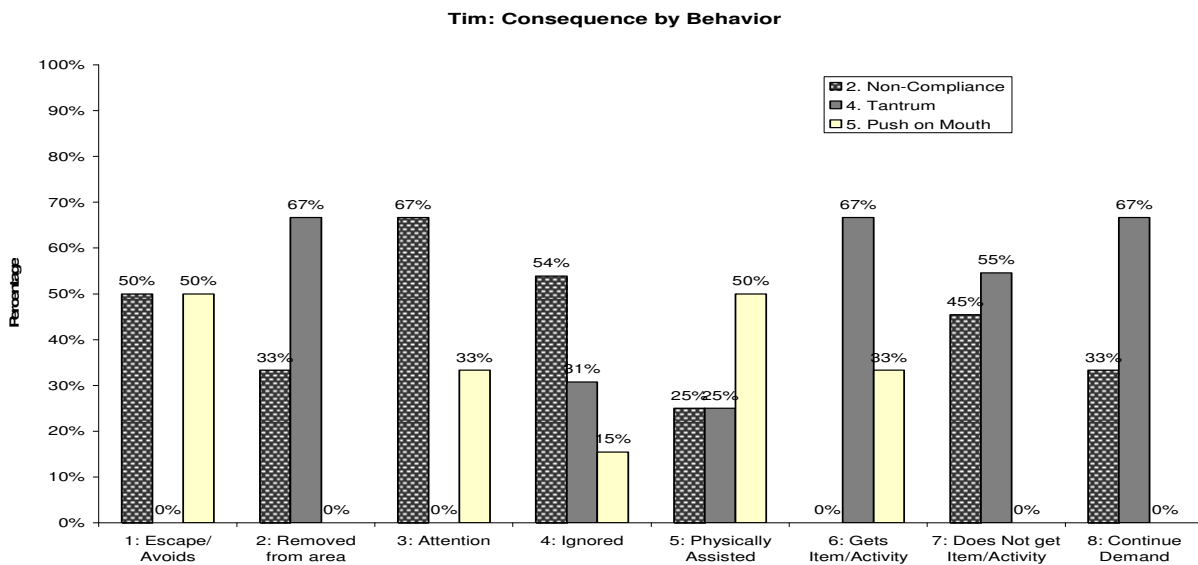
The following graphs outlines each of Tim’s problem behaviors according to that behaviors specific antecedent (see Figure 8).

Figure 8. Tim A-B-C Data: Each Problem Behavior by Antecedent



The following graphs outlines each of Tim’s behaviors according to that behaviors specific consequence (see Figure 9).

Figure 9. Tim A-B-C Data: Each Problem Behavior by Consequence



Functional Analysis Results for Subject 1: Tim

Based on the A-B-C data, the hypotheses was formed that Tim's problem behaviors served one of two functions: escape or access to tangible. Therefore, two different session types (Demand and Tangible) were used as well as a control condition to experimentally assess the function of Tim's problem behaviors. Data were collected on his non-compliance, compliance, screaming, flopping, aggression, and pushing his hands into his mouth. See Appendix C for a copy of Tim's functional analysis data sheet, which was modified as needed during the process. Initially, sessions were conducted in a separate analogue setting. However, Tim's problem behaviors were not significant in that setting. Therefore, after nine sessions, the functional analysis sessions were moved to his self contained classroom, which was a more naturalistic setting.

Tim did not engage in any aggressions in any condition. The rates of his flopping behavior were low with only one occurrence in the naturalistic setting during a tangible condition. Tim did exhibit some screaming in the analogue and naturalistic tangible sessions. He also pushed on his mouth in the demand and tangible sessions in both the analogue and naturalistic setting. The rates of non-compliance were low in the analogue condition and higher in the naturalistic condition. However, the rates and intensity of these behaviors did not reflect the A-B-C data or what was being reported anecdotally in the classroom.

Therefore, the demand and tangible conditions were combined into a modified tangible condition. During this condition there were still demands being placed on Tim, but he was allowed to get "his way" instead of being provided escape contingent on the occurrence of a problem behavior. This modified session was based on the hypothesis that Tim was not trying to escape demands, but was instead trying to control some aspect of the demand that was being placed on him. The new condition immediately elicited high rates of screaming. Tim's rates of

pushing on his mouth were inconsistent, but as high or higher for most sessions in comparison to rates observed in any previous condition. The occurrence of Tim’s flopping was variable and high only in two of the ten sessions. Due to the design of the session, non-compliance and compliance data were not taken. See Figures 10, 11, 12, 13, and 14 for Tim’s functional analysis graphs.

Figure 10. Tim Functional Analysis: Screaming

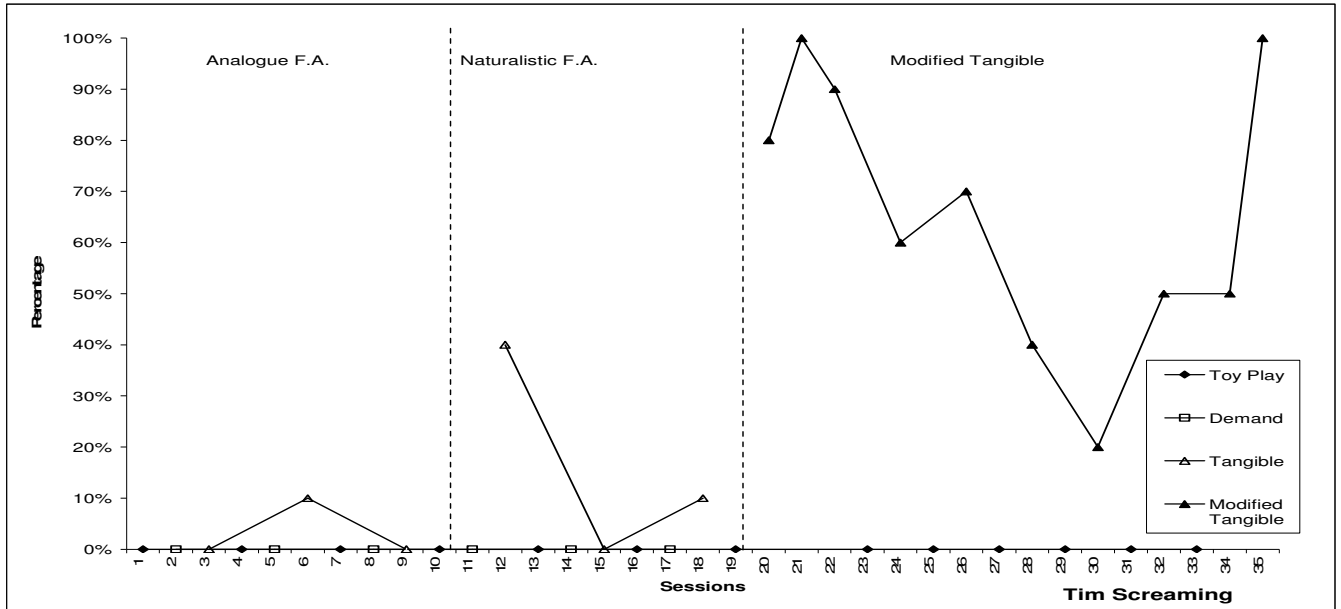


Figure 11. Tim Functional Analysis: Flopping

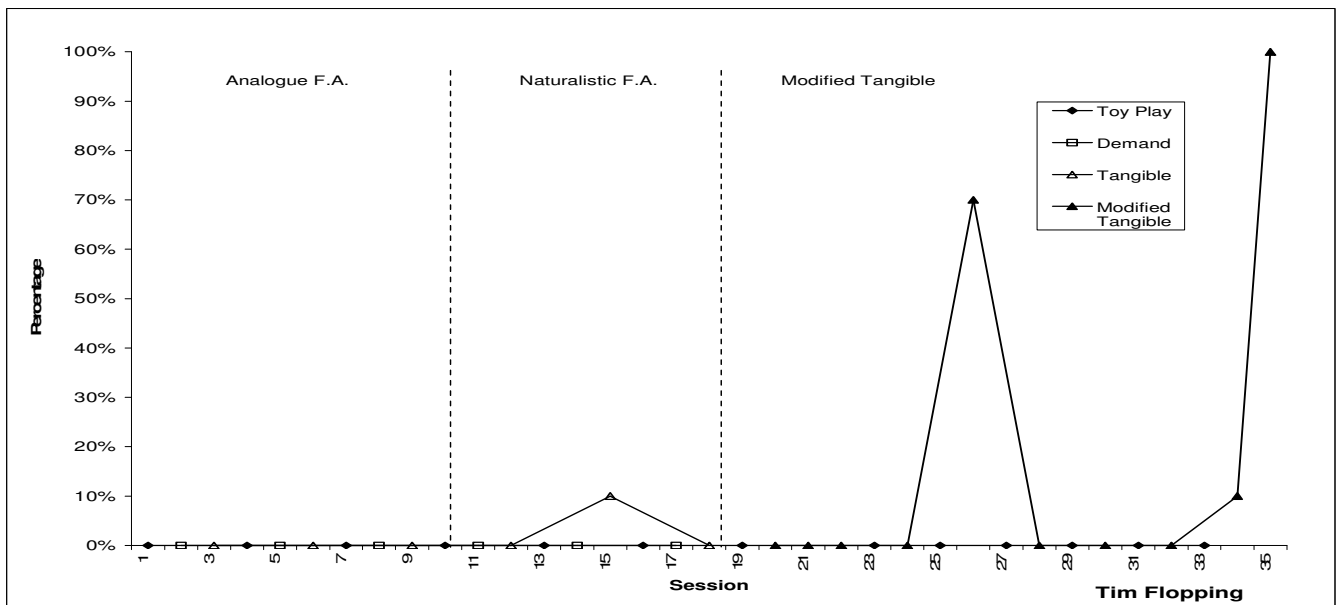


Figure 12. Tim Functional Analysis: Non-Compliance

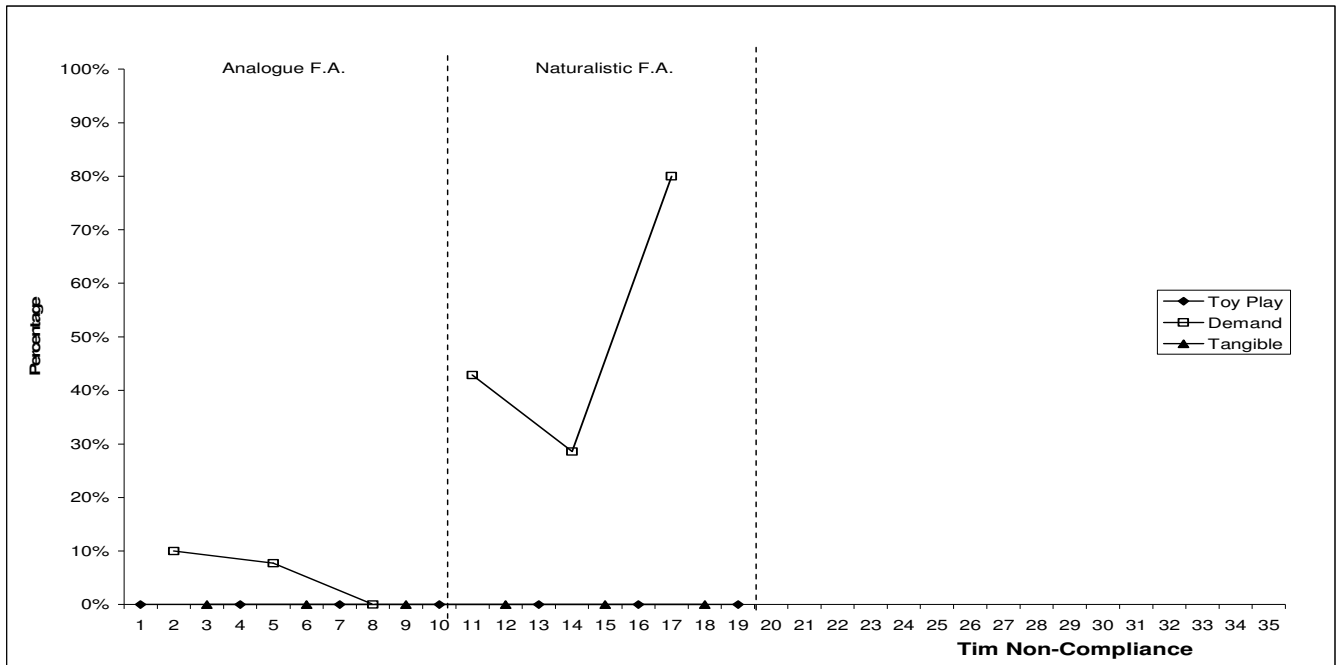


Figure 13. Tim Functional Analysis: Aggression

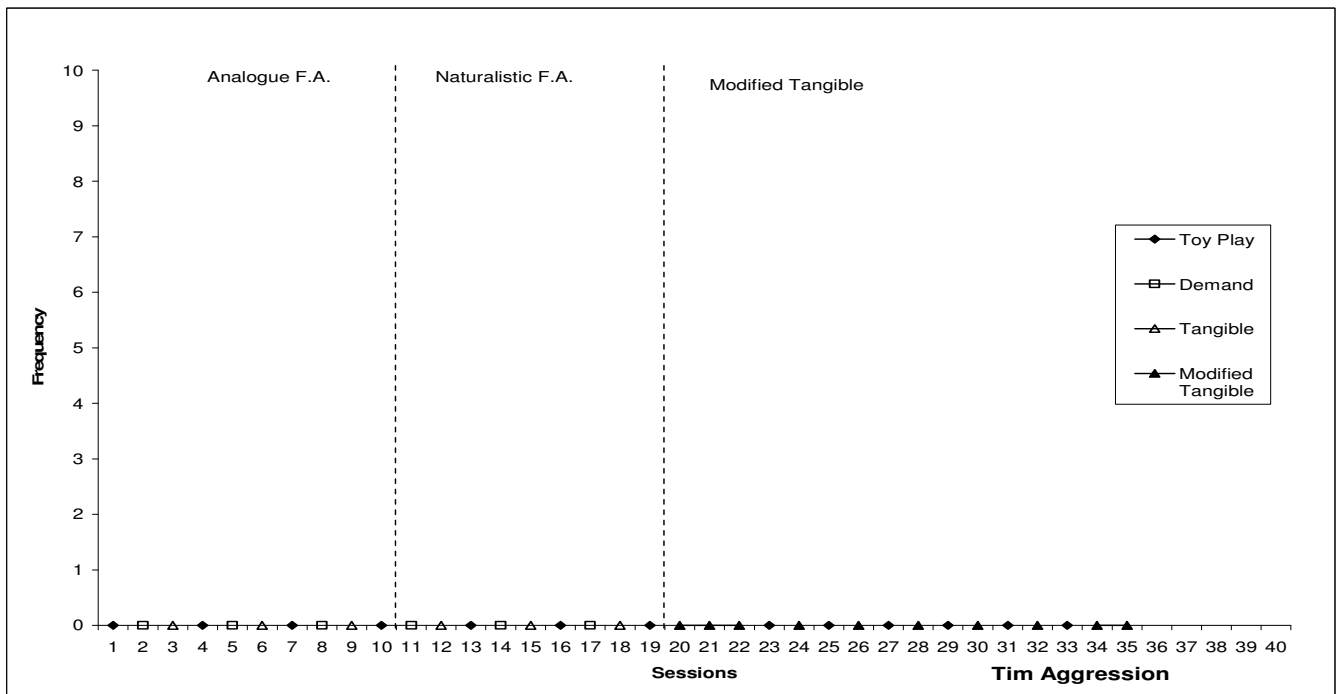
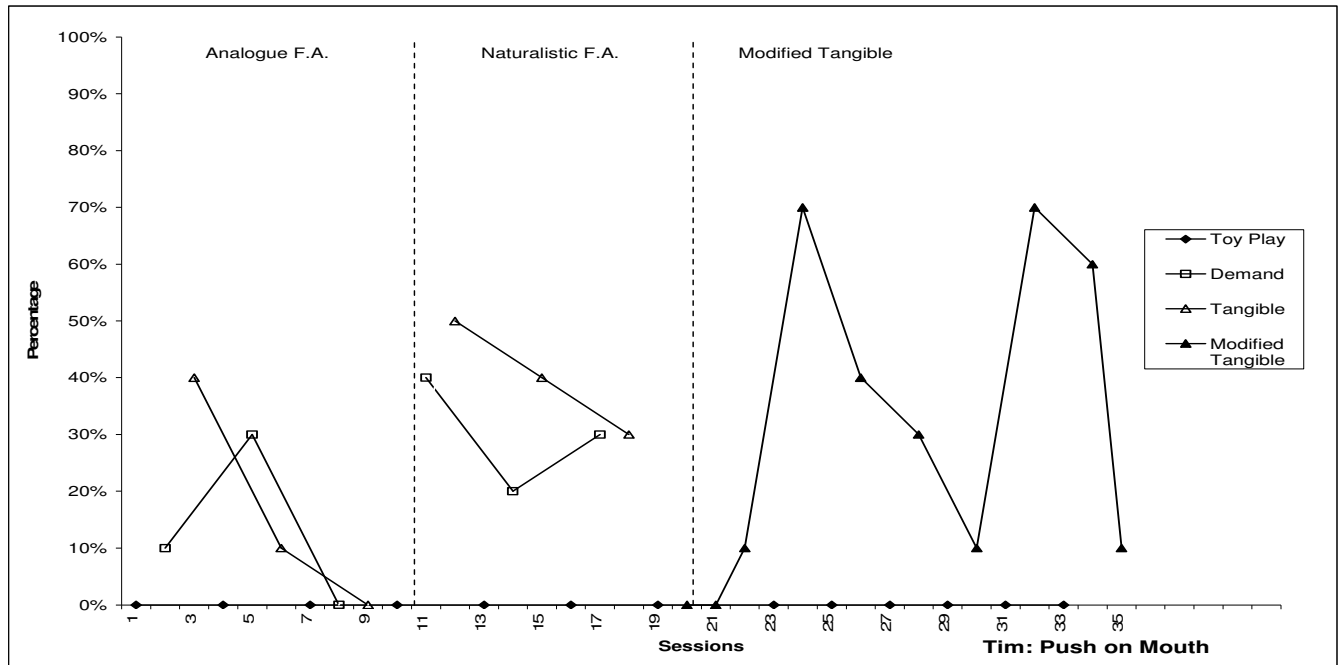


Figure 14. Tim Functional Analysis: Push on Mouth



The following table outlines all of Tim’s problem behaviors and each behaviors individual function based on the functional analysis. The functional analysis indicated that some of his behaviors were maintained by more than one function. Therefore, the functions were listed in order starting with the primary function.

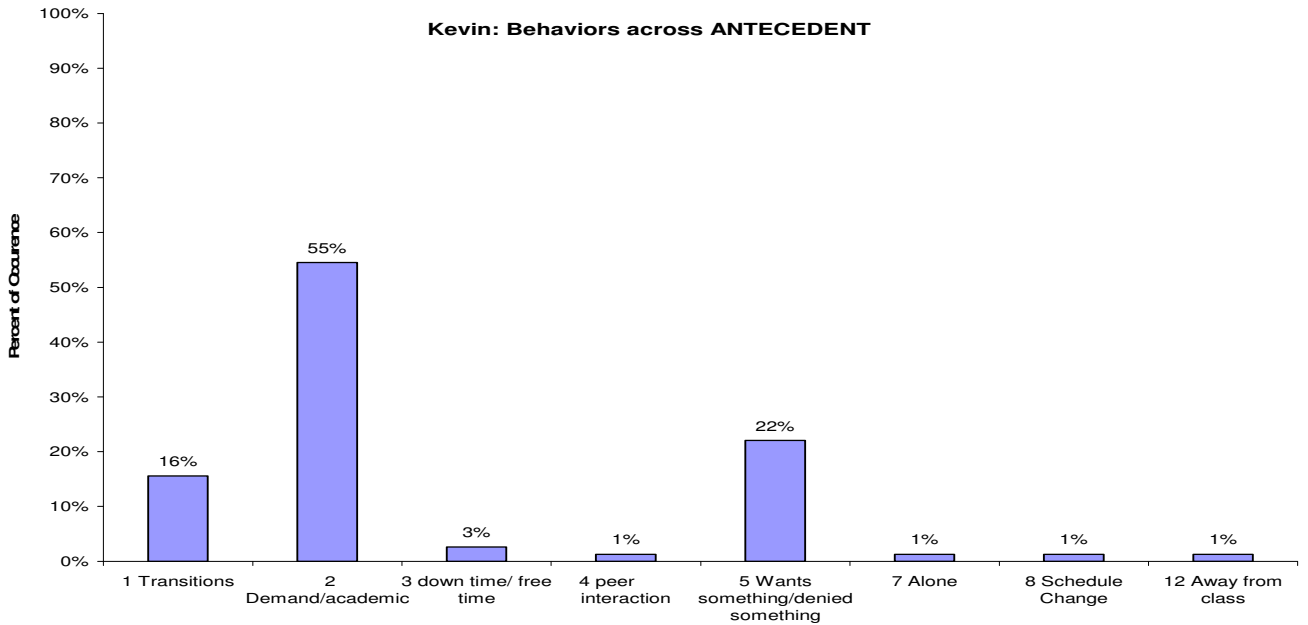
Table 1. Tim’s Behaviors by Function based on the Functional Analysis

Behavior	Function (primary listed first)
Pushing on Mouth	Control over Demand/Activity, Access to Items, & Escape from Demand
Screaming (Tantrum)	Control over Demand/Activity
Flopping	Low rates of occurrence → highest in Modified Tangible
Non-Compliance	Escape from Demand
Aggression	Not observed

A-B-C Results for Subject 2: Kevin

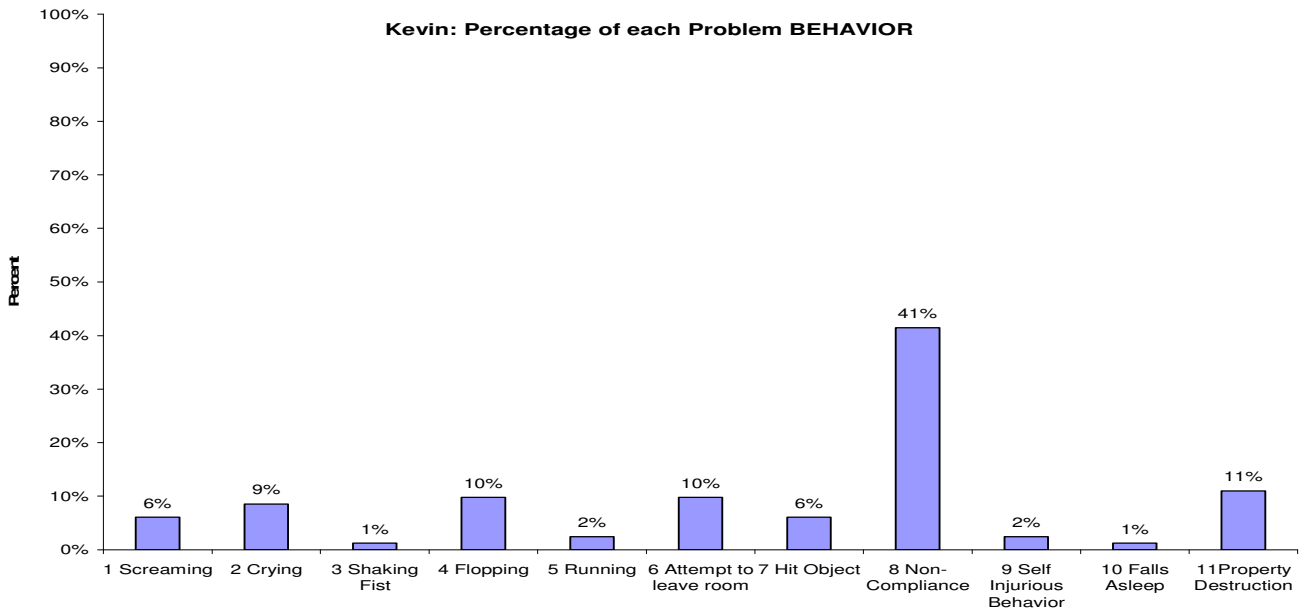
The results of Kevin’s A-B-C data were as follows: Antecedent: Demand/Academic-55%, Wants Something/Denied Something- 22%, Transitions-16%, Down Time/Free Time-3%, Peer Interaction-1%, Alone-1%, Schedule Change-1%, and Away from Class-1% (see Figure 15).

Figure 15. Kevin A-B-C Data: Total Behavior by Antecedent



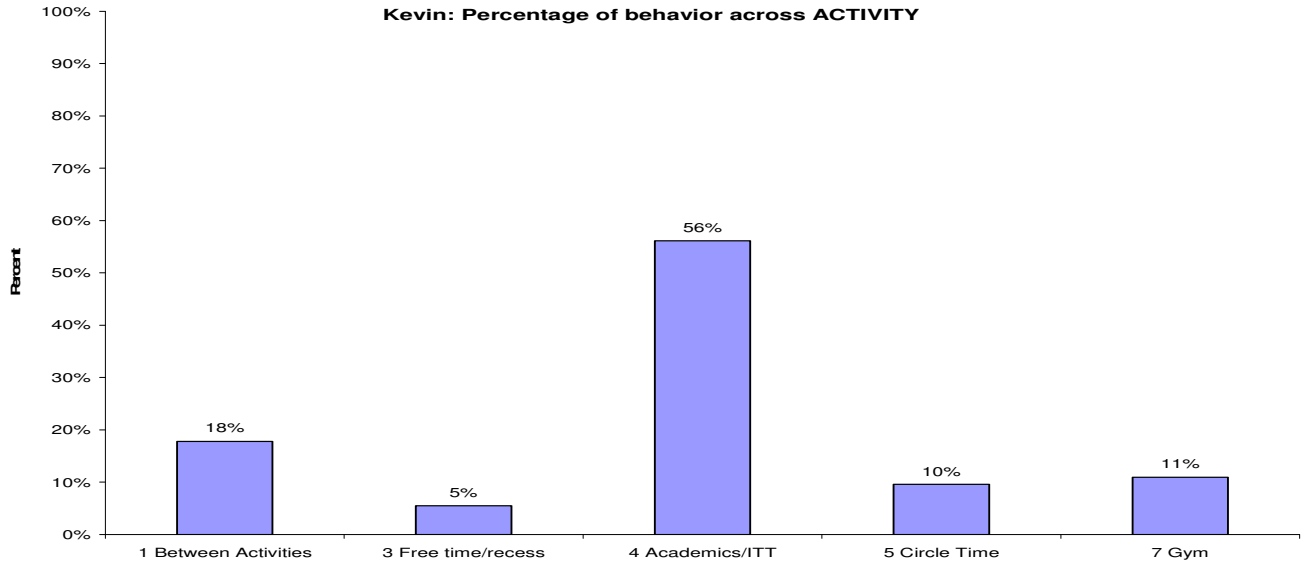
Behavior: Non-Compliance-41%, Property Destruction-11%, Flopping- 10%, Attempt to Leave Room- 10%, Crying-9%, Hit object- 6%, Screaming- 6%, Running-2%, Self Injurious Behavior- 2%, Shaking Fist-1%, and Asleep-1% (see Figure 16).

Figure 16. Kevin A-B-C Data: Percentage of Each Problem Behavior



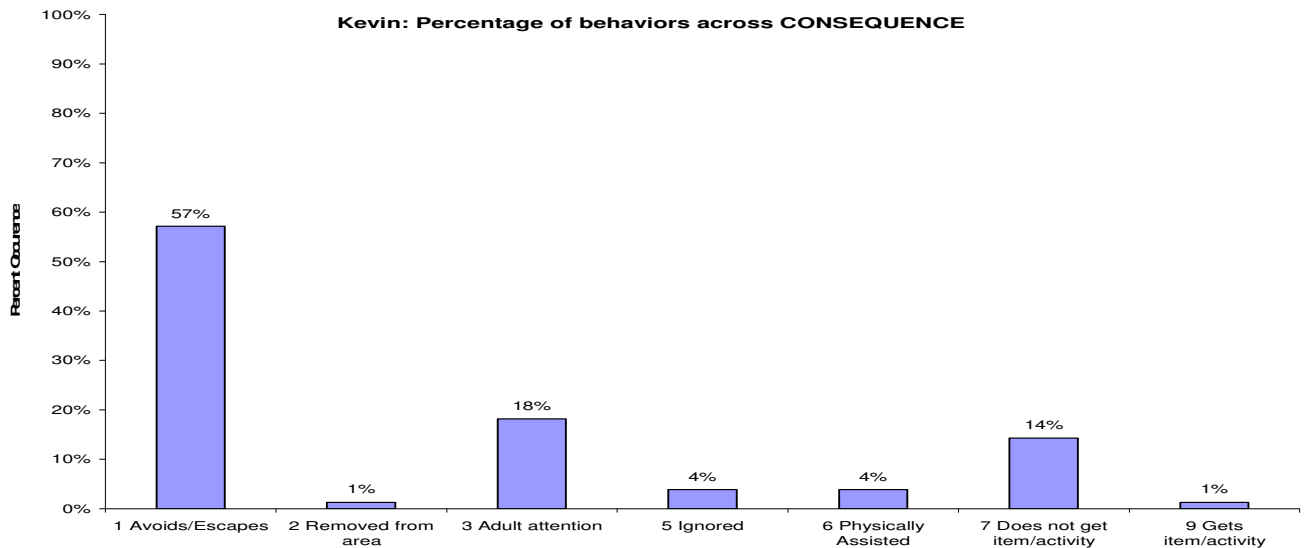
Activity: Academics/Individual Teaching Time-56%, Between Activities-18%, Gym-11%, Circle Time-10%, and Free time/Recess-5% (see Figure 17).

Figure 17. Kevin A-B-C Data: Total Problem Behavior by Activity



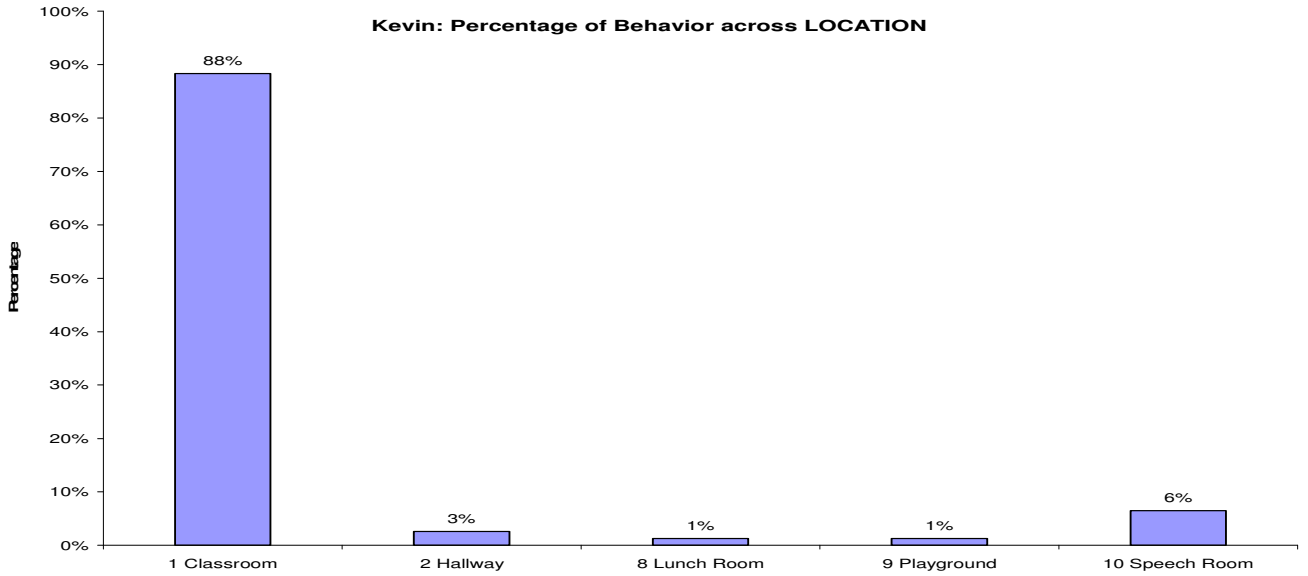
Consequence: Avoids/Escapes-57%, Adult Attention-18%, Does not get Item/Activity-14%, Ignored-4%, Physically Assisted-4%, Removed from Area-1%, and Gets item/Activity-1% (see Figure 18).

Figure 18. Kevin A-B-C Data: Total Behavior by Consequence



Location: Classroom-88%, Speech Room-6%, Hallway-3%, Playground-1%, and Lunch Room-1% (see Figure 19).

Figure 19. Kevin A-B-C Data: Total Behavior by Location



Time: Evenly distributed throughout day. See Figure 20 for graphs detailing Kevin’s A-B-C data.

Figure 20. Kevin A-B-C Data: Total Behavior by Time

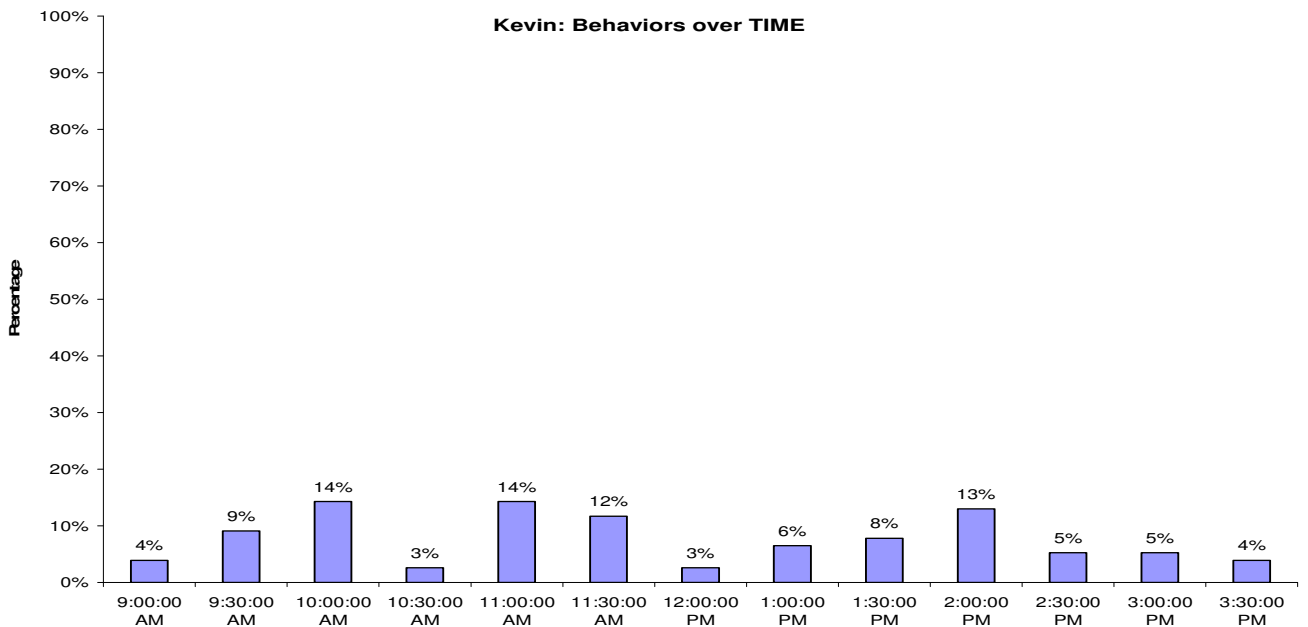
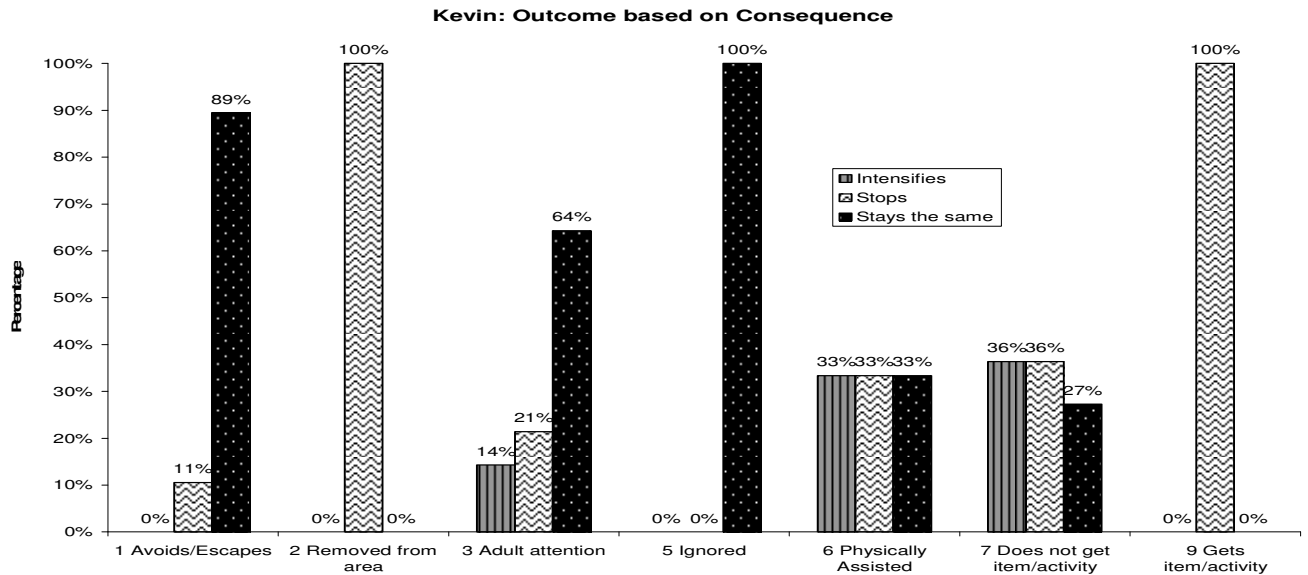


Figure 21. Kevin A-B-C Data: Outcome Data by Consequence



Functional Analysis Results for Subject 2: Kevin

Based on the A-B-C data, the hypothesis was formed that Kevin's behaviors may have served the following functions: escape/avoidance, social attention, or access to tangible.

Therefore, the functional analysis included the following conditions: Demand, Tangible, and Attention. A control (i.e. Toy Play) condition was also implemented to ensure experimental control. Data were collected on Kevin's problem behaviors including: non-compliance, compliance, flopping, screaming, attempts to leave room, crying, running, property destruction, and self injurious behavior. See Appendix C for a copy of Kevin's original functional analysis data sheet, which was modified as needed for additional session types. Due to the results of the A-B-C data as well as space limitations in Kevin's school, sessions were done solely in the naturalistic setting.

The functional analysis demonstrated that adult attention and access to tangibles were not functions of any of Kevin's problem behaviors. However, he did exhibit problem behaviors during demand sessions, revealing a possible function. Based on input from Kevin's teacher, two

additional modified sessions were added: Modified Demand and Modified Attention/Tangible. The modified demand session involved asking Kevin to leave the room for various reasons. According to his teacher, this was an antecedent in the classroom. However, no behaviors were observed during those sessions. The Modified Attention/Tangible condition involved Kevin's classmates leaving the classroom without him. This condition resulted in Kevin exhibiting high rates of problem behaviors. Due to the fact that the Modified Attention/Tangible condition involved other students in the classroom, it was not always feasible to conduct the session on any given day. As a result, this session was not conducted in a multielement design. The session was implemented as scheduling permitted so it did not interfere with his classmate's educational programming. See Figures 22, 23, 24, 25, 26, 27, 28, and 29 for Kevin's functional analysis graphs.

Figure 22. Kevin Functional Analysis: Non-Compliance

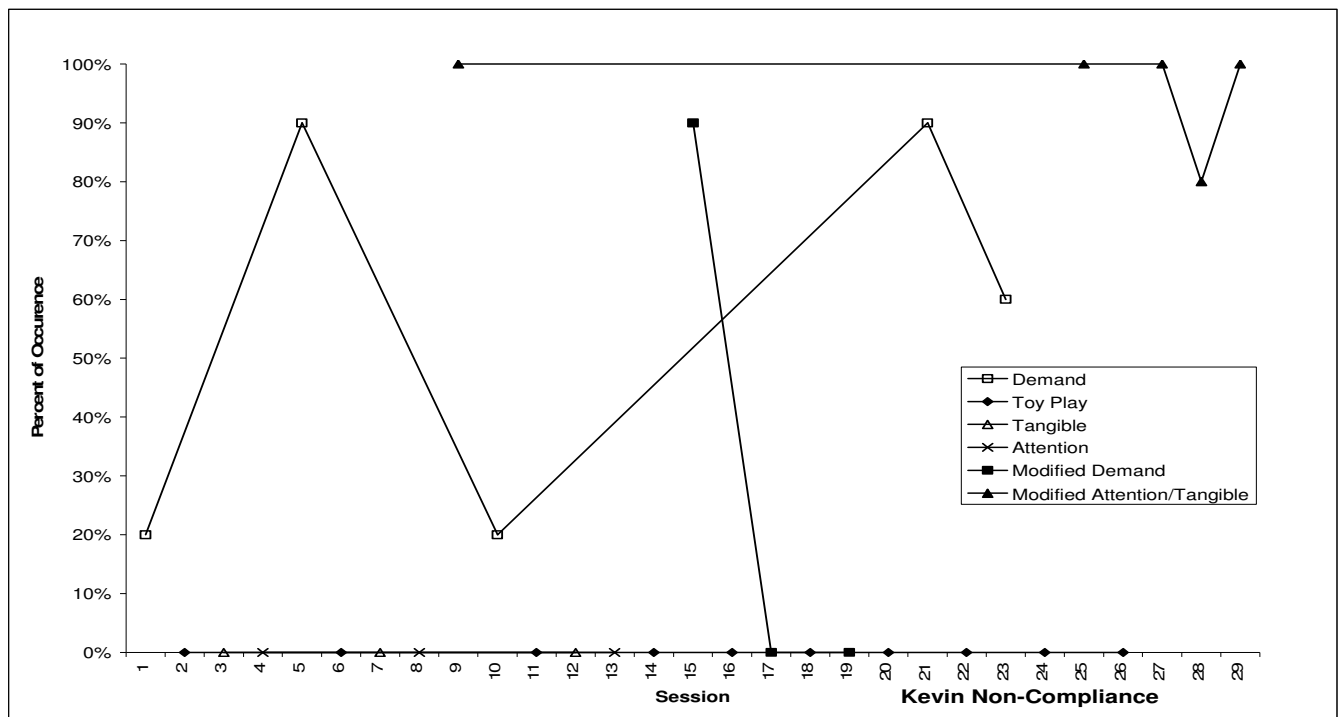


Figure 23. Kevin Functional Analysis: Attempts to Leave the Room by Function

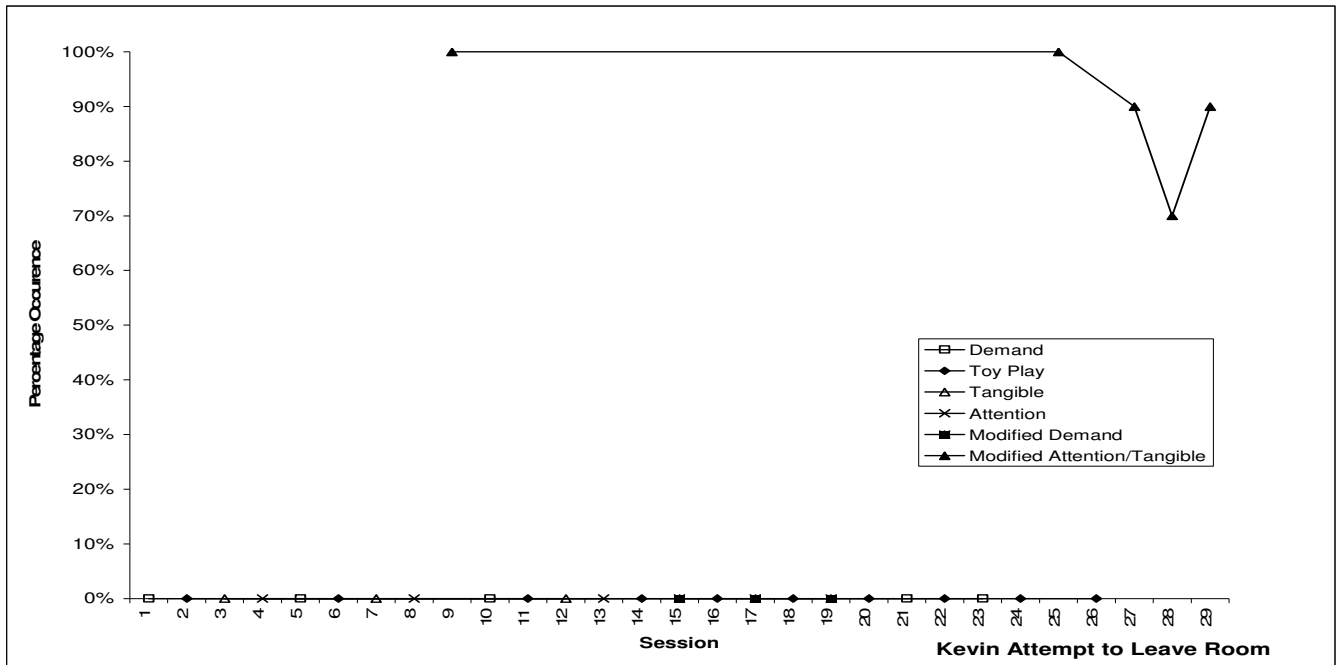


Figure 24. Kevin Functional Analysis: Crying

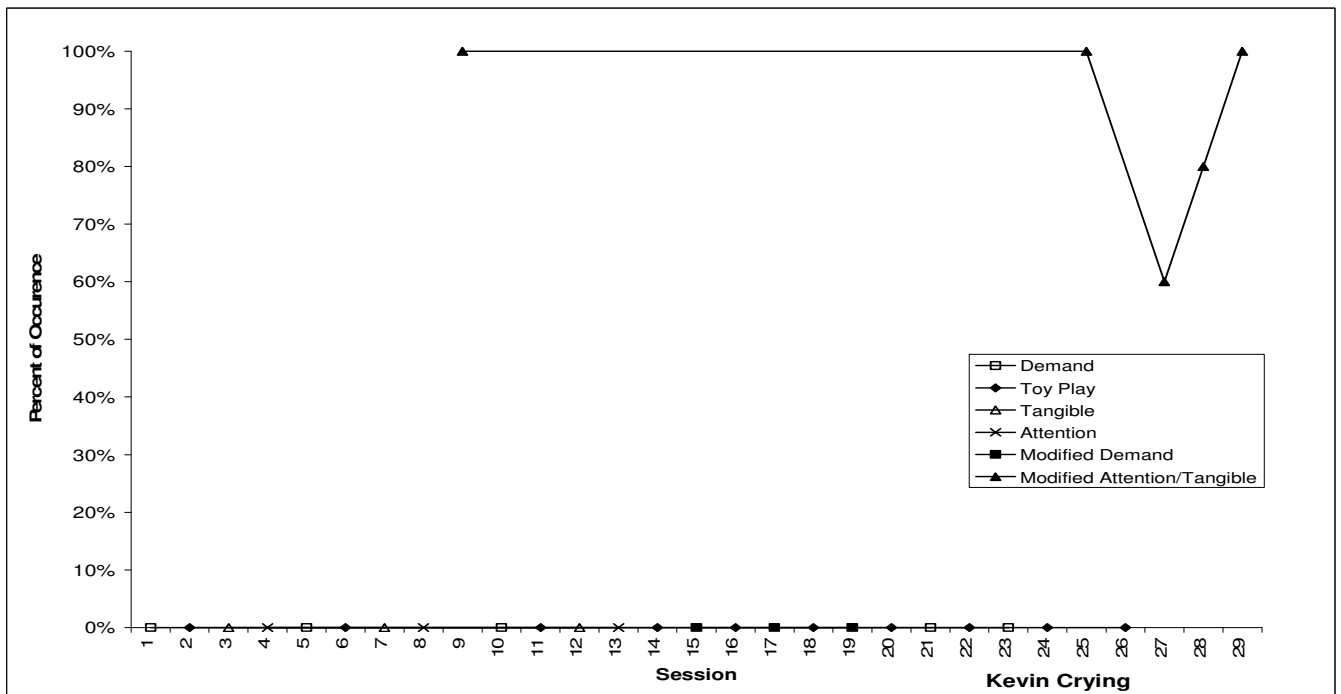


Figure 25. Kevin Functional Analysis: Property Destruction

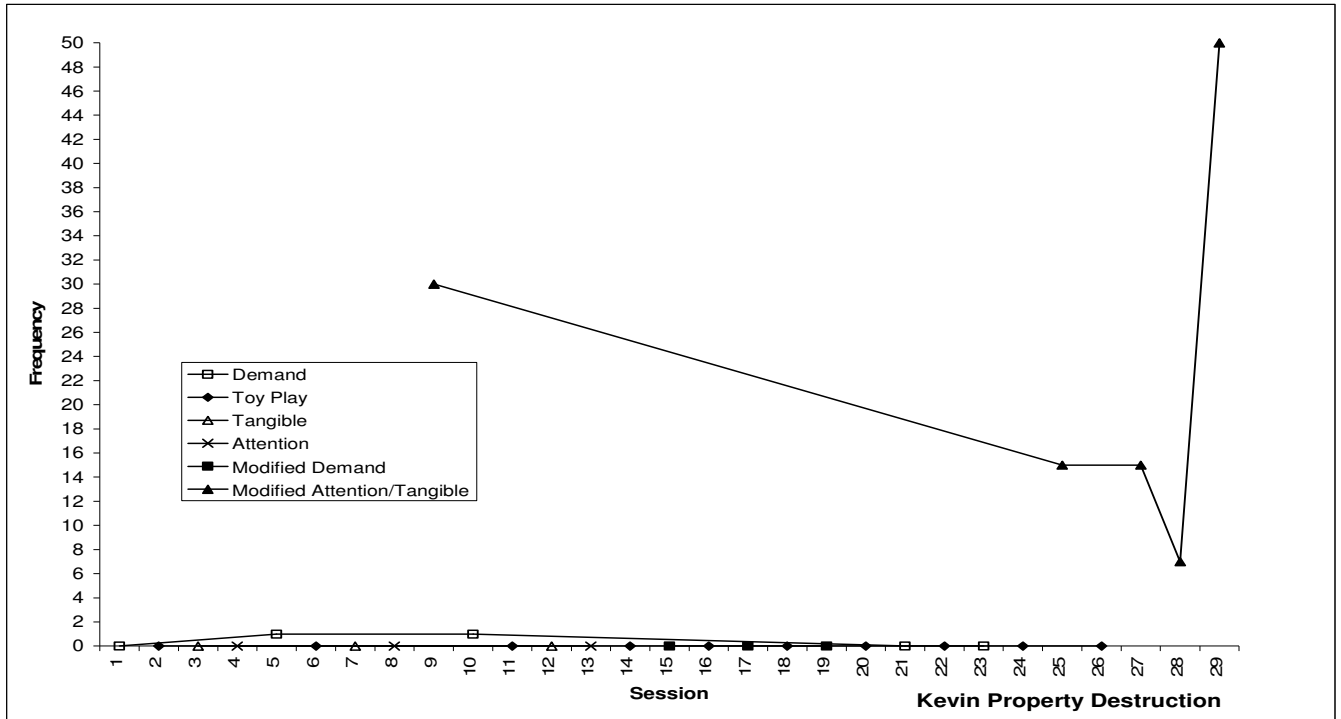


Figure 26. Kevin Functional Analysis: Flopping

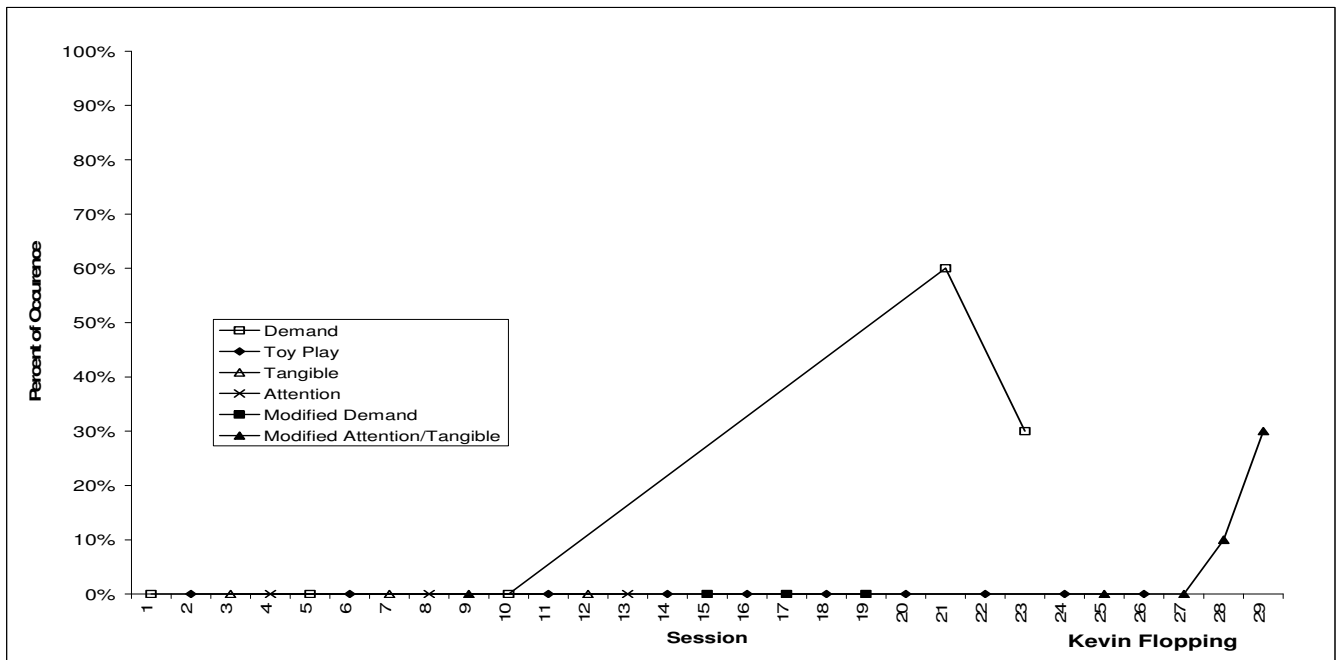


Figure 27. Kevin Functional Analysis: Running

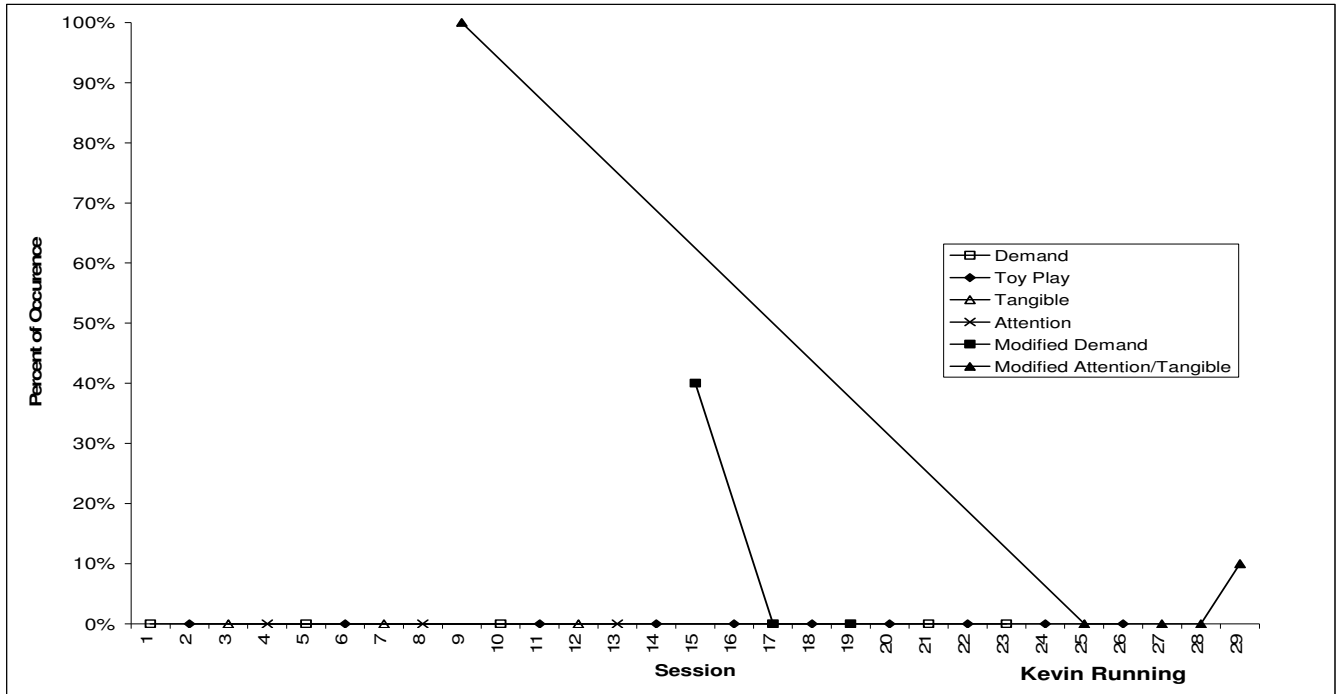


Figure 28. Kevin Functional Analysis: Aggression

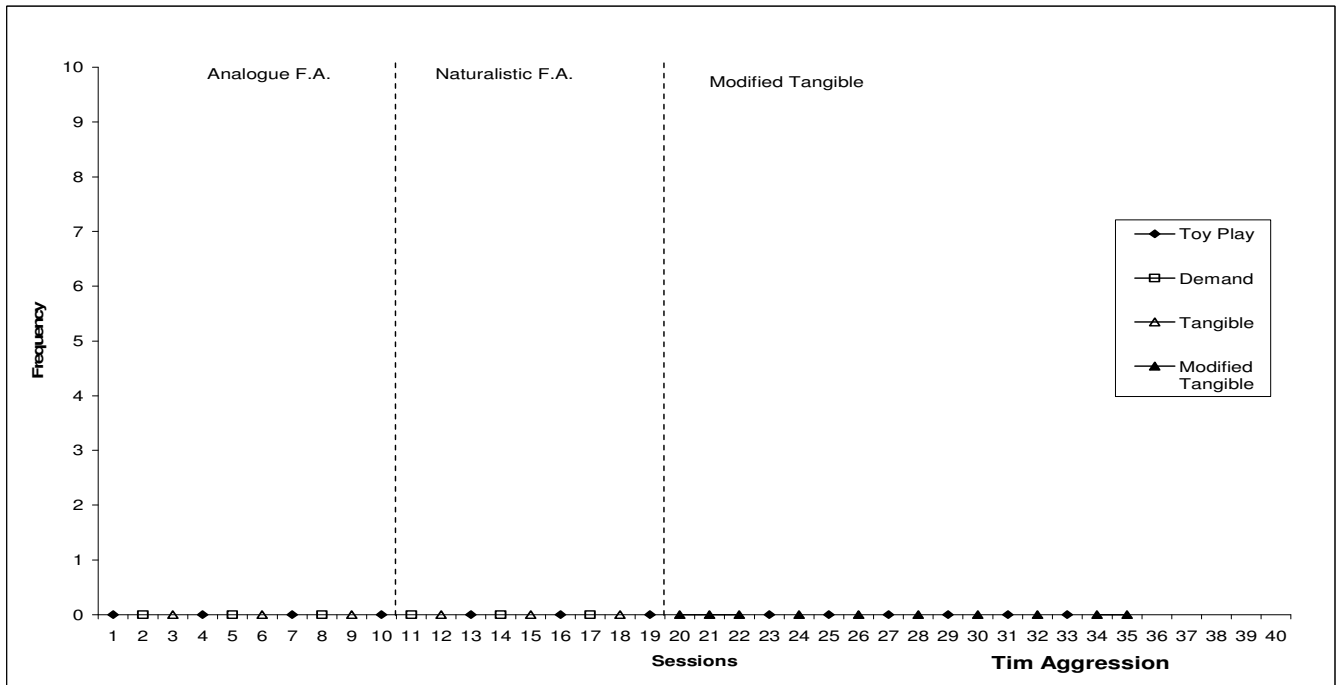


Figure 29. Kevin Functional Analysis: Screaming

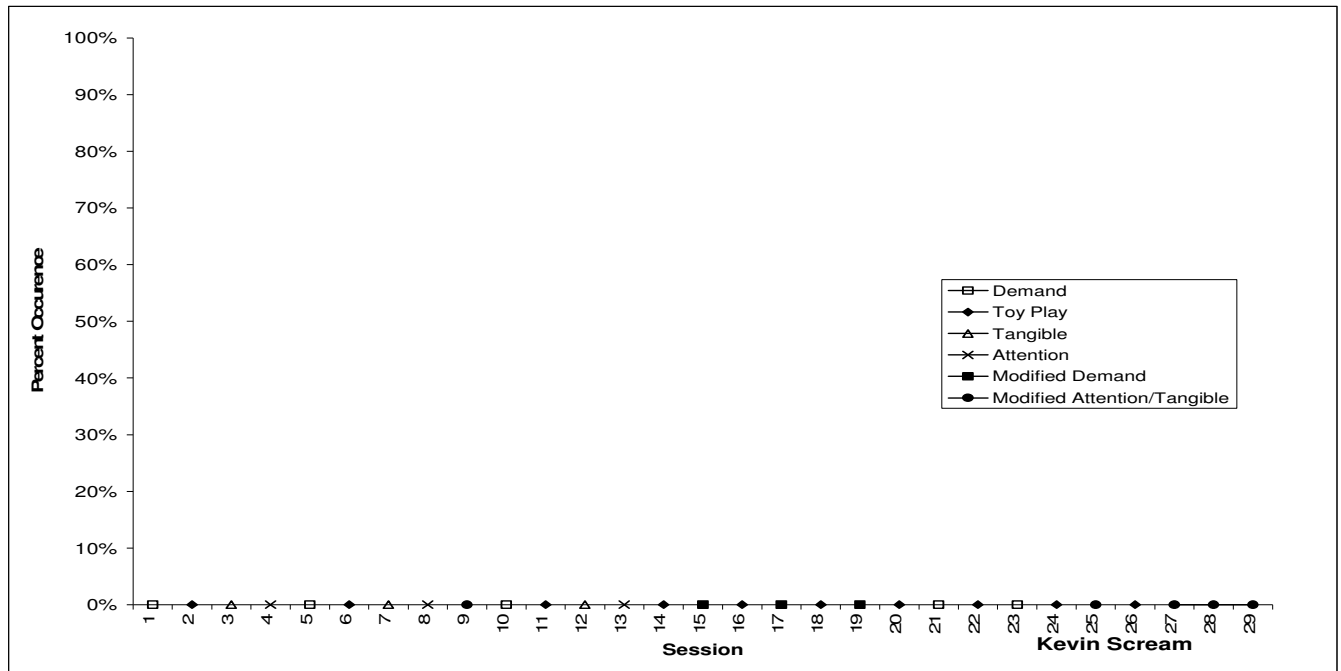


Table 2 lists each of Kevin’s problem behavior as well as the behaviors’ function based on the results of the functional analysis. When a behavior seemed to serve more than one function, the functions were listed in order indicating the primary function first and any secondary functions next.

Table 2. Kevin’s Behaviors by Function based on the Functional Analysis

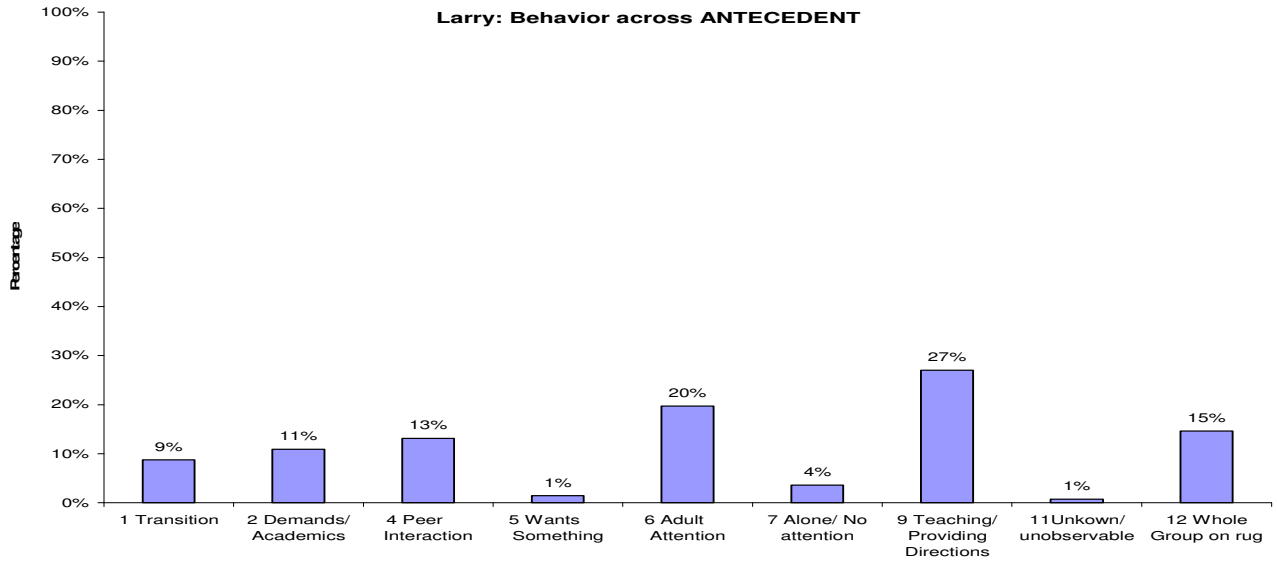
Behavior	Function (primary listed first)
Non-Compliance	Escape/Avoidance & Access to Peers When They Leave
Flopping	Escape/Avoidance & Access to Peers When They Leave
Attempts to leave room	Access to Peers When They Leave
Crying	Access to Peers When They Leave
Running	Access to Peers When They Leave & Escape/avoidance
Property Destruction	Access to Peers When They Leave & Escape/avoidance
Self Injurious Behavior	Escape/Avoidance
Scream	No Occurrence

A-B-C results for Subject 3: Larry

The results of Larry’s A-B-C data were as follows: Antecedent: Teaching/Providing Directions- 27%, Adult Attention-20%, Whole Group Lesson on Rug-15%, Peer Interaction-13%,

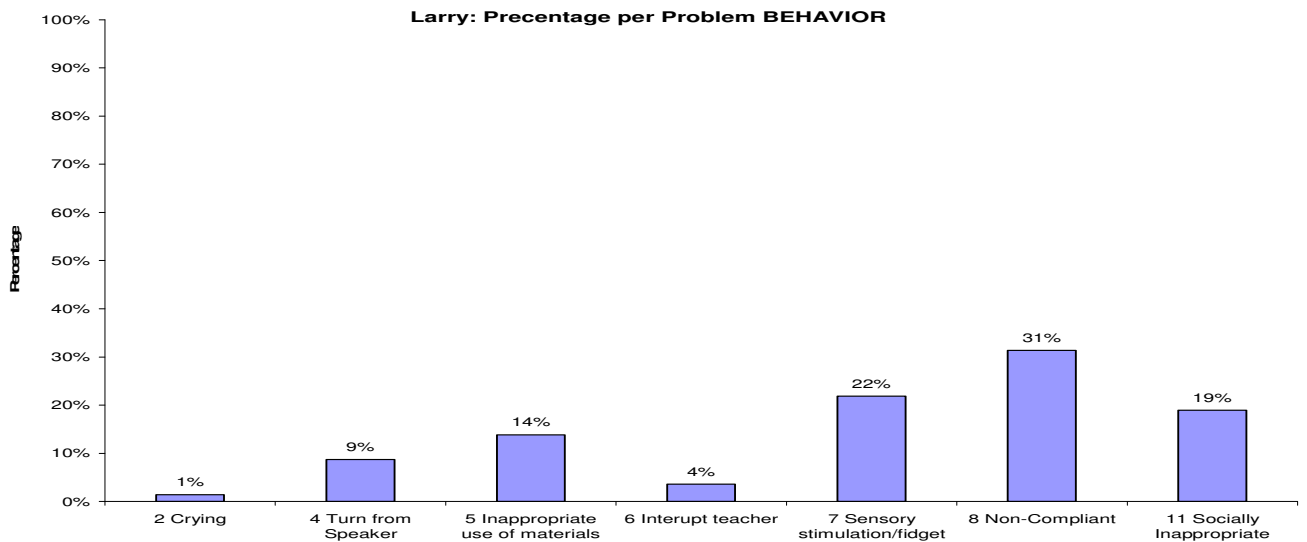
Demands/Academics-11%, Transition-9%, Alone/No Attention-4%, Wants Something-1%, and Unknown/Unobservable- 1% (see Figure 30).

Figure 30. Larry A-B-C Data: Total Problem Behavior by Antecedent



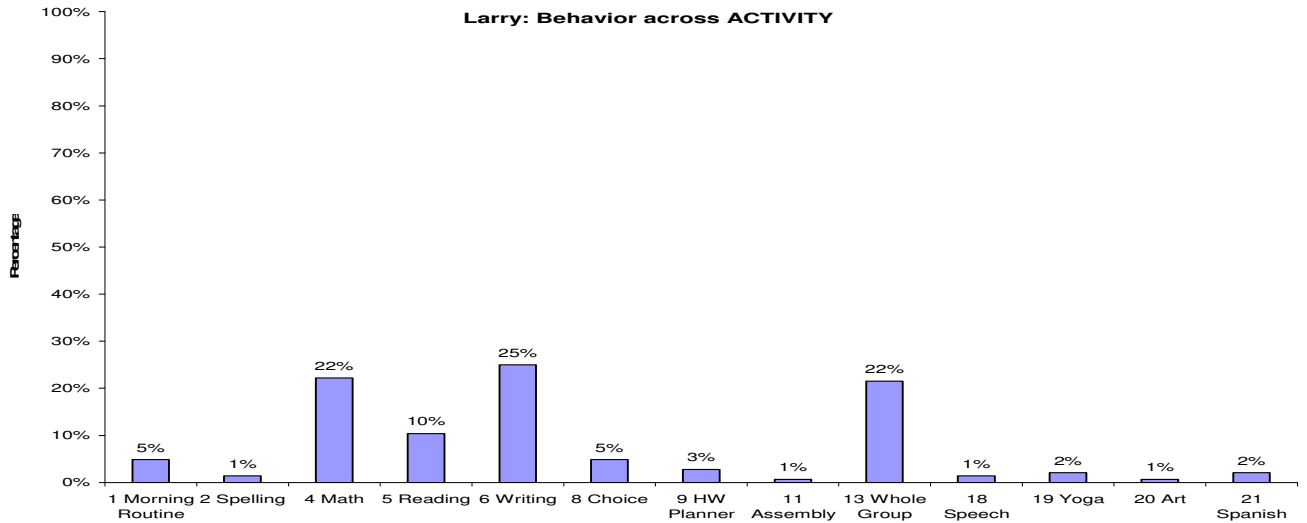
Behavior: Non-Compliance-31%, Sensory Stimulation- 22%, Socially Inappropriate-19%, Inappropriate Use of Materials-14%, Turn From Speaker-9%, Interrupt Teacher-4%, and Crying- 1% (see Figure 31).

Figure 31. Larry A-B-C Data: Percentage of Each Problem Behavior



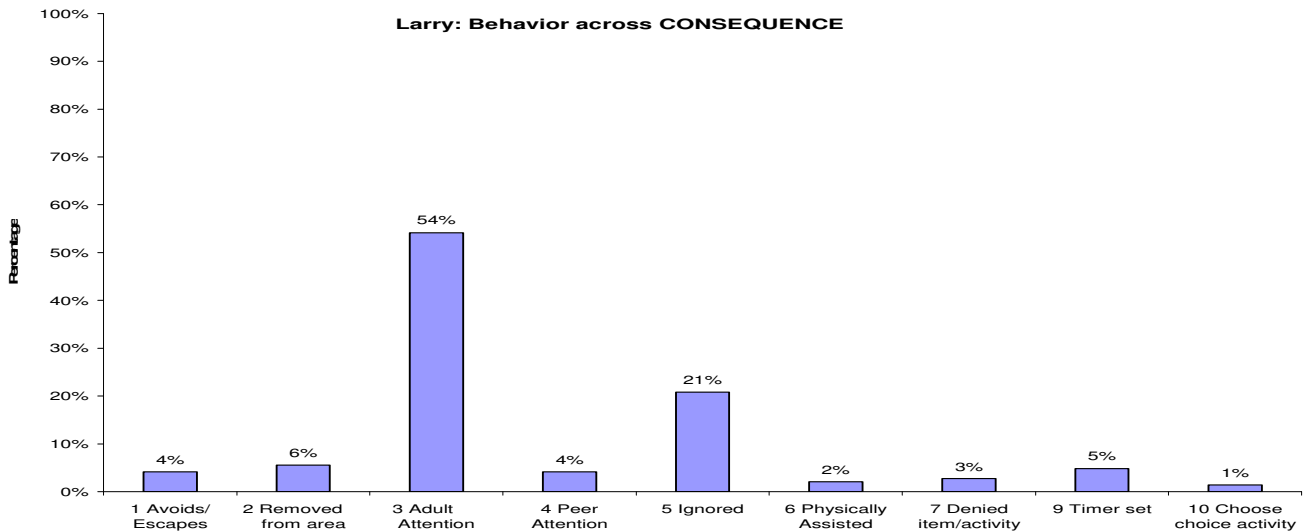
Activity: Writing-25%, Math-22%, Whole Group-22%, Reading-10%, Choice-5%, Morning Routine-5%, Homework (HW) Planner-3%, Yoga-2%, Spanish-2%, Spelling-1%, Speech-1%, Assembly-1%, and Art-1% (see Figure 32).

Figure 32. Larry A-B-C Data: Total Problem Behavior by Activity



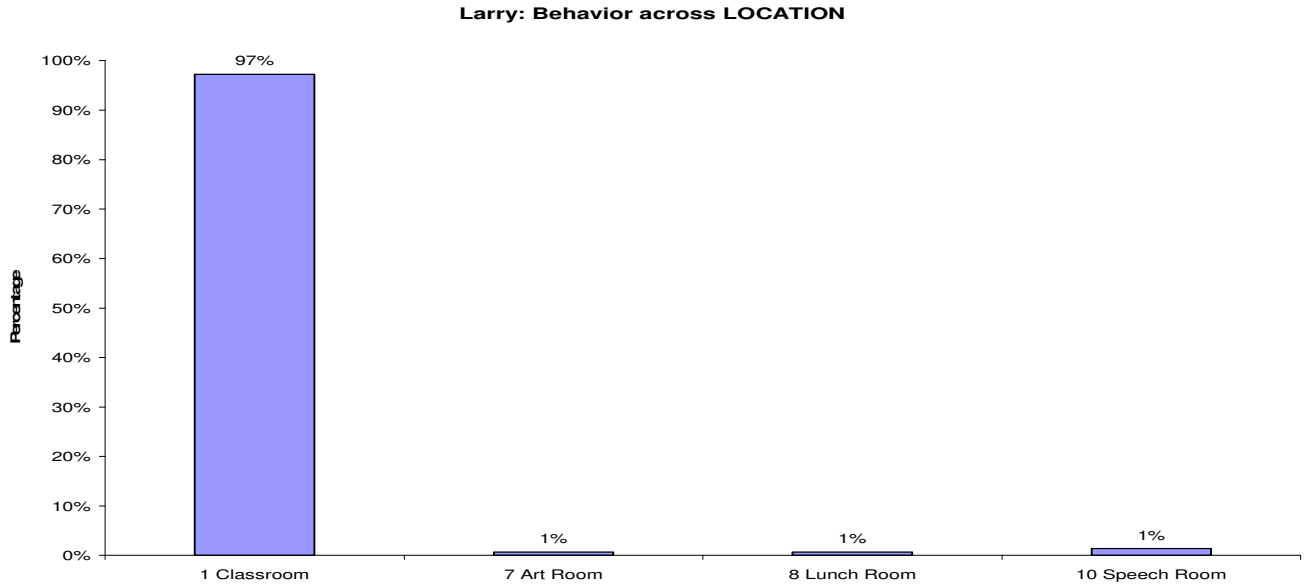
Consequence: Adult Attention- 54%, Ignored- 21%, Removed From Area-6%, Timer Set-5%, Peer Interaction-4%, Avoids/Escapes-4%, Denied Item/Activity-3%, Physically Assisted-2%, and Choice Activity-1% (see Figure 33).

Figure 33. Larry A-B-C Data: Total Problem Behavior by Consequence



Location: Classroom-97%, Speech Room-1%, Art Room- 1%, and Lunch Room-1% (see Figure 34).

Figure 34. Larry A-B-C Data: Total Problem Behavior by Location



Time: 2:30 PM-15%, 10:30 AM-14%, 11:00 AM-12%, 11:30 AM-11%, 3:00 PM-11%, 2:00 PM-9%, 10:00 AM-8%, 9:30 AM-8%, 1:00 PM-5%, 1:30 PM-5%, 9:00 AM-3% (see Figure 35).

Figure 35. Larry A-B-C Data: Total Problem Behavior by Time

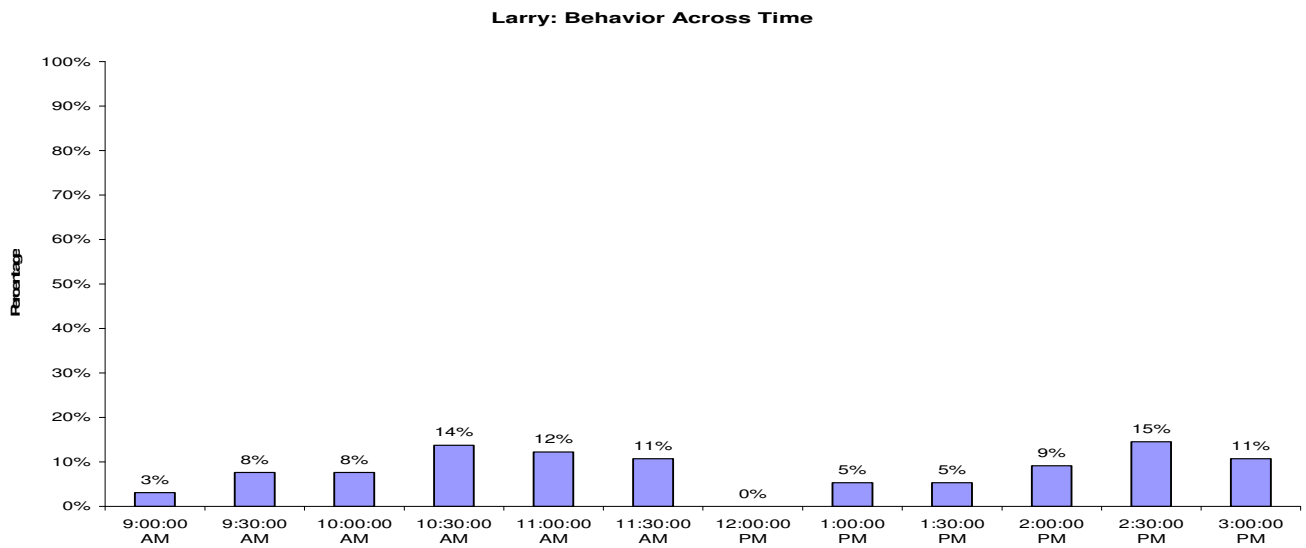
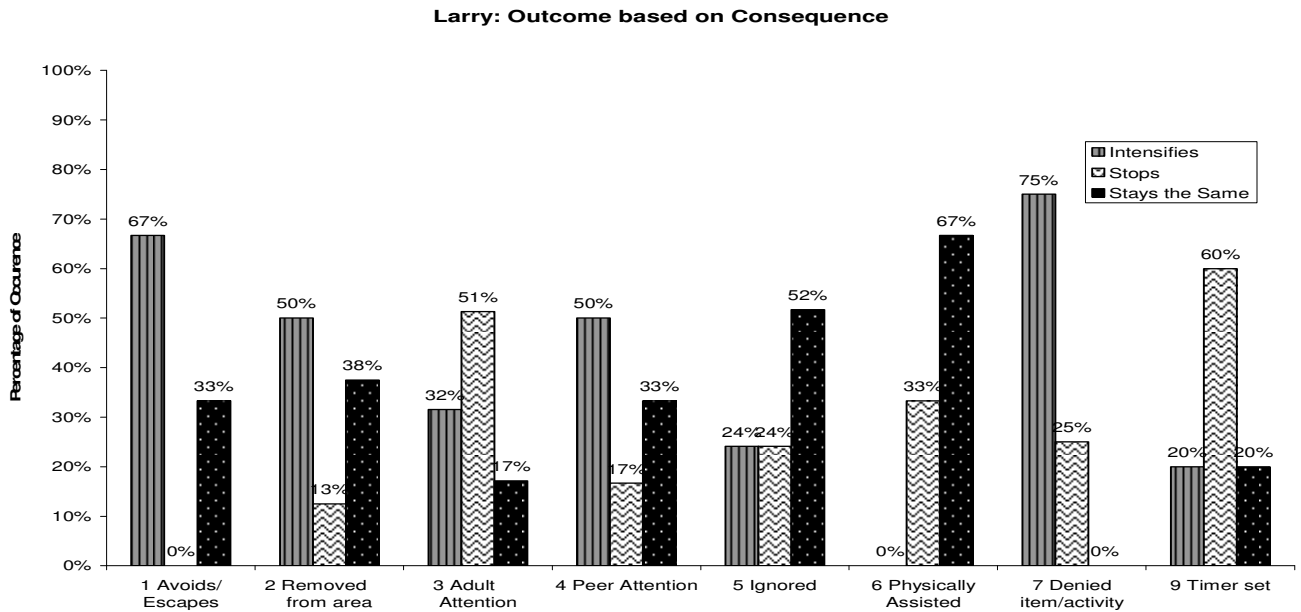


Figure 36. Larry A-B-C Data: Outcome Data by Consequence



Functional Analysis Results for Subject 3: Larry

Based on the A-B-C data, the hypothesis was formed that Larry’s problem behaviors may have served one of two functions: escape/avoidance or social attention. Therefore, the functional analysis included the following conditions: Demand, Attention, Control (i.e. Toy Play). Data were collected on Larry’s non-compliance, compliance, socially inappropriate behavior, sensory stimulation/fidgeting, crying, property destruction, and aggression. See Appendix C for a copy of Larry’s functional analysis data sheet. Due to the results of the A-B-C data as well as space limitations at the time, his functional analysis sessions were done solely in the naturalistic setting. The results of the functional analysis demonstrated that the function of Larry’s problem behaviors was escape from a demand. Additionally, his socially inappropriate behavior had a secondary function of attention. See Figures 37, 38, 39, 40, 41, and 42 for Larry’s functional analysis graphs.

Figure 37. Larry Functional Analysis: Non-Compliance

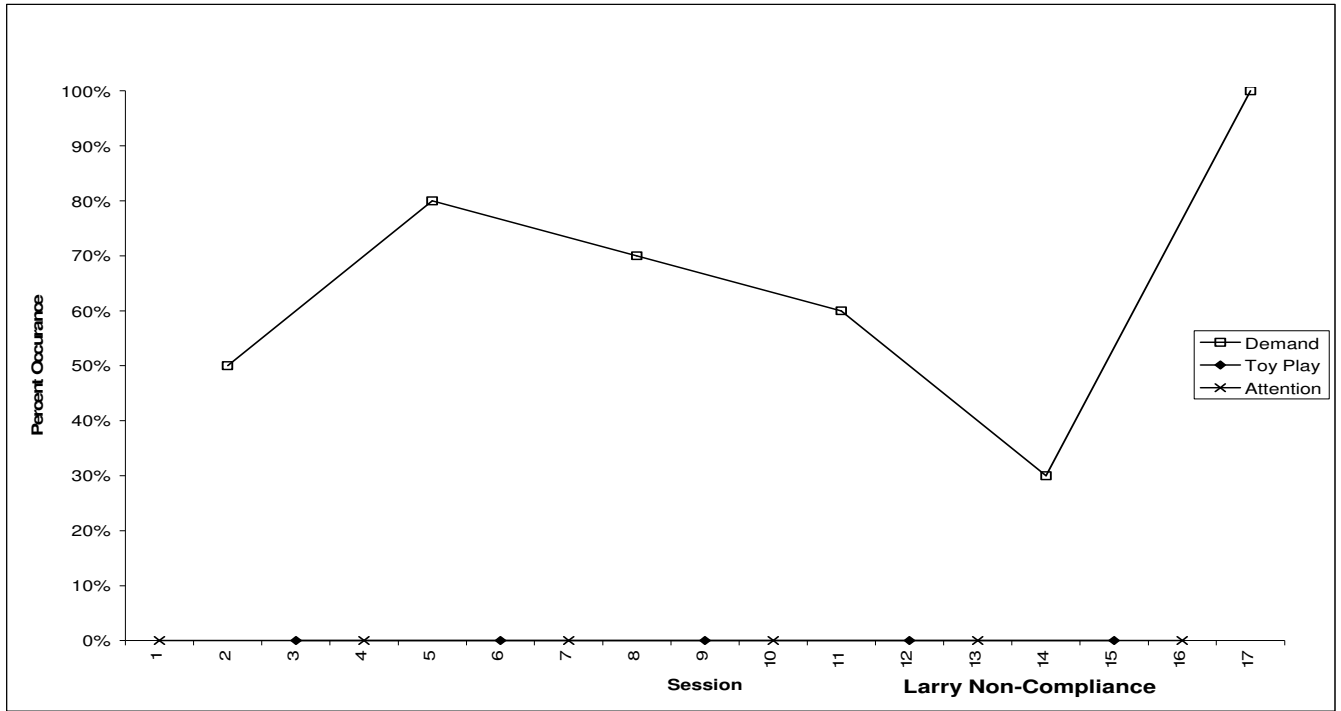


Figure 38. Larry Functional Analysis: Socially Inappropriate Behavior

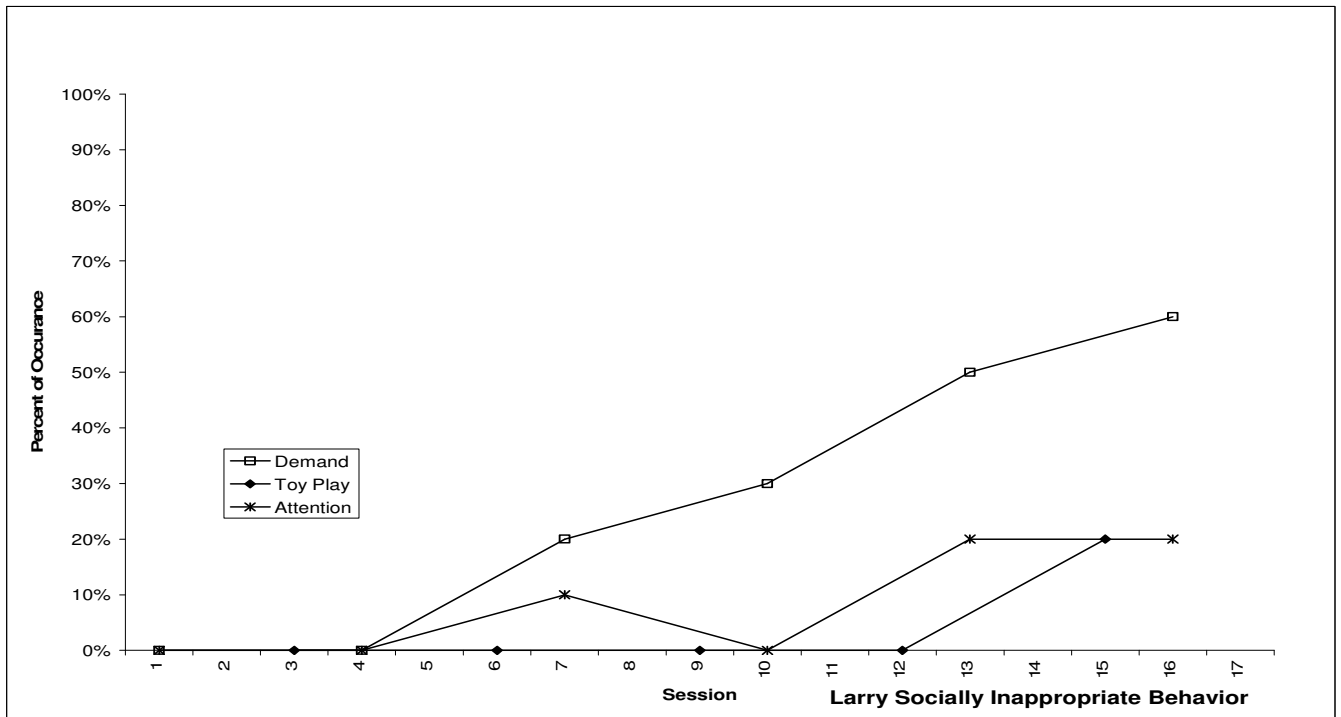


Figure 39. Larry Functional Analysis: Sensory Seeking Behavior

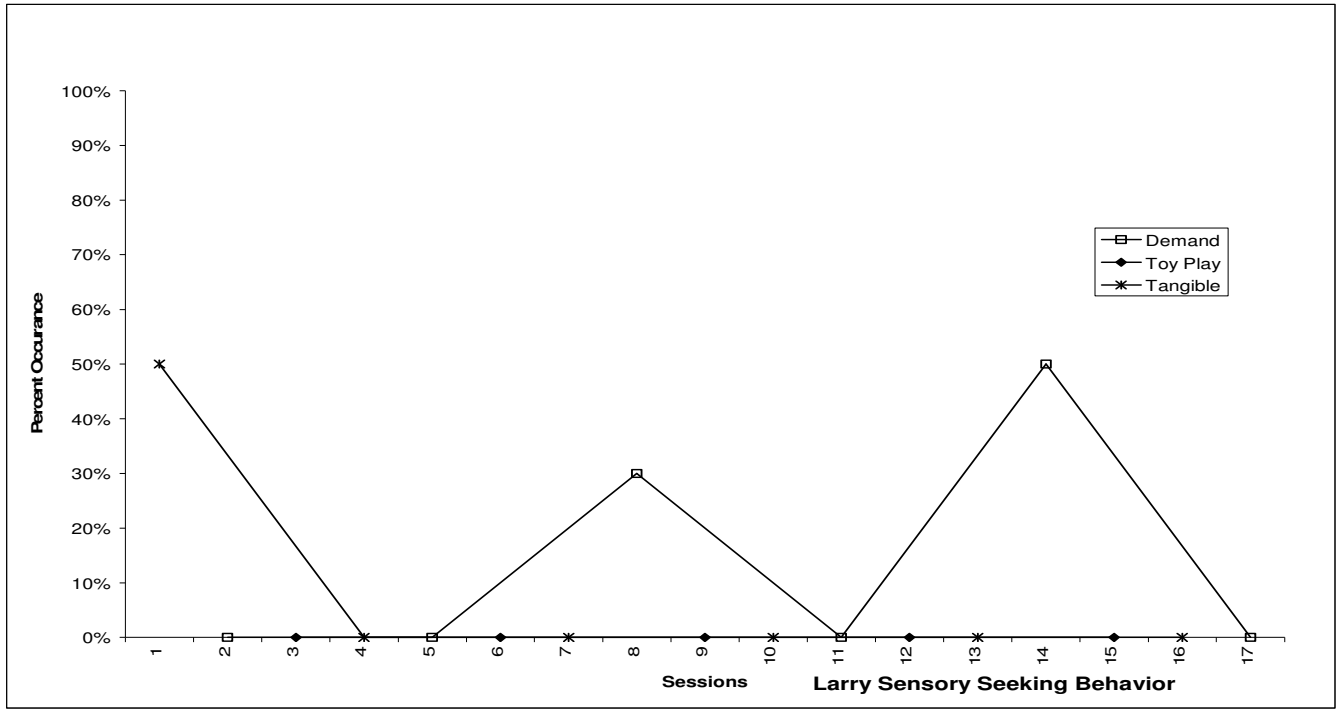


Figure 40. Larry Functional Analysis: Property Destruction

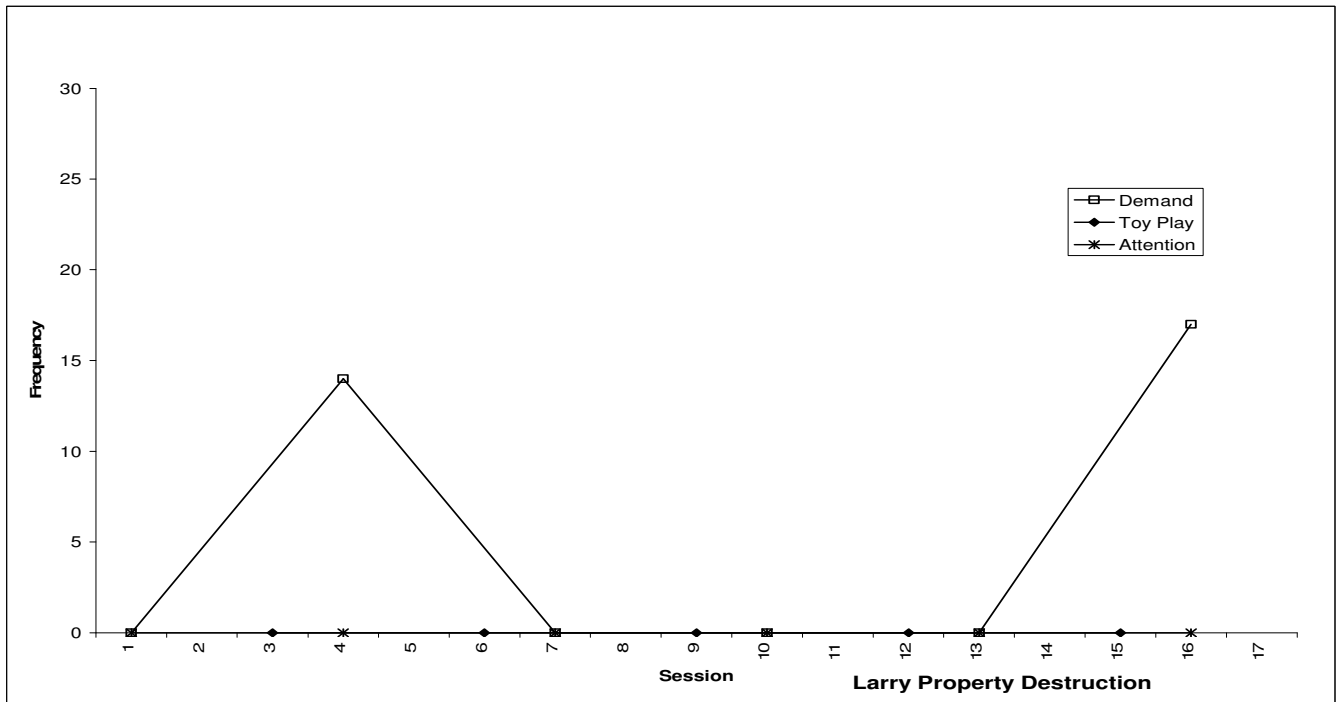


Figure 41. Larry Functional Analysis: Aggression

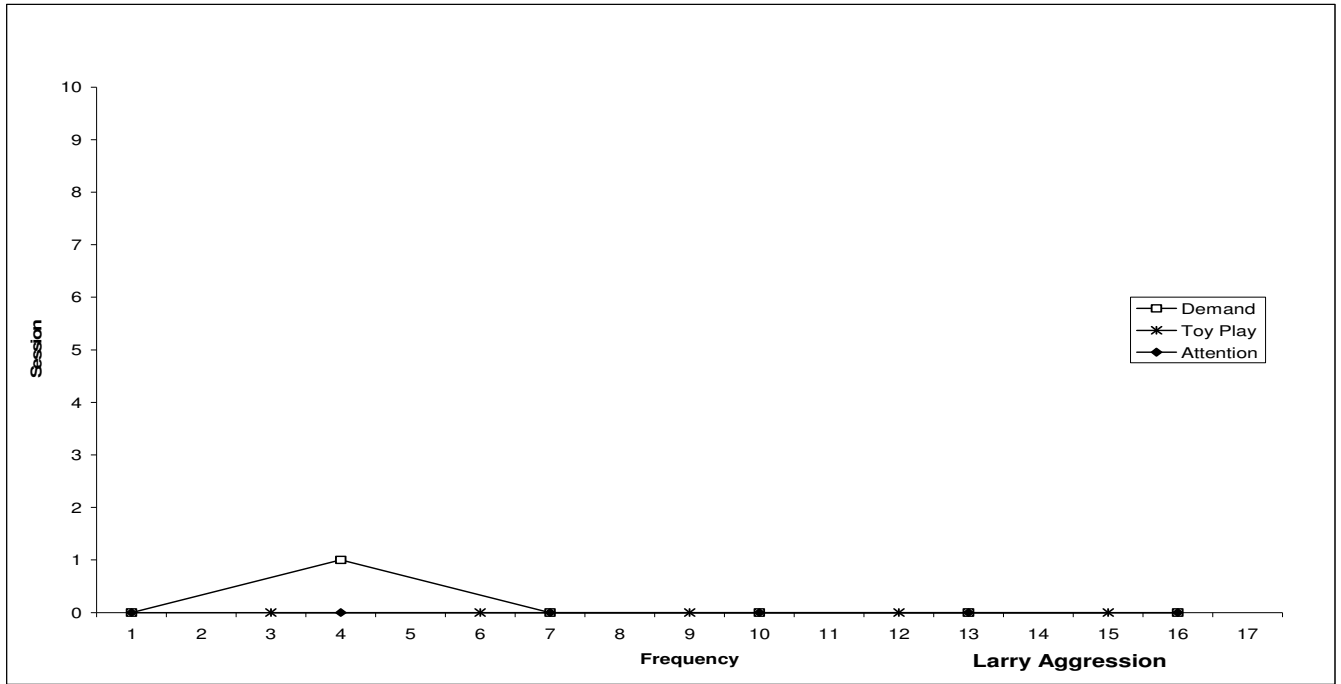


Figure 42. Larry Functional Analysis: Crying

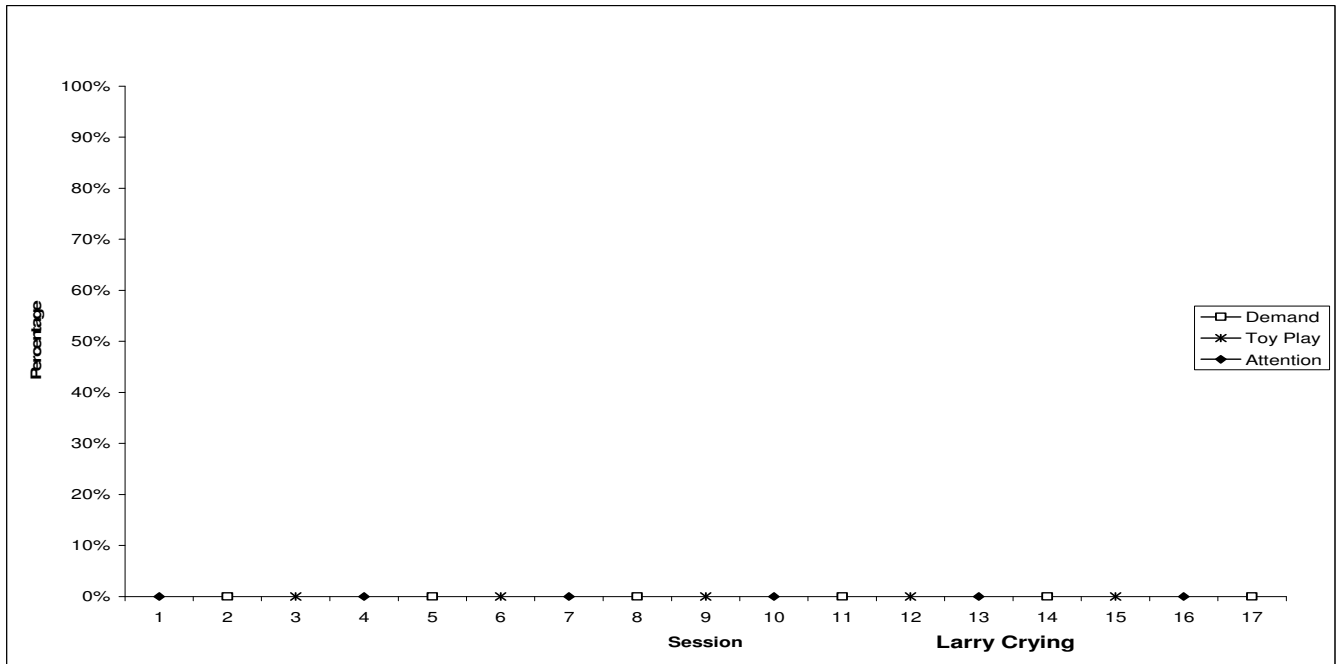


Table 3 details the function of each of Larry’s problem behaviors.

Table 3. Larry’s Behaviors by Function based on the Functional Analysis

Behavior	Function (primary listed first)
Non-Compliance	Escape From Demand
Socially Inappropriate	Escape From Demand, Attention
Sensory Seeking Behavior	Escape From Demand
Property Destruction	Escape From Demand
Aggression	Only occurred once during Demand Session
Crying	Not observed

Experiment 2

Treatments Based on Function

Based on the results of the functional analysis, the experimenter, who was also a school psychologist, designed and implemented a function based treatment package to successfully reduce each student’s problem behaviors. The treatment established for each subject was individually designed based on that subject’s functional analysis. However, each treatment incorporated a FCT component. The entire functional assessment took place in each child’s public elementary school.

Treatment Subject 1: Tim

Based on the preliminary results of his functional analysis thus far, the experimenter focused on establishing a treatment for the two most problematic behaviors that Tim exhibited: screaming and pushing on his mouth. The condition used to experimentally control for the treatments was the same condition that elicited the highest rates of these behaviors during the functional analysis, which was the modified tangible condition. Baseline data were taken directly from the modified tangible sessions conducted as part of Experiment 1 of this study.

Tim’s primary mode of communication based on the communication mode checklists was speech. Therefore, the first treatment attempted to teach Tim to verbally request for a break (FCT) by saying, “Break”, which he then received immediately. The treatment resulted in an

immediately reduction in Tim's rate of screaming and pushing on the mouth. Although Tim's primary mode of communication was verbal, the experimenter provided him with the continued option of verbalizing the word, "Break" in addition to another alternative method of using a "Break" card that was available in his immediate vicinity. This modification was made based on studies demonstrating that the easier it is for the subject to use a communicative response, the better the chances that the response will replace the problem behavior (Durand, 1993; Horner & Day, 1991). Although Tim was verbal, the examiner was unsure if he would find it easier to vocalize when he was upset in comparison to handing over a "Break" card. Tim was reinforced at the same frequency and efficiency for either mode of communication.

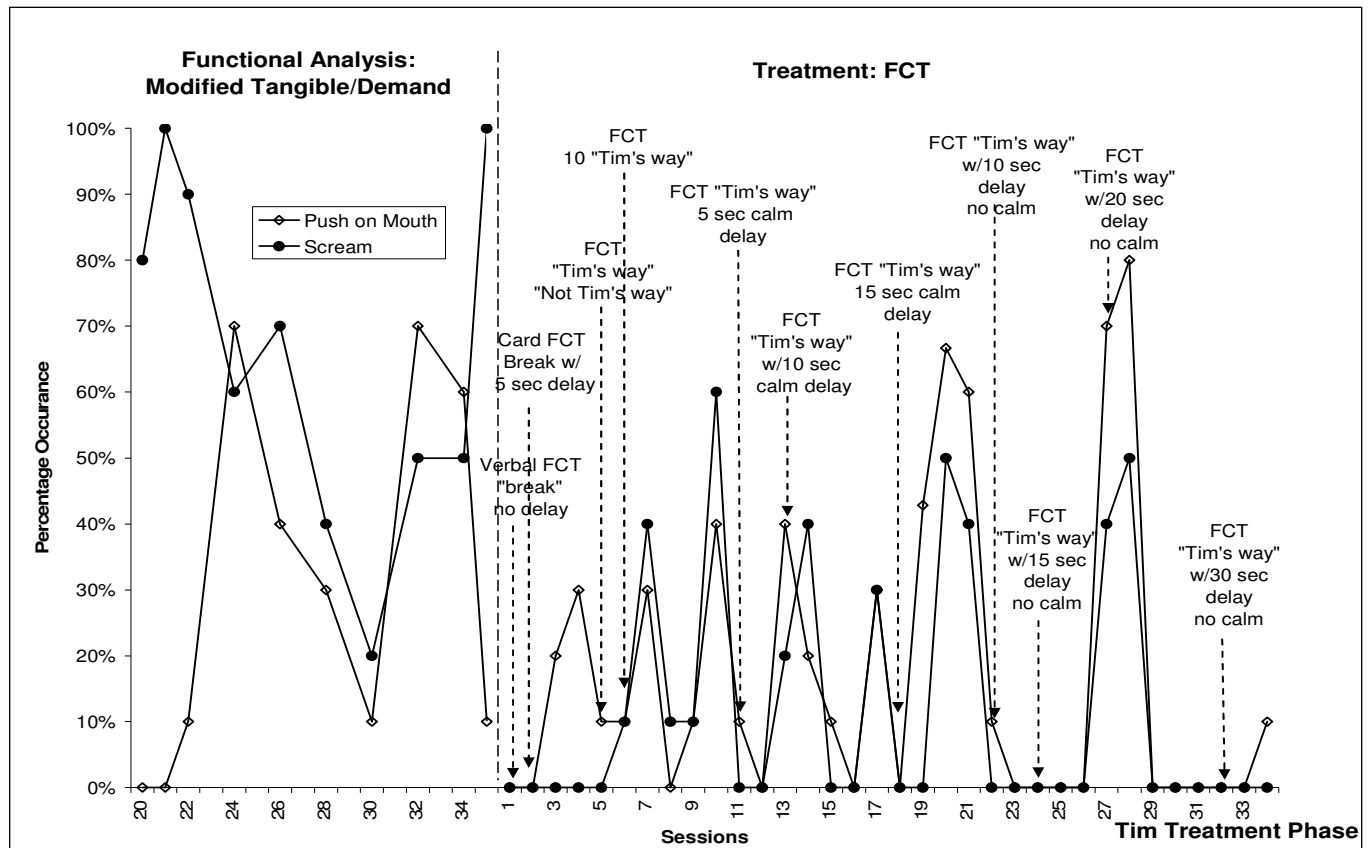
Additionally, another modification was made to the treatment based on the immediate effectiveness of the first treatment session. Specifically, a five second delay was built into the treatment package starting with the second treatment session. During this phase, Tim was still prompted to request a break via either modality, but needed to remain calm for five seconds before receiving the break. Tim's rate of screaming remained very low, but his rate of pushing on his mouth increased slightly.

The FCT was changed for the fifth treatment session to include two different cards: 1) "Tim's way" and 2) "Not Tim's Way". The cards were modified this way in order to specifically address the hypothesized function of Tim trying to control the demand or activity. The modified treatment was designed to prepare Tim for situations in which it may not be an option for him to get his way (i.e. when other students were involved). The FCT was changed after only one session to eliminate the "Not Tim's Way" card. Instead, Tim was provided with a total of ten "Tim's Way" cards. The new plan was for Tim to use a "Tim's Way" card at any time to control whatever aspect he was trying to control. However, he would have to ration his cards because he was only

provided with ten cards. This treatment did not seem to result in a further reduction of Tim's problem behaviors (i.e. screaming or pushing on his mouth).

Therefore, the treatment was once again modified. Tim was provided once again with only one "Tim's Way" card. However, a five second change over delay was added. During these sessions, Tim needed to use the card and remain calm for five seconds before being reinforced. After two sessions, the change over delay was extended to ten seconds. After six more sessions, the delay was extended to 15 seconds. Tim's rates of behaviors seemed to increase when the delay was extended to 15 seconds. The treatment was modified back to a ten second delay, but the criteria of Tim remaining calm was taken out of the plan. This modification seemed very effective and the delay was once again extended to 15 seconds without an increase in his problem behaviors. There was an increase in problem behaviors once the delay was extended to 20 seconds. However, after two sessions with high rates of problem behaviors, Tim's problem behaviors returned to near zero rates. The final treatment extended the change over delay following his request to get "Tim's Way" to 30 seconds without the criteria of remaining calm. Tim's problem behaviors remained at near zero rates in this last treatment phase. Overall, his problem behaviors were significantly lower when comparing the same behaviors in the baseline phase of the functional analysis. During Tim's treatment phase, the examiner realized that some of the initial treatment modifications were made prematurely without allowing treatments to be attempted long enough to be able to fully determine their effectiveness. See Figure 43 for Tim's functional analysis graph with the treatment phase.

Figure 43. Tim's Treatment Graph: Total Problem Behaviors



Treatment Subject 2: Kevin

Kevin's functional analysis indicated two different primary functions depending on the specific behavior: Escape from Demands as well as Attention in the form of not being left behind when his classmates left the classroom (Table 2). Based on the functional analysis data, four of Kevin's problem behaviors were maintained at least in part by both functions. Since Kevin's behaviors were more problematic in the modified attention/tangible session, it was targeted as the first condition to design and implement a treatment. The first proposed treatment involved reading Kevin a social story prior to his classmates leaving the room. The social story was written to help him understand and accept that there would be times when his classmates left, but they would return shortly and he would be alright. Even when the social story was shortened, Kevin did not

seem to be able to attend to the story. Therefore, the social story was discontinued. In fact, data were not taken on this treatment as the plan was to read the story prior to the start of the session. Since Kevin was not able to sustain attention or focus on the story, the sessions were never conducted. (See Appendix E for a copy of Kevin's social story.)

The first treatment that was conducted experimentally involved FCT. Kevin, whose primary mode of communication was speech, was prompted to verbally express what he wanted (i.e. "I want to go to gym") whenever a peer left the room. Kevin was provided with specific praise and allowed to leave the room immediately following any FCT response (i.e. "Nice job using your words to tell me that you want to go to gym"). The treatment resulted in an immediate reduction in his crying, attempts to leave room, non-compliance, and property destruction. After four sessions of low rates of problem behavior, the same treatment was generalized to Kevin's demand condition.

During these sessions Kevin was prompted to request a break. Once the break was requested, Kevin needed to complete one demand before receiving the break. He was then given a two minute break. Kevin's compliance increased and non-compliance decreased over the following four sessions. However, his compliance reduced and non-compliance increased during sessions eight and nine. Kevin also engaged in other problem behaviors during those two sessions including: flopping and running. Therefore, another component, Differential Reinforcement of Compliance (DRC), was added to the treatment plan. Kevin was still prompted to request a break, which he would receive after the completion of one demand. However, he was also being reinforced with a break on a variable schedule based on compliance. As part of the DRC procedure, Kevin was shown the exact number of items he would be required to complete before the start of the session. He continued to have the option of asking for a more immediate break at

any time during the session. If Kevin asked for a break, he was asked to do one more item before receiving the break. However, if he did not ask for a break, he would receive one following the completion of all demands. The exact number of demands was variable for each session depending on the task. With this new contingency, Kevin's compliance once again increased and non-compliance decreased for sessions ten and eleven. Furthermore, he did not exhibit any problem behaviors.

The examiner and teacher were both concerned that it would not always be practical to show Kevin the total task before every activity. However, he seemed to benefit from visually seeing how much more he needed to complete before earning a demand. Due to the variable number of demands inherent in any given academic task, this presented as a challenge. Ultimately, a modification was made regarding the specific implementation of the DRC procedure. One of Kevin's preferred items was a small car, which he called "grave digger". Grave digger was placed on one end of a shelf, which was immediately next to Kevin in his work area. Every time he complied with a demand, Grave Digger was moved slightly closer to Kevin. Once Grave Digger was at Kevin's end of the shelf, he was provided with a break. This system allowed the adult to control and vary the number of demands based on the activity. The DRC component specifically addressed Kevin's non-compliance.

However, in order to further increase the success of the plan, another component was added to specifically address his other problem behaviors. The Differential Reinforcement of Other Behavior (DRO) allowed Kevin to earn an item of his choice for engaging in any other behavior besides the targeted problem behaviors. Specifically, Kevin was asked prior to the activity what he would like to work for that day. It was then written down on a small blank note card visible in his immediate vicinity. During the academic demands, "smiley faces" were drawn at variable

intervals and specific verbal praise was provided (i.e. Kevin, I like the way you are working so nicely) as long as he was not engaging in any problem behavior. When Kevin earned five “smiley faces” during his academic time, he received his reward.

Once the treatment continued to result in near zero rates of problem behavior and high rates of compliance, the revised treatment was then generalized to the modified attention/tangible condition. The treatment was the almost the same as in the demand condition with the exception of the elimination of the DRC component since there were no demands placed on Kevin. The Furthermore, the FCT component required Kevin to ask to go with his peers rather than ask for a break. The final treatment implemented in the modified attention/tangible condition was FCT with DRO-FR5. There were zero rates of problem behaviors and non-compliance observed during those final five sessions. See Figure 44, 45, and 46 for Kevin’s treatment graphs.

Figure 44. Kevin Treatment Graph: Compliance in Demand Sessions

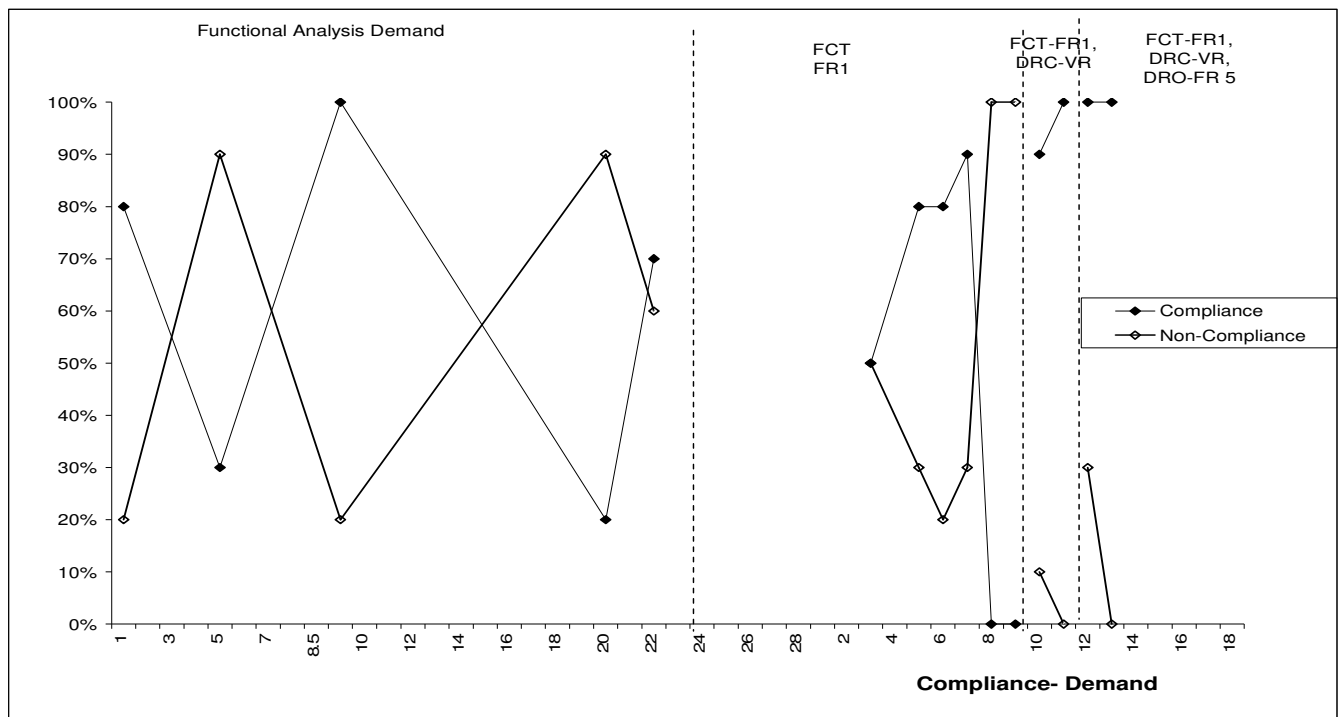


Figure 45. Kevin Treatment Graph: Flopping, Attempts to Leave, Crying & Running in Demand Sessions

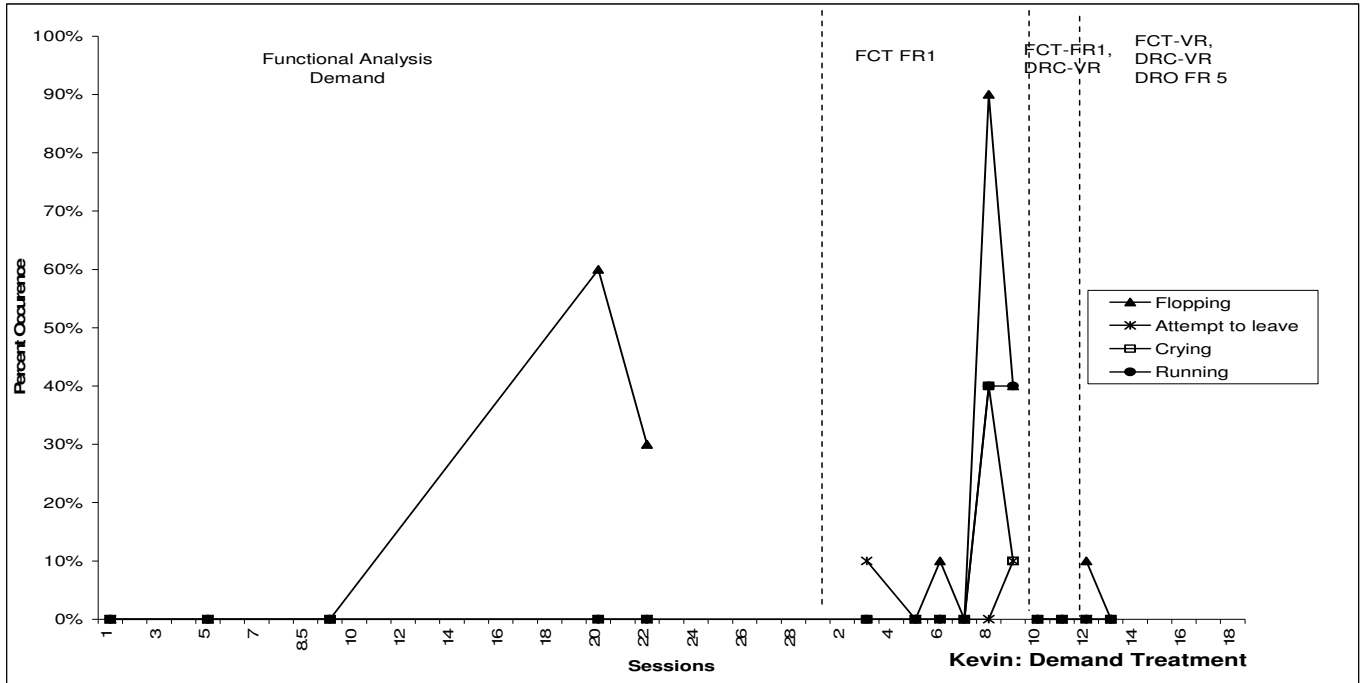
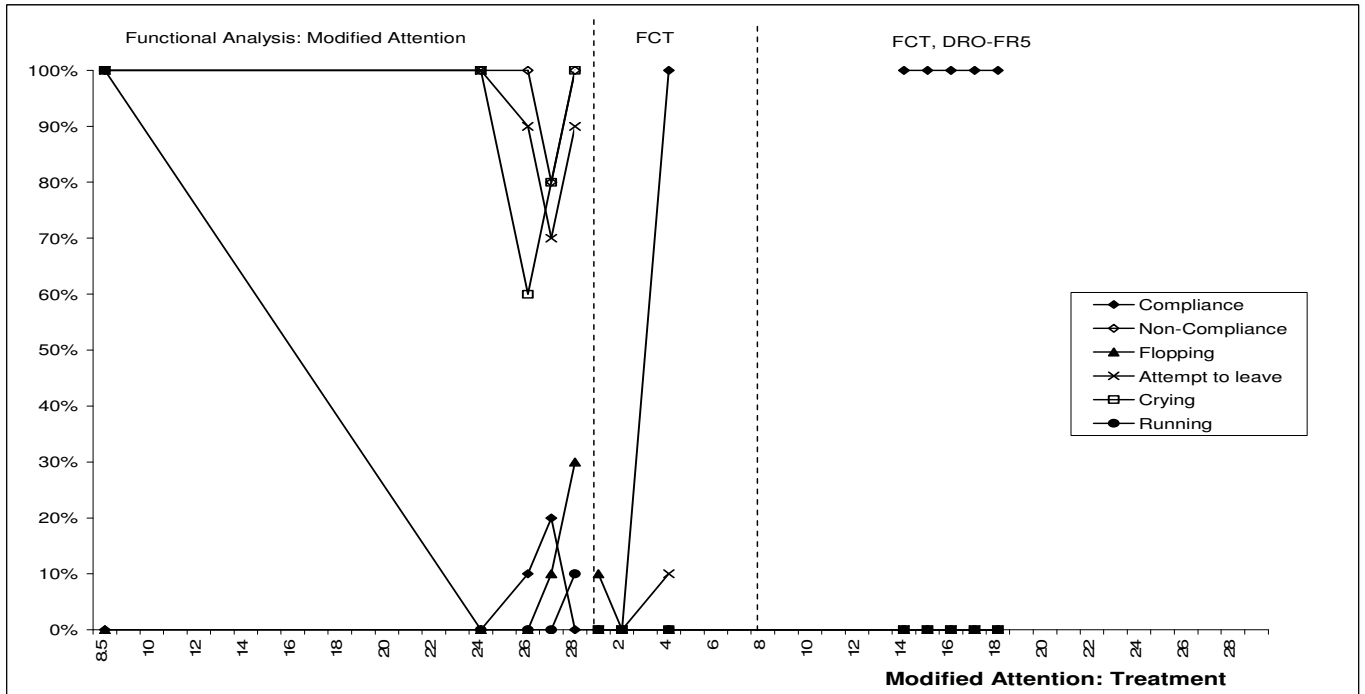


Figure 46. Kevin Treatment Graph: All Problem Behaviors in Modified Attention Sessions



Treatment Subject 3: Larry

Larry's functional analysis data indicated the same primary function for all problem behaviors: escape from demand. Therefore, baseline data were taken directly from his demand sessions conducted as part of experiment 1 of this study. Larry's primary mode of communication based on the communication mode checklists was speech. Therefore, the first treatment included a FCT component as well as a DRO component and a response cost. Specifically, Larry was earning "smiley faces" following activities for listening, complying, working, and acting appropriately. Moreover, he would also receive a "sad face" if he engaged in inappropriate (i.e. problem) behavior. At the end of the activity, the number of sad faces was subtracted from the number of smiley faces. Each smiley face equated to one minute of reading immediately following that activity. Reading by himself was a preferred activity for Larry. If he did not have more smiley faces than sad faces, he would not earn for that activity. Larry was also encouraged to ask for a "break" at any time. Following any request for a break, he received one to two minutes of a sensory based activity. The plan was set up to be implemented in the morning as well as the afternoon. At the end of the morning as well as the end of the afternoon, Larry would earn a longer activity of his choice contingent on earning five or more smiley faces over the morning or afternoon. His choice activity would be written on his data sheet first thing in the morning and the afternoon so Larry knew what he would be working for at any time.

The treatment seemed to be successful during the first session. However, as soon as Larry received a "sad face" during the second session, his problem behaviors increased. The treatment was implemented for three additional sessions before being modified. The revised plan was similar to the initial treatment; however, there was no response cost component. Larry continued to earn "smiley faces" for the same appropriate behaviors that the examiner was attempting to

increase. However, all problem behaviors were placed on extinction. Each smiley face earned at the end of the activity still equated to one minute of reading immediately following that activity. Larry was still encouraged to request a “break” at any time. Again, the plan was set up to be implemented in the morning as well as the afternoon. Larry’s non-compliance and socially inappropriate behaviors were completely extinguished. He continued to engage in sensory seeking behavior between zero and 20% of the sessions. See Appendix C for a copy of Larry’s data sheets. See Figure 47 for Larry’s functional analysis graphs with the treatment phase.

Figure 47. Larry Treatment Graph: Non-Compliance, Socially Inappropriate Behavior, and Sensory Seeking Behavior in Demand Sessions

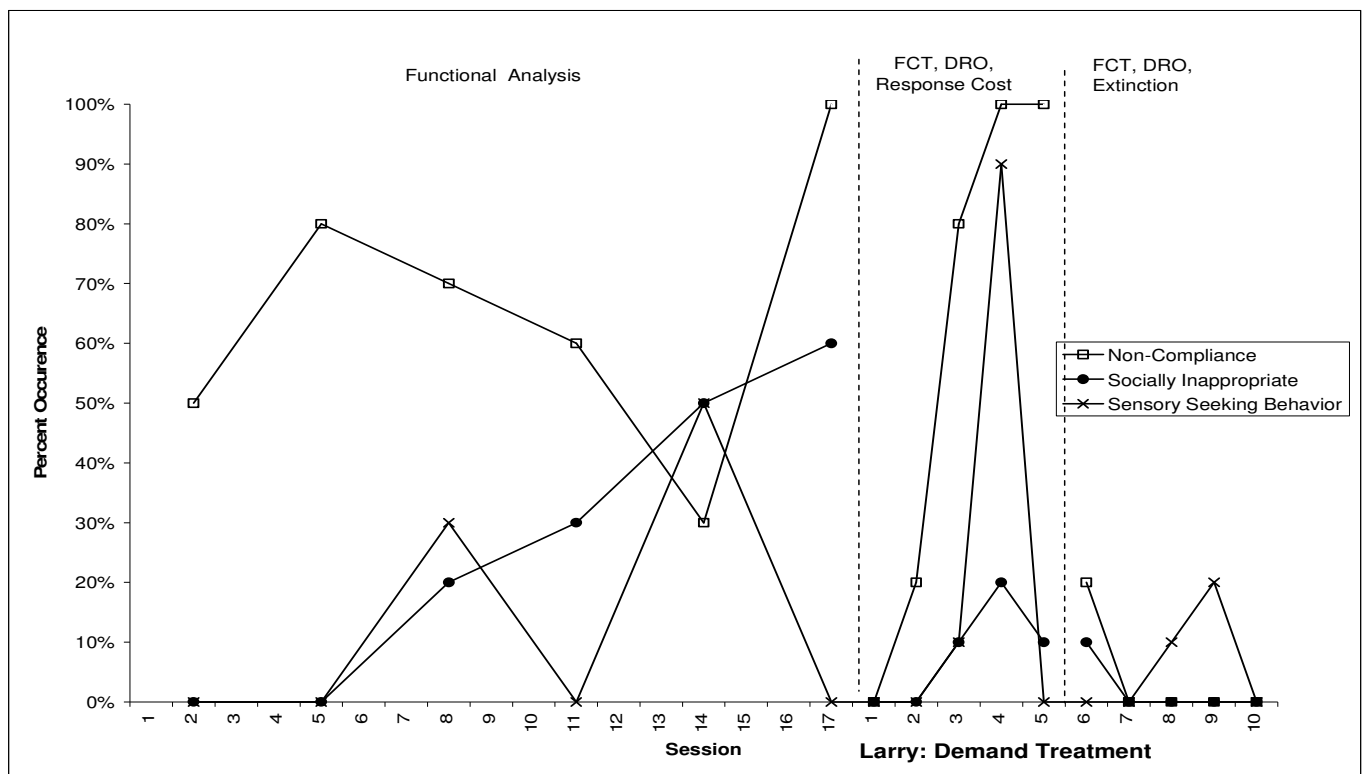


Figure 48. Larry Treatment Graph: Property Destruction in Demand Sessions

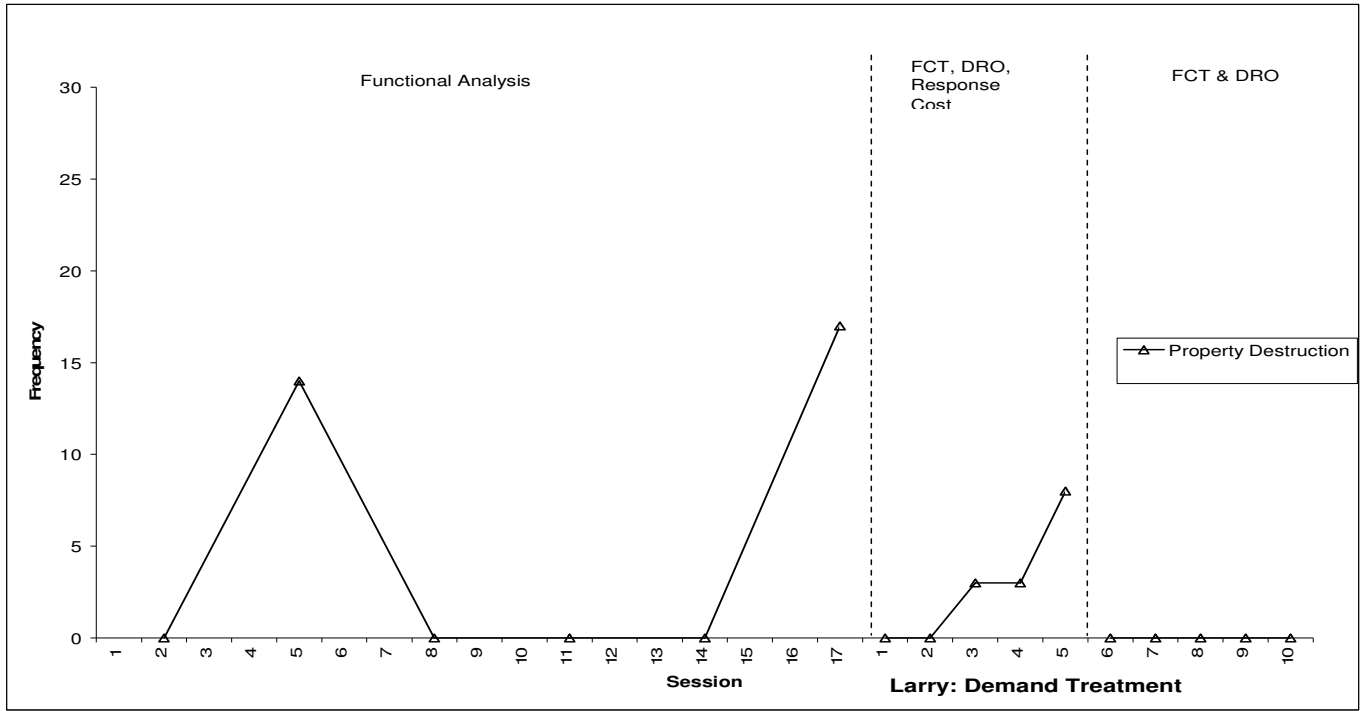
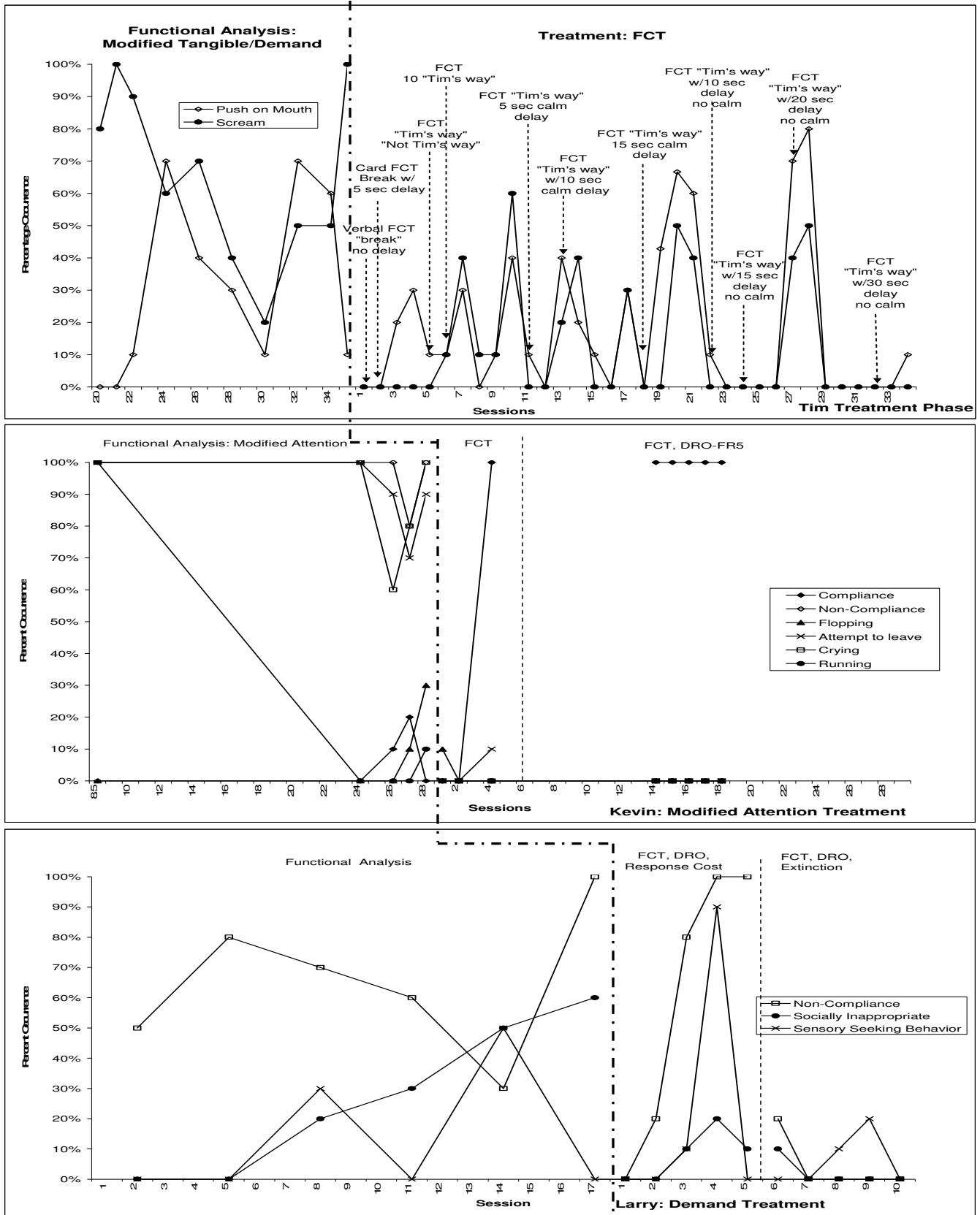


Figure 49. Multiple Baseline Treatment Graphs



CHAPTER 5

DISCUSSION

Experiment 1

The study demonstrated that a functional analysis could be conducted in a public school setting by public school personnel in order to provide information regarding the function of a student's problem behavior. As a result school districts may be able to utilize personnel already employed in their district to address these students' problem behaviors. If problem behaviors are successfully reduced, these students would have more opportunities to mainstream into the general education curriculum. This is important since one of the significant advantages of a public school placement is the ability to mainstream disabled students into classrooms with their typically developing peers. Furthermore, while in a self contained classroom, the students' behaviors would no longer interfere with their ability to be taught. However, there were limitations that were evident during the study that need to be discussed.

One challenge of this study was the dual use of a school psychologist as an experimenter in addition to her current role and responsibilities. Since the experimenter was hired as a school psychologist, she continued to have her typical roles and responsibilities as a district school psychologist. As a result, there were many scheduling constraints that interfered with the timing at various points of the study. Specifically, the experimenter's availability presented as an obstacle. Ideally, the functional analysis phase should have been conducted in as many consecutive days as possible. However, due to the experimenters schedule as well as each student's availability, there were often gaps in the functional analysis sessions. On average the examiner was only able to devote time during two days a week. In fact, at times the experimenter had to skip entire weeks due to scheduling constraints. This limitation confirmed previously documented challenges stated

in the literature by Ervin *et. al* (2001) regarding a lack of extra personnel as an obstacle to conducting functional analysis in school districts. Therefore, although functional analysis sessions can be conducted by school personnel as shown in this study, school districts would have to plan for this by reducing other job responsibilities of those staff.

Although spreading out the functional analysis sessions was unintentional in this study, it did provide one possible advantage. Instead of student's missing a significant amount of class time within a small period of time, missed class time for each individual student was spread out over extended periods of time. Although the total amount of missed class time was the same, the student's academic performance may not have been impacted as much if sessions were spread out. This was important since previous researchers (Ervin *et al.*, 2001) discussed the impact of depriving students educationally as a result of the student's participation in a functional analysis. Since the individual students in this study were not out of their classrooms for many consecutive days, one could argue that the sessions did not deny them access to an appropriate learning environment. However, one would need to look at the impact the student's behavior was already having on their availability to learn before determining the impact of using school time to conduct a functional analysis.

Research has shown that school personnel are often less likely to attempt mainstreaming with non-disabled peers when a student with a disability also exhibits problem behaviors (Arceneaux & Murdock, 1997). For example, if a student's problem behaviors were significant enough to prohibit him or her from participating in certain activities within his or her school or from learning up to his or her full potential, then they were already being denied access to a free and appropriate education. Therefore, spreading out the sessions over time would only result in a delay to the student being able to once again fully benefit from his or her public school placement.

Another obstacle to this particular study had to do with the timing of each student's problem behavior. When a student exhibits problem behaviors, parents as well as teachers typically desire a quick if not immediate solution to reduce the problem behaviors. Since the school district in this study already employed behavior analysts on staff, behaviors were often addressed quickly before the examiner of this study was able to become involved. Furthermore, when the experimenter was involved, the process seemed very slow due to scheduling delays. Therefore, parents and teachers were asked to be patient when their child participated in the study. If school districts modified the role of the school psychologist to allow more time for such behavioral procedures, the functional assessment process would be quicker.

Another challenge to this study involved variables that were out of the examiner's control (e.g. student out sick, student in school sick, special events in school that could not be missed, medication changes, lack of sleep, events occurring at home that may have carried over into school, etc.). Staff conducting functional analyses on children in clinical settings would have more control over these variables than a staff working in a public school. The examiner attempted not to conduct functional analysis sessions on days when there were reported establishing operations that may have impacted the results of the study. For example, if a parent reported that a child was sick or did not sleep the night before, functional analysis sessions were not conducted that day. During the A-B-C phase of the study, staff were instructed to note anything that may have influenced the student's behaviors on any given day. This information was taken into account when analyzing the A-B-C data.

Ervin *et al.* (2001) discussed the available space in a public school as a challenge to conducting a functional analysis. This study supported the lack of available space as another difficulty when conducting a functional analysis in a public school setting. Ideally, functional

analyses should start in an analogue environment to reduce factors that may impact the results. However, there was never a completely empty classroom in any building within the current district in which this study was done. When the experimenter attempted to use her office as a setting, there were many items and distractions even in that room. Furthermore, the second school year when subjects two and three participated in the study, the experimenter's office was shared with another school district personnel and was no longer an option. When the functional analysis sessions were conducted in the natural environment, the specific environments contained variables beyond the experimenter's control that may have impacted the study. For example, there were other students and staff in all classrooms, which made it challenging if not impossible to completely control for attention. There were also many tangible items in the natural environments, which made it difficult to control when conducting tangible sessions. Although there were challenges as stated above, the function of each student's problem behaviors was revealed through the functional analysis sessions.

Although the experimenter did not need to implement an alone condition, it was important to point out that public school settings were not conducive to conducting these types of conditions. Due to the inherent characteristics of these sessions (i.e. no other adults or staff), alone sessions could not be conducted in the child's classroom. Moreover they could not be conducted in any environment within the current school district due to a district policy that a student could not be left alone in a classroom without staff. Furthermore, alone sessions would need to occur in environments with a method of observing the student unobtrusively while they were alone such as using a one way mirror or video surveillance. Other school districts would likely have similar spacing constraints when trying to implement a functional analysis. This limitation would be more significant if a student's problem behavior served an automatic function.

There were some benefits to conducting the study in the child's natural environment. For instance, the natural setting allowed the examiner to ensure that the treatment would be feasible to implement in the child's current setting after completion of the study. Moreover, the natural setting provided for easier generalization of the treatment following the study. Although treatment generalization following the functional analysis in the school setting was not an area explored formally during this study, it could be an area of future research.

When looking for subjects to participate in the study, the experimenter noticed that her prior relationship with teachers seemed to be a factor. Teachers who were familiar with the experimenter seemed to be more willing to ask for assistance and support. Although the school district had five self contained autistic classes, students who were named as potential participants were students in three of the five district classes, located in two of the three schools. The other two classes were in a school that was new to the examiner and those staff did not have a prior history with the examiner.

Based on the results of the descriptive analyses, conditions were established as part of the functional analyses. Although this single subject design had only three subjects, it appeared that the more hypothesized functions of any given behavior, the higher the number of different session conditions. As a result, the functional analysis was quicker when the A-B-C data showed a clearer function. Interestingly, based on each subject's adaptive functioning levels on the Vineland, the two subjects who were in the low range involved more complex functional analyses and treatments in comparison to the subject who was in the moderately low range for adaptive functioning. Adaptive functioning in relation to functional analyses could also be an area of future study.

Although the experimenter was referred to as a school psychologist throughout the study, she was also a Board Certified Associate Behavior Analyst who had four years experience

conducting functional analysis in a clinical setting. Since most school psychologists employed in public school settings do not hold a behavior analyst certification with specific training in functional analyses, it would be a challenge for them to conduct functional analyses. However, if districts employed behavior analysts or other staff with a background in functional assessments and functional analysis, this study clearly demonstrated that staff can conduct an experimental functional analysis in a public school setting. Therefore, the study demonstrates that functional analyses can be done in public school settings, but would require well trained personnel.

Specifically, the person conducting the functional analysis would need to be able to analyze the results of the functional assessment phase and A-B-C data in order to make initial hypotheses regarding the function of a child's behavior. Furthermore, they would need to know how to set up and conduct functional analysis sessions as discussed in the literature. Staff would also need to know how to modify session conditions based on the data. They would also need to be trained to analyze the data and design an appropriate function based treatments. Staff would need to know how to make modifications and fade or generalize treatments as needed. This study therefore supported Ervin *et al.* (2001) who documented a lack of trained school personnel as an obstacle to conducting a functional analysis in a public school setting.

Experiment 2

The study ultimately demonstrated that based on the results of a functional analysis, a function based treatment package, incorporating FCT, could be designed and implemented by school personnel in a public school setting to successfully reduce students' problem behaviors. Furthermore, this study demonstrated the above with autistic students, a specific and growing subset of the special education population, who have often presented as a challenge for school districts around the country. Specifically, the study demonstrated that school districts could use research based methods to design more functionally based treatments for autistic children exhibiting problem behaviors. However, school districts would need to commit a great deal of resources (e.g. space, trained and available personnel) to this process in order to achieve success.

Research has indicated that students diagnosed with autism exhibit problem behaviors to a large extent because they do not possess the ability to appropriately express their wants and needs to access the reinforcement (Carr & Durand, 1985a). However, before implementing a FCT procedure to address this communication deficit, one would need a functional analysis to ensure that the response being taught is functionally equivalent to the communicative intent of the person (O'Neill & Sweetland-Baker, 2001). Research has shown that FCT that replaces the function of a problem behavior will result in the reduction of problem behaviors in autistic children (Sigafos & Meikle, 1996). There have many studies that have demonstrated that FCT can independently reduce problem behaviors by developing new communication skills (Buschbacher & Fox, 2003; Hagopian *et al.*, 1998; Hagopian *et al.*, 2001; Lalli *et al.*, 1995; Sigafos & Meikle, 1996). However, other studies have combined FCT with other techniques to successfully reduce problem behaviors (Billingsley & Neel, 1985; Durand *et al.*, 1993; Hagopian *et al.*, 1998; Shirley *et al.*, 1997; Wacker *et al.*, 1990). In order to achieve an optimal and timely reduction of each student's

problem behaviors, this study consistently combined FCT procedures with other functionally based treatments such as extinction and differential reinforcement procedures. The results demonstrated that a treatment package including FCT, in addition to other functionally based treatments, resulted in the reduction of problem behaviors for three male students diagnosed with autism. Once a student's problem behaviors were reduced, he was more available to learn and benefit from their current educational placements. The examiner also attempted to design treatments that would be feasible to implement in the classroom.

Implications for School Psychology

School districts are required by federal law to conduct FBA's when a special education student engages in problem behaviors (IDEA, 1997, 2004). As a result, districts often rely on outside professionals in order to conduct these assessments. However, these outside professionals would not have the same extensive background knowledge of the student that the school psychologist would have as a result of working with students and their families over extended periods of time. This study demonstrated that it was possible for a school psychologist to conduct a functional analysis without the assistance of outside supports, which would be very valuable to many districts.

Another important implication of the study was the potential impact that it may have on individual student's academic progress. For example, if problem behaviors were successfully reduced, students would have more opportunities to mainstream with typically developing peers in the Least Restrictive Environment (LRE). According to federal law, the LRE would mean that school districts were educating special education students in regular classrooms with their non-disabled peers, in the school they would attend if not disabled, to the maximum extent appropriate

(IDEA, 1997, 2004). A student would have more opportunities to be in the LRE if they were not engaging in problem behaviors.

Furthermore, regardless of the class placement, reducing or eliminating a students' problem behaviors would improve his or her ability to benefit educationally as they would be more available to learn. Although cognitive and academic testing provides valuable information, the results do not typically have a direct and immediate influence on the child being more accessible and available to learn. However, reducing a student's problem behaviors would have an immediate and direct effect on that student's availability to learn.

Although functional analysis sessions can be conducted by school psychologists as evidenced in this study, school districts would have to plan for this by reducing their other job responsibilities. However, not all school psychologists have the training to conduct these types of analyses. Therefore, districts would have to be willing to provide initial as well as ongoing trainings and supports. Moreover, this study demonstrated that the total time needed to conduct a functional analysis would not be that different from the total time needed to conduct a comprehensive child study team evaluation, which typically takes 60 to 90 days. A comprehensive evaluation by the Child Study Team may require testing in various disciplines over numerous days. Once that testing is complete, the evaluators would require time to write up the results. In this study, functional analyses were conducted in approximately four to six days, indicating the function of individual student's problem behaviors. Successful treatments were then implemented in an additional three to six days. Therefore, the total amount of time needed to conduct a functional analysis versus the time needed to conduct a comprehensive child study team assessment was not that different.

Suggestions for Future Research

The current study used a method to collect A-B-C data that allowed for a more intensive and quantitative analysis of the data than is often used when collecting A-B-C data. Yet the data collection involved in this type of A-B-C data did not seem to be more labor intensive for those staff taking the data. Although there have been studies comparing A-B-C results with functional analyses, it would be interesting to design a similar study using this method of collecting A-B-C data. It would also be interesting to compare the various methods that professionals working in schools use to collect A-B-C data. Future studies could examine both the ease and practicality of the different methods from the perspective of the staff taking the data. Another study could also use different A-B-C methods to evaluate whether they would provide a similar hypothesis depending on what method was used. A study could also compare school psychologists' ability to generate hypotheses based on the results of A-B-C data in general and compare that to this method of collecting A-B-C data. Finally, a study could compare school psychologists' ability to generate a hypothesis based on the way the A-B-C results were presented to them (i.e. graphs or written as percentages).

Since the goal of the A-B-C data and functional analysis would be to generate a hypothesis based on function, a future study may choose to examine this specifically in regards to school psychologists working in schools. It would be interesting to determine how many school psychologists actually use any method of looking at the function of a behavior before designing a treatment. It would also be interesting to determine if school psychologists would come to the same conclusion regarding the function of a student's behavior if they were presented with the same information. Furthermore, a study could look at whether or not most school psychologists

could design treatment based functions if the function is previously told to them. This last study may be significant in regards to training programs for school psychologists.

This study concluded with the success of designing and implementing a function based treatment, which resulted in the reduction of problem behaviors. However, future studies could also expand this study by examining the ability of these treatments to be generalized across time, location or personnel. A study could also assess the long term effectiveness of these function based treatments in comparison to treatments that were not functionally based. It may also be interesting to look at treatment integrity of those staff that were involved personally in the A-B-C or functional analysis portion of the study to determine if they would have higher treatment integrity if they were more closely involved in the entire functional assessment process.

Within the field of autistic spectrum disorders, there is often a great deal of rigidity noted. As a result, children diagnosed with autism may be engaging in problem behaviors in an attempt to gain control over some aspects of their environment or lives. Therefore, future studies may want to examine the potential for an additional condition beyond the four common functions to include a different type of “control” condition. The control condition would evaluate if the function of a student’s behavior was his or her desire to be in control of some aspect of their environment. The control condition should not be mistaken with the condition typically referred to as a control condition (i.e. Toy Play) that would be used to demonstrate experimental control. Instead, these conditions would evaluate a variable often associated with severely disabled children, which was a lack of control of their lives.

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APPENDIX A
VINELAND ADAPTIVE BEHAVIOR RATING SCALE-
SECOND EDITION: TEACHER RATING FORM

Figure 50. Tim Vineland Adaptive Behavior Scale- Second Edition: Teacher Rating Form

Domain	Standard Score	Percentile Rank	Adaptive Level
Communication	72	3	Moderately Low
Daily Living Skills	70	2	Low
Socialization	71	3	Moderately Low
Motor Skills	78	7	Moderately Low
Adaptive Behavior Composite	68	2	Low

Subdomain	Adaptive Level
<i>COMMUNICATION</i>	
Receptive	Moderately Low
Expressive	Moderately Low
Written	Low
<i>DAILY LIVING SKILLS</i>	
Personal	Low
Academic	Moderately Low
School Community	Low
<i>SOCIALIZATION</i>	
Interpersonal Relationships	Low
Play & Leisure	Low
Coping Skills	Moderately Low
<i>MOTOR</i>	
Gross	Moderately Low
Fine	Moderately Low

Figure 51. Kevin Vineland Adaptive Behavior Scale- Second Edition: Teacher Rating Form

Domain	Standard Score	Percentile Rank	Adaptive Level
Communication	72	3	Moderately Low
Daily Living Skills	72	3	Moderately Low
Socialization	64	1	Low
Motor Skills	94	34	Adequate
Adaptive Behavior Composite	67	1	Low

Subdomain	Adaptive Level
<i>COMMUNICATION</i>	
Receptive	Moderately Low
Expressive	Moderately Low
Written	Moderately Low

<i>DAILY LIVING SKILLS</i>	
Personal	Moderately Low
Academic	Adequate
School Community	Low
<i>SOCIALIZATION</i>	
Interpersonal Relationships	Low
Play & Leisure	Low
Coping Skills	Low
<i>MOTOR</i>	
Gross	Adequate
Fine	Moderately Low

Figure 52. Larry Vineland Adaptive Behavior Scale- Second Edition: Teacher Rating Form

Domain	Standard Score	Percentile Rank	Adaptive Level
Communication	82	12	Moderately Low
Daily Living Skills	80	9	Moderately Low
Socialization	81	10	Moderately Low
Motor Skills	91	27	Adequate
Adaptive Behavior Composite	79	8	Moderately Low

Subdomain	Adaptive Level
<i>COMMUNICATION</i>	
Receptive	Moderately Low
Expressive	Moderately Low
Written	Moderately Low
<i>DAILY LIVING SKILLS</i>	
Personal	Moderately Low
Academic	Moderately Low
School Community	Moderately Low
<i>SOCIALIZATION</i>	
Interpersonal Relationships	Moderately Low
Play & Leisure	Moderately Low
Coping Skills	Moderately Low
<i>MOTOR</i>	
Gross	Adequate
Fine	Adequate

APPENDIX B
A-B-C DATA SHEET

Figure 53. A-B-C Data Sheet Tim

Tim

Date: _____

Time	Activity	Location	Antecedent	Behavior	Consequence	Outcome	Initials

Activity

- 1 Transitions
- 2 Arrival to school
- 3 Free/play time/recess
- 4 Group Academics/teaching
- 5 Individual Work Time
- 6 Snack
- 7 Journal
- 8 Centers
- 9 Story time
- 10 Specials (i.e. art, music, gym, library)
- 11 OT
- 12 Speech
- 13 Bathroom
- 14 Other _____

Behavior

- 1 aggression (incl. attempts)
- 2 non-complaint (verbal)
- 3 non-compliant (physical)
- 4 Tantrums (flopping, screaming, etc.)
- 5 Pushing on mouth w/ hand
- 6 Other _____

Outcome

- 1 Behavior Increases/intensifies
- 2 Behavior stops
- 3 Behavior stays the same

Antecedent

- 1 Transition
- 2 Demand/academics
- 3 Down/free time
- 4 Adult attention (positive)
- 5 Adult attention (negative)
- 6 Denied something/told no/not getting way
- 7 Alone/no attention
- 8 Schedule change
- 9 Loud noise
- 10 Unknown/unobservable
- 11 Other _____

Consequence

- 1 Escapes/avoids
- 2 Removed from room/area
- 3 Attention
- 4 Ignored
- 5 Physically assisted
- 6 He does get item/activity
- 7 He does NOT get item/activity
- 8 Continue w/demand
- 9 Modify work/demand

Location

- 1 Outside
- 2 Reg Educ classroom
- 3 Special Educ classroom
- 4 Hallway
- 5 Specials rm
- 6 Bathroom
- 7 Therapy rm
- 8 Other inside _____

Figure 54. A-B-C Data Sheet Kevin

Kevin

Date: _____

Time	Activity	Location	Antecedent	Behavior	Consequence	Outcome

Activity

- 1 between activities
- 2 arrival to school
- 3 free/play time/recess
- 4 academics/ITT
- 5 circle time
- 6 snack/lunch
- 7 gym
- 8 art
- 9 music
- 10 OT
- 11 spitting
- 12 quiet choice
- 13 end of day
- 14 assembly
- 15 bathroom
- 16 Other _____

Location

- 1 classroom
- 2 hallway
- 3 library
- 4 bathroom
- 5 nurse
- 6 music rm
- 7 art rm
- 8 lunch rm
- 9 playground
- 10 Speech
- 11 Other _____

Consequence

- 1 he escapes/avoids
- 2 removed from room/area
- 3 adult attention
- 4 peer attention
- 5 ignored
- 6 physically assisted
- 7 he does not get item/activity
- 8 he stops asking
- 9 Other _____

Antecedent

- 1 transition
- 2 demand/academics
- 3 down/free time
- 4 peer interaction
- 5 wants something/denied something
- 6 staff individual attention
- 7 alone/no attention
- 8 schedule change
- 9 teaching/providing directions
- 10 loud noise
- 11 unknown/unobservable
- 12 Away from class
- 13 Other _____

Behavior

- 1 screaming
- 2 crying
- 3 shaking fist
- 4 flopping
- 5 running in room
- 6 attempt to leave room
- 7 hit object
- 8 non-compliant
- 9 self injurious
- 10 Sleepy
- 11 Property Destruction

Outcome

- 1 Behavior Increases/intensifies
- 2 Behavior stops
- 3 Behavior stays the same

Figure 55. A-B-C Data Sheet Larry

Larry

Date: _____

Time	Activity	Location	Antecedent	Behavior	Consequence	Outcome

Activity

- 1 Morning Routine
- 2 Spelling
- 3 Lunch/Recess
- 4 Math
- 5 Reading
- 6 Writing
- 7 Laptop
- 8 Choice
- 9 HW Planner
- 10 Pack up
- 11 Assembly
- 12 Bathroom
- 13 Whole Group
- 14 Small Group
- 15 Penny/Given taken
- 16 Class store
- 17 Handwriting
- 18 Speech
- 19 Yoga
- 20 Art
- 21 Spanish

Location

- 1 Classroom
- 2 Hallway
- 3 Library
- 4 Bathroom
- 5 Nurse
- 6 Music Rm
- 7 Art Rm
- 8 Lunch Rm
- 9 Playground
- 10 Speech Rm

Consequence

- 1 He escapes/avoids
- 2 Removed from room/area
- 3 Adult attention
- 4 Peer attention
- 5 Ignored
- 6 Physically assisted
- 7 Does not get item/activity
- 8 He stops asking
- 9 Timer set
- 10 Choose choice activity

Antecedent

- 1 Transition
- 2 Demand/academics
- 3 Down/free time
- 4 Peer interaction
- 5 Denied something
- 6 Staff attention
- 7 Alone/no attention
- 8 Schedule change
- 9 Teaching/providing directions
- 10 loud noise
- 11 Unknown/unobservable
- 12 Whole group on rug

Behavior

- 1 Lay Head down
- 2 Crying
- 3 Says something not friendly
- 4 Turn from speaker
- 5 Inappropriate use of materials
- 6 Interrupt teacher
- 7 Sensory stimulation/fidget
- 8 Non-compliance (1)
- 9 Hands in pants
- 10 Acting silly
- 11 Socially Inappropriate (3, 9, 10)

Outcome

- 1 Behavior Increases/intensifies
- 2 Behavior stops
- 3 Behavior stays the same

APPENDIX C
FUNCTIONAL ANALYSIS DATA SHEETS

Figure 56. Functional Analysis Data Sheet: Tim

Date: _____ Time: _____ Session #: _____

Session Type (Circle): **CONTROL (Toy Play)** **DEMAND** **TANGIBLE**

Therapist: _____ Data Collector: _____

Behavior	Frequency (Broken into 30 second intervals)									
	0-30	31-60	1-1.30	1.31-2	2-2.30	2.31-3	3-3.30	3.31-4	4-4.30	4.31-5.00
Flopping	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Screaming	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Push on Mouth	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Aggression										
Non-Compliance										
Compliance										
Issue Demand										

- Flopping-** dropping intentionally to the floor
- Screaming-** raising voice louder than normal speaking volume/yelling
- Push on Mouth-** taking both hands and pushing hard on both sides of his cheeks
- Aggression-** any attempt or success at hurting someone else
- Compliance-** complying with a demand after a verbal prompt or gestural prompt
- Non-Compliance-** not complying with a demand after a verbal prompt and gestural prompt
- Issue Demand-** every time the examiner places a demand on Tim

Figure 58. Functional Analysis Data Sheet: Larry

Date: _____ Time: _____ Session #: _____

Session Type: **TOY PLAY** **ATTENTION** **DEMAND**

Therapist: _____ Data Collector: Donielle Cohen Friedenthal

Behavior	Frequency (Broken into 30 second intervals)									
	0-30	31-60	1-1.30	1.31-2	2-2.30	2.31-3	3-3.30	3.31-4	4-4.30	4.31-5.00
Non-Compliance	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Compliance	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Socially Inappropriate	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Sensory Stimulation/fidget	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Crying	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Property Destruction										
Aggression										

Non-Compliance- not complying with a demand after a verbal prompt and or gestural prompt

Compliance- complying with a demand after a verbal prompt

Socially Inappropriate- acting silly, making noise, lift shirt, hands inn pants, not friendly, inappropriate use of materials

Sensory Stimulation- playing with velcro on shoes, covering eyes or eats, playing with hands

Property Destruction- any attempt to destroy object

Aggression- any attempt or success at hurting another person

APPENDIX D
TREATMENT DATA SHEETS: LARRY

Figure 59. Treatment Data Sheet: Larry

Larry **Date:** _____

Activity	Happy Faces	Sad Faces	TOTAL ☺	FCT
<i>MORNING: Working for</i> _____				
	☺ ☺ ☺ ☺ ☺	☹ ☹ ☹ ☹ ☹		
	☺ ☺ ☺ ☺ ☺	☹ ☹ ☹ ☹ ☹		
	☺ ☺ ☺ ☺ ☺	☹ ☹ ☹ ☹ ☹		
	☺ ☺ ☺ ☺ ☺	☹ ☹ ☹ ☹ ☹		
	☺ ☺ ☺ ☺ ☺	☹ ☹ ☹ ☹ ☹		
<i>AFTERNOON: Working for</i> _____				
	☺ ☺ ☺ ☺ ☺	☹ ☹ ☹ ☹ ☹		
	☺ ☺ ☺ ☺ ☺	☹ ☹ ☹ ☹ ☹		
	☺ ☺ ☺ ☺ ☺	☹ ☹ ☹ ☹ ☹		
	☺ ☺ ☺ ☺ ☺	☹ ☹ ☹ ☹ ☹		
	☺ ☺ ☺ ☺ ☺	☹ ☹ ☹ ☹ ☹		
<i># Happy Faces - # Sad Faces = Total # of minutes to read</i>				

At the start of the day, Larry's schedule should be placed under the activity section above.

☺ = He will receive 1 HAPPY face for appropriate behavior (i.e. listening, complying, working, acting appropriately)

☹ = He will receive 1 sad face for each inappropriate behavior (i.e. refusing to comply, saying inappropriate things, property destruction, calling out, crying, hands in pants, lifting shirt, making strange noises, acting silly).

Larry must have more happy faces than sad faces at the end of the activity. If he has more ☹ faces, he does not earn.

He will earn 1 minute of reading for each ☺ face in the total column. This can be done immediately or later if schedule does not permit.

If he has 5 or more smiley faces at the end of the morning, he earns 30 minutes of an activity of his choice. That activity should be written in above first thing. Repeat in afternoon.

Functional Communication Training (FCT): Larry may also ask for a break at any time. If he does this, provide a 1-2 minute sensory break (i.e. walk around, jumping jacks, push ups, turning in circle, deep pressure, etc. See OT for details). Please mark all breaks requests under FCT section.

Figure 60. Treatment Data Sheet: Larry Revised

Larry Date: _____

Activity	Happy Faces	FCT
MORNING: Working for _____		
	☺ ☺ ☺ ☺ ☺	
	☺ ☺ ☺ ☺ ☺	
	☺ ☺ ☺ ☺ ☺	
	☺ ☺ ☺ ☺ ☺	
	☺ ☺ ☺ ☺ ☺	
AFTERNOON: Working for _____		
	☺ ☺ ☺ ☺ ☺	
	☺ ☺ ☺ ☺ ☺	
	☺ ☺ ☺ ☺ ☺	
	☺ ☺ ☺ ☺ ☺	
	☺ ☺ ☺ ☺ ☺	

At the start of the day, Larry's schedule should be placed under the activity section above.

☺ = He will receive 1 HAPPY face for appropriate behavior (i.e. listening, complying, working, acting appropriately)

He will earn 1 minute of reading for each ☺ face. This can be done immediately or later if schedule does not permit.

If he has 5 or more smiley faces at the end of the morning, he earns 30 minutes of an activity of his choice. That activity should be written in above first thing. Repeat in afternoon.

Functional Communication Training (FCT): Larry may also ask for a break at any time. If he does this, provide a 1-2 minute sensory break (i.e. walk around, jumping jacks, push ups, turning in circle, deep pressure, etc. See OT for details). Please mark all breaks requests under FCT section.

APPENDIX E
KEVIN'S SOCIAL STORY

My name is Kevin and I go to ***** Elementary School.

I like school and I have friends in my classroom.

Sometimes, I go with another class, Mrs. *****, for art, music, library, gym, or circle time.

I know that my friends in my classroom will be there when I get back so I do not get angry.

When I leave the room, I am quiet in the hallway.

When I come back and see my friends, I am happy.

Sometimes, my friends in my classroom go to art, music, library, gym without me.

I know I will be here when they get back so I do not get angry.

I know that sometimes I get to go with them and sometimes I do not.

I do not get angry when I do not get to go with them.

I know that they still like me and I still like them.

I know I will see them again very soon.

I know that getting angry does not help them to come back any sooner.

When I do not get angry, my teacher and parents are happy with me.

I am happy when my friends come back to the classroom and I get to see them.

APPENDIX F
IRB CERTIFICATION OF APPROVAL
Approval 1

Committee B Protocol Certification

Subject: Committee B Protocol Certification
From: "COMMITTEE, IRB" <irb@temple.edu>
Date: Thu, 30 Nov 2006 12:41:37 -0500
To: "AXELROD, SAUL" <AXELROD@temple.edu>

The attached file is a notice regarding the continuing compliance of your research project



TEMPLE
UNIVERSITY®

Office for Human Subjects Protections
Institutional Review Board
Medical Intervention Committees A1 & A2
Social and Behavioral Committee B

3400 North Broad Street
Philadelphia, Pennsylvania 19140
Phone: 215.707.3390 Fax: 215.707.8387
e-mail: richard.throm@temple.edu

Research Review Committee B

Certification of Approval for a Project Involving Human Subjects

Protocol Number: **10399**
PI: **AXELROD, SAUL**
Approved On: 30-Nov-2006
Review Date: 30-Nov-2006
Committee: B BEHAVIORAL AND SOCIAL SCIENCES
School/College: College of Education
Department: CUR, INSTR, & TECH (1902)
Project Title: School Personnel Establishing Functional Communication Training Based on a Functional Analysis with Autistic Students in a Public School Setting to Reduce Problem Behaviors

In accordance with the policy of the Department of Health and Human Services on protection of human subjects in research, it is hereby certified that protocol number 10399, having received preliminary review and approval by the department of CUR, INSTR, & TECH (1902) was subsequently reviewed by the Institutional Review Board in its present form and approved on 30-Nov-2006 with respect to the rights and welfare of the subjects involved; appropriateness and adequacy of the methods used to obtain informed consent; and risks to the individual and potential benefits of the project.

In conforming with the criteria set forth in the DHHS regulations for the protection of human research subjects, and in exercise of the power granted to the Committee, and subject to execution of the consent form(s), if required, and such other requirements as the Committee may have ordered, such orders, if any, being stated hereon or appended hereto.

It is understood that it is the investigator's responsibility to notify the Committee immediately of any untoward results of this study to permit review of the matter. In such case, the investigator should call Richard Throm at 707-8757.

ZEBULON KENDRICK, Ph.D.
CHAIRMAN, IRB

APPENDIX F
IRB CERTIFICATION OF APPROVAL
Approval II



Office for Human Subjects Protections
Institutional Review Board
Medical Intervention Committees A1 & A2
Social and Behavioral Committee B

3400 North Broad Street
Philadelphia, Pennsylvania 19140
Phone: 215.707.3390 Fax: 215.707.8387
e-mail: richard.throm@temple.edu

Research Review Committee B

Recertification of Approval for a Project Involving Human Subjects

Protocol Number: **10399**
 PI: **AXELROD, SAUL**
 Expires On: 28-Nov-2008
 Committee: B BEHAVIORAL AND SOCIAL SCIENCES
 Department: CUR, INSTR, & TECH (1902)
 Project Title: School Personnel Establishing Functional Communication Training Based on a Functional Analysis with Autistic Students in a Public School Setting to Reduce Problem Behaviors

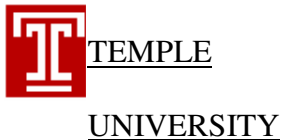
 Based on a review of your status report, the Institutional Review Board hereby re-approves protocol number **10399**, originally approved on 30-Nov-2006, for the period ending 28-Nov-2008

* Original Review Date: 21-Jul-2006
 * Re-Review Date: 09-Nov-2007

It is understood that it is the investigator's responsibility to notify the Committee immediately of any untoward results of this study to permit review of the matter. In such case, the investigator should call Richard Throm at 707-8757.

ZEBULON KENDRICK, Ph.D.
CHAIRMAN, IRB

APPENDIX G
IRB PARENT CONSENT LETTER



Department of Psychological Studies
in Education

Second Floor, Ritter Annex (004-00)
Philadelphia, Pennsylvania, 19122
Phone: (215) 204-6012
Fax: (215) 204-6013

A Commonwealth University

Dear Parents/Guardians of Students diagnosed with autism in one of Cherry Hill's self contained autistic support classes:

Hello! My name is Donielle Cohen and I am a certified school psychologist working in the Cherry Hill School District. I previously worked at Bancroft NeuroHealth for over five years. I spent four of those years at Bancroft's neurobehavioral crisis unit working on reducing problem behaviors exhibited by both children and adults. Through my time at Bancroft in addition to conferences and classes, I learned a great deal about the application of various applied behavioral techniques to reduce problem behaviors (i.e. functional analysis methodology). While working at Bancroft, I also became a Board Certified Associate Behavior Analyst (BCABA) and earned my masters degree in education (M.Ed.) through Temple University. I spent my last year at Bancroft working as a school psychologist in their education and brain injury programs. I became a certified school psychologist in the state of New Jersey in 2003. The 2006-2007 school year will be my fourth year in the Cherry Hill School District. I am also now a nationally certified school psychologist.

Although I now work full time for the Cherry Hill School District, I am also conducting dissertation research for the completion of my doctoral degree through Temple University. I am asking for your assistance to help me with my research. My research examines the application of functional analysis methodology in a public school setting to reduce problem behaviors commonly associated with children diagnosed with autism. As you probably already know from personal experience, problem behaviors interfere with a child's ability to benefit from education and reduce mainstreaming opportunities. My study will use the information obtained via a functional analysis conducted with your child to create and implement an individualized intervention incorporating Functional Communication Training (FCT) to reduce these problem behaviors. Currently, most intervention plans in schools are created without experimentally assessing the function they are serving. This is a dangerous, but common practice as research has shown that if treatments are not based on the specific variables controlling the problem behavior, interventions can have no effect or even worsen a behavior. Conversely, when the function of a behavior is known, it is possible to create a functional match between the behavior and a treatment. Therefore, functional assessments such as the one that will be conducted as part of this study help determine what treatments will be effective before they are even implemented. You and your child's participation will be COMPLETELY anonymous and voluntary. Furthermore, your child and the school will NOT be identified in any way in the research.

By signing the attached consent form, you would be giving me permission to work with your child in school in hopes of reducing his or her problem behaviors. The study will involve gathering

some information about your son or daughter's adaptive level of functioning and problem behaviors. I will then train staff already working with your child in school to collect Antecedent-Behavior-Consequence (ABC) data. ABC data provides preliminary information regarding the function of any problem behaviors. I will oversee this data collection phase. Based on that data, sessions will be designed and conducted in school to experimentally assess the true function of one or more of your child's problem behaviors. I will conduct these sessions along with school personnel already working with your son and daughter. These school personnel may include an educational assistant, special education teacher, regular education teacher, speech pathologist, occupational therapist, or physical therapist. I will personally graph and analyze the data.

Sessions will average approximately ten minutes in duration with the total session time not exceeding ninety minutes on any given day. These sessions will occur in your child's school between one and five times a week. Participation in this study would mean that your son or daughter will miss a maximum of ninety minutes a day of his or her daily school schedule. This time will be coordinated with his or her teacher to minimize the effects of missed activities. Care will be taken to ensure that your child is not repeatedly missing the same opportunities during this research. Assessment sessions will be implemented until stable levels of problem behaviors are noted, or a clear pattern provides evidence as to the function of the problem behavior. Specific aspects within sessions will be modified if they are not eliciting problem behaviors.

Once the function is determined, I will design an intervention to target the specific function of your child's problem behaviors. Interventions will then be trialed in 'treatment sessions'. These treatment sessions will continue until reduced rates of the problem behavior are evident. If there is no effect after the intervention is implemented in 3-5 sessions, the intervention will be modified as needed. This will continue until a successful treatment has been developed. If the function of your child's problem behaviors is unclear based on the data, you will be notified. Furthermore, if the function is clear, but I am unable to produce a substantial reduction in your child's problem behaviors, you will be notified. In these situations, the data collected will still be graphed and analyzed. The information obtained will be provided to you to help in the ongoing modification of your child's problem behaviors.

Due to your son or daughter's cognitive level of functioning and communication skill level, he or she will not be asked to provide consent for his or her participation in the study. Once you have signed the permission form, your child's name will be entered into a list of possible candidates. Three names will be chosen at random from that list for participation. I will notify you if your child is or is not picked for the study. If you change your mind at any time, your child's participation in the study can be terminated immediately. In that situation, your son or daughter will return to his or her previous daily routine.

I hope the results of the study will provide information as to whether or not a functional analysis can be conducted in a public school setting by school personnel. Ideally, it will also provide information as to the use of functional communication training when working with the autistic population, where language delays are inherent to the diagnosis. This does NOT mean that if results are favorable, the study will be completed with other autistic students within the Cherry Hill School District. Again, this is just an independent research study being done so that I can obtain my doctorate degree. Once the study is complete, your child's performance will NOT

increase or decrease any services or support that your child is currently receiving or not receiving through the district. If there are any possible changes that are indicated through your child's participation in this study, they will be discussed with you in a meeting with your child's Individualized Education Plan (IEP) team. Otherwise, there will be no modifications to your son or daughter's IEP.

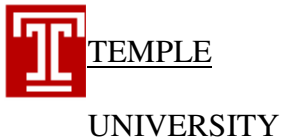
I would really appreciate the opportunity to work with your child in this study, as this is the final step towards completion of my doctoral degree. I also hope it will have a positive impact on the reduction of your child's problem behavior while increasing his or her ability to learn while at school. For your compensation, I will also graph the results of the A-B-C data, functional analysis, and treatment phases. Additionally, a written report will be provided to explain the graphs and results of the study. The results will also be shared with school personnel working with your son or daughter. This will allow all relevant school personnel to understand why your son or daughter engages in problem behaviors. I have attached a sample of the results you would receive if you son or daughter were a participant in this study.

If you would be willing to have your child participate, please sign the consent form attached (that further describes the study) giving your permission for participation in my research study. Please return in the self-addressed envelope provided to my attention at Bret Harte Elementary School, Cherry Hill School District. I would welcome and gladly answer any questions that you may have about this research. Please call me directly at 856-795-0515 extension 5 with any questions or concerns.

Sincerely,

Donielle M. Cohen, M.Ed., NCSP, BCABA
NJ and Nationally Certified School Psychologist
Board Certified Associate Behavior Analyst

APPENDIX H
IRB PARENT CONSENT FORM



Department of Psychological Studies
in Education

Second Floor, Ritter Annex (004-00)
Philadelphia, Pennsylvania, 19122
Phone: (215) 204-6012
Fax: (215) 204-6013

A Commonwealth University

PARENT/CAREGIVER CONSENT FORM

School Personnel Establishing Functional Communication Training Based on a Functional Analysis with Autistic Students in a Public School Setting to Reduce Problem Behaviors

Subject's Name: _____ **Subject ID #** _____

Principal Investigator: Saul Axelrod, Ph.D., BCBA, Professor of Special Education Curriculum, Instruction, and Technology in Education, Temple University 215-204-6060

Co-Principal Investigator: Donielle M. Cohen, M.Ed., BCABA, Doctoral Student, School Psychology Program, Nationally Certified School Psychologist, 856-795-0515 ext 5

IRB Protocol # 10399 Temple University is not being compensated for performing this study.

Purpose of the Study

The purpose of this research includes: a) evaluating experimental assessment in a public school setting, b) reducing problem behaviors of students with autism, and c) improving communication with students with autism.

How the Children Were Selected

To obtain possible candidates for this study, select Cherry Hill School District teachers were asked to provide a list of names of student's diagnosed with autism who exhibit problem behaviors that interfere with that child's ability to benefit from education. Student's names were then chosen randomly from that list.

General Experimental Procedures

I understand that my child will participate in an assessment involving direct data collection on his or her problem behaviors. Initially, data will be taken by staff while my child follows his or her normal routine. Once these data are collected, my child will participate in experimental conditions to learn more about the reasons he or she displays problem behaviors. These sessions will be conducted between one and five times in a given week. When sessions are conducted, they will not exceed a total of one hour per day. These sessions may be repeated until clear results are obtained as to the reason why my child is displaying problem behaviors. These sessions will initially take place in my child's school, however, not in his or her classroom. If needed, the sessions may be moved to my child's

Respondent's Initials and Date: _____

PARENT/CAREGIVER CONSENT FORM, page 2

School Personnel Establishing Functional Communication Training Based on a Functional Analysis with Autistic Students in a Public School Setting to Reduce Problem Behaviors

classroom or another appropriate room on the school's property. Once the assessment sessions are completed, treatment sessions will begin. Treatments will be designed based on the data collected during the assessment phase of the study. Interventions will try to teach specific communication skills to help reduce the problem behaviors. Interventions will be designed, implemented, and modified as needed. The total number of sessions needed to complete the study will vary depending on my child's behaviors during the sessions.

Possible Risks/ Injury

I understand that participation in this study would mean that my son or daughter may miss a maximum of one hour of his or her daily schedule. However, if appropriate, daily activities may be switched to alternate times to accommodate these sessions. I also understand that my child's problem behaviors may initially increase during a treatment phase. I understand that all attempts will be made to block any behaviors that may place my child or any other person in any harm. I also understand that if any behaviors can not be safely blocked or managed, that sessions will be terminated immediately. I understand that sessions will not be terminated due to the occurrence of problem behaviors that are not placing my child or others in immediate danger. I understand that although all attempts will be made to safely block my child's problem behaviors, they may result in injury to my child or others. I understand that if my child were injured at any time during this study, I would be free to temporarily or permanently remove him or her from the study. I am also free to discontinue my child's participation at any time for any reason. In the event of an injury during a session, my child will be taken directly to the school nurse and I will be contacted immediately.

Benefits/ Compensation

I understand that this study intends to identify the reasons why my child exhibits problem behaviors. I understand that once these reasons are identified, research based treatments will be designed and implemented to reduce these behaviors. At the conclusion of the study, I will receive a written summary of all results. I understand that neither my child nor I will receive any monetary compensation for participation in this study.

Confidentiality/Anonymity

I understand that all papers and information from this research study will be kept confidential according to federal, state, and local laws and regulations. My child's name will never appear in connection with any of the information collected. I understand that files and information obtained from the study may be reviewed by Temple Universities Institutional Review Board or by federal agencies to make sure that the investigators are doing the study properly and obeying federal regulations. I understand that any results that may be presented or published as a result of this study will not identify my child or his or her school.

Respondent's Initials and Date: _____

*PARENT/CAREGIVER CONSENT FORM, page 3***School Personnel Establishing Functional Communication Training Based on a Functional Analysis with Autistic Students in a Public School Setting to Reduce Problem Behaviors****Disclaimer/Withdrawal/ Termination**

I understand that I am free to decide whether or not my child participates in the study. I understand that my child is not able to decide whether or not to participate due to his or her cognitive and language limitations. I further understand that not participating in the research or dropping out of the research will yield no negative consequences for my child or me in the future. I understand that it is possible that the study will not be able to clearly identify the reasons for my child's problem behavior. I also understand that it is possible that my child may not respond to any interventions designed in this study.

Institutional Contacts

I understand that if I wish further information regarding my child's rights as a research subject, I may contact Mr. Richard Throm, Institutional Review Board Manager and Coordinator, in the Office of the Vice President for Research of Temple University, 3400 N. Broad Street, Philadelphia, PA, 19140, 215-707-8757

Questions

I understand that I may ask the investigators questions about the research and my child's participation and that these questions will be answered to my satisfaction before I agree to have my child participate.

Final Statement and Signature

This study has been explained to me. I have read the consent form and I agree to have my child participate. I have been given a copy of this consent form for my records.

Child's Name (please print)

Date of Birth

Teacher's Name

Parent/Guardian's Name (please print)

Signature

Date

Principal Investigator's Name (please print)

Signature

Date

Co- Principal Investigator's Name (please print)

Signature

Date

APPENDIX I
COMMUNICATIVE RESPONSE MODALITY CHECKLIST (Durand, 1990)

Name _____

Date _____

Respondent's Name _____

1. Does the student use one of the following methods of communication on a regular basis? (if more than one is used, circle the preferred method)

VERBAL SIGN/GESTURAL SYMBOLIC NO

2. Does the student use one or more verbal responses to communicate on an occasional basis (e.g. "cookie", "no")?

YES NO

If YES, then the communicative response might be verbal. If NO, go to question #3

3. Does the student use one or more signs or understandable gestures to communicate on an occasional basis?

YES NO

If YES, then the communicative response might be sign/gestural. If NO, go to question #4

4. Does the student use one or more symbolic forms of communication to communicate on an occasional basis) e.g. points to pictures in a picture book?)

YES NO

If YES, then the communicative response might be symbolic. If NO, go to question #5

5. Is one method of communication being emphasized in speech/language training?

YES NO

If YES, then the communicative response may be in the modality currently used in training. If previous speech/language training has been unsuccessful with all modalities, attempt simple gestures or symbols to start.

APPENDIX J
COMMUNICATIVE RESPONSE "FORM" CHECKLIST (Durand, 1990).

Name _____

Date _____

Expected Response by others (e.g. assistance, tangibles):

Communicative Response (Include form; e.g. verbal):

Circle YES or NO for each of the questions below.

1. Is this response one that can be easily taught to the student (i.e. within a few days or weeks)?

YES NO

2. Is this response one that could be understood by someone not familiar with the student?

YES NO

3. Is this response appropriate for those situations in which most problem behaviors seem to occur?

YES NO

4. Is this response one that will be responded to appropriately by other people?

YES NO

5. If used appropriately, would other people not find this response annoying?

YES NO

If you answered NO to any of the above questions, then a different communicative response (i.e. form and/or modality) should be considered.