

COLLABORATION AMONG GRANDPARENTS AND PROFESSIONALS WITH DISCRETE TRIAL TRAINING IN THE TREATMENT FOR TRAUMATIC BRAIN INJURY

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ABSTRACT

This study evaluated the impact of collaborative efforts of grandparents and school professionals in the treatment of Traumatic Brain Injury in a six-year-old boy. The method of treatment was discrete trial training across settings (e.g., home and school) and the change agents were the child's grandparents, special education teacher, and a teacher assistant. Findings indicated that discrete trial training led to increased academic and adaptive skills.

Traumatic Brain Injury (TBI) is the leading cause of acquired disability in children (Rothlisberg, D'Amato, & Palencia, 2003). Severity of the disability is dependent on the nature of the injury; however, it is often the cause of ab-

normal development among children (Wassenberg, Max, Lindgren, & Schatz, 2004). TBI is injury to the brain that impedes normal cognitive development and/or psychosocial impairment which influences educational achievement (Dykeman, 2003). TBI is included in the Individuals with Disabilities Education Act (IDEA) as a condition that is eligible for special services in the school environment (Spears, 2005). Severe brain injury often leads to the greatest difficulty among life domains including social, education and occupational. Individuals with severe brain injury generally have difficulty with comprehending commands, verbal communication, and are not likely to receive their education in a mainstream setting without significant intervention (Warzak, Mayfield, & McAllister, 1998). Deficits are evident in abilities to respond to stimulation, develop long-term speech and language, attend, concentrate and obtain impulse control. Problems with cognitive ability, motor development and behavioral management are commonly deficits experienced by those with severe TBI.

Individuals with Disabilities Education Act defines TBI as a head injury resulting in partial or total impairments in one or more areas of functioning: cognition, language, memory, attention, reasoning, abstract thinking, judgment, problem solving, sensory, perceptual, motor abilities, psychosocial behavior, physical function, information processing and speech (Perselli, 2007). As the ability to function is regained, the child with TBI will have transition plans developed to reintroduce the student to the education setting. Returning to school, such a child requires accommodations and modification of the learning experiences (Hawley, 2004). Research has demonstrated an increased level of success for children who are supported by a treatment team consisting of counselors, occupational therapists, physical therapists, speech language therapists, social workers, school psychologists, and special educators (Glang, Tyler, Pearson, Todis, & Morvant, 2004). These professionals work collectively to address academic, physical and emotional needs that the student may face during the transition into school (Dykeman, 2003).

Several teaching strategies have been utilized with children with TBI, but the utilization of a specific applied behavior analysis intervention, such as discrete trial training, is lacking in professional literature on TBI. Many of the objectives targeted with children with TBI address attention and concentration, memory and organization, following directions, and developing appropriate play and social skills (Hawley, 2004). These objectives are similar to ones found in interventions designed for children with Autism. Numerous studies illustrate the success of applied behavior analysis with children diagnosed with Autism (Anderson, Avery, DiPietro, Edwards, & Christian, 1987; Devlin & Harber, 2004; Lovaas, 1987; McEachin, Smith, & Lovaas, 1993). The application of the procedures found in these studies to children with TBI is a logical

extension of behavioral intervention strategies.

Lovaas (1987) designed a behavioral intervention paradigm utilizing one-to-one discrete trial training for children with severe autistic symptoms. In this model, the trainer presents a discriminative stimulus, the child responds, the trainer provides an immediate consequence, and a brief between-trial interval pause is taken. The trainer would provide an aversive consequence when an incorrect response is given.

Anderson et al. (1987) replicated the discrete trial training procedure in a home-based intensive treatment but without physically aversive consequences. The only contingent consequence was positive responses. Participants in this study were also children with Autism. The parents in this study were extensively trained in discrete trial training methods and required to perform the intervention 25 hours a week. Children receiving a behavioral intervention in their own homes demonstrated significant gains in language, daily living skills, social skills and academic development.

Devlin and Harber (2004) utilized discrete trial training across two settings (home and school) with a 5-year-old child with autism. The change agents were the child's parents, siblings, special education teacher, resource teacher, and a speech/ language pathologist. Twenty-eight weeks of discrete trial training was conducted between twenty and thirty hours per week. Six skill categories were examined pre and post treatment. Skill areas that increased significantly were: attending, receptive language, expressive language, and pre-academic skills.

Intensive behavioral interventions, such as discrete trial training, for children with Autism result in less restrictive school placements (McEachin et al., 1993). The behavioral gains were maintained for children receiving early intervention (before age 7) throughout age 13. These significant findings support further investigation of the possible benefits of intensive behavioral interventions across other disabilities, such as TBI.

The purpose of this study was to assess the effectiveness of implementing an intensive behavioral intervention with change agents acting as interventionists who had no previous training in utilization of discrete trial training for a child with TBI. The intervention goals are to increase specific skill deficits that were observed and consisted of fewer hours of intensive discrete trial training than seen in previous studies with individuals with autism. The discrete trial training intervention was implemented by the child's grandparents, his special education teacher, and the teacher assistant under the supervision of a trained applied behavior analysis specialist. The grandparents and the teacher assistant previously had no training in discrete trial training or behavioral training prior to this study. The special education teacher did not have any discrete trial training but had taken a basic contingency management class as part of her

undergraduate training. This class had provided her with knowledge of basic behavior management.

METHOD

PARTICIPANTS

The participants of this study were a 6-year-old child diagnosed with TBI, and the change agents: the child's grandparents, the child's special education teacher, and the special education teacher's assistant. The research took place in a rural southeastern town in the child's home and in his special education classroom. The child was diagnosed as having TBI following a blunt force trauma to the head when he was an infant. He was hospitalized for many months following the incident and had been receiving occupational and physical therapy as well as early intervention services since that time.

MATERIALS

The Battelle Developmental Screening Inventory (BSDI) was administered to screen for current personal/social, adaptive, gross and fine motor, receptive and expressive and cognitive problems. Project Memphis was administered to assess fine motor, personal/social, adaptive, language and perceptual/cognitive function. The Battelle Developmental Inventory (BDI) also assessed personal/social, adaptive, fine motor, and cognitive functioning. It was noted that the child had an awkward gait and limited use of one hand. His grandmother reported that he suffered occasional seizures. No materials (e.g., diagnostic instruments or medical reports) were available from the University Medical Center where he had been hospitalized could be obtained.

PROCEDURE

The researchers developed the child's program by assessing his current level of functioning, establishing goals, and developing an activity/skill list of desired goals. The Applied Behavioral Analysis (ABA) specialist assessed the child utilizing the Curriculum Guide provided in Behavioral Interventions for Young Children with Autism: A Manual for Parents and Professionals (Maurice, C., Green, G., & Luce, S.C., 1996). Observational recording was used to measure performance on skills from the curriculum. Instructional objectives that the child did not master without prompting were discussed with his grandparents, his special education teacher and other members of his Individualized Education Plan Team. The team determined which goals from each of the curriculum areas should be targeted for intervention during the twelve weeks of intervention. Observational recording using a checklist of

performance skills was used to determine progress. Results related directly to the instructional objectives. The program was implemented using applied behavior analysis. The grandparents, the special education teacher, and the teacher's assistant were trained and used discrete trial training to teach the appropriate instructional objectives.

Discrete trial training is an intensive treatment that is designed to train a variety of skills that individuals with disabilities may not learn incidentally. Objectives usually begin with pre-learning skills such as eye contact, sitting independently in a chair, attending skills, basic self help skills and safety skills. The training is conducted using intense drills for each objective. Students are pre-guided to follow commands and then receive reinforcement for correct responses.

In discrete trial training the trainer presents a discriminative stimulus to the child in the form of a command (e.g., "Clap your hands." or "Point to house.") Concurrently, or directly after presentation of the discriminative stimulus, the trainer prompts the child (taking the child's hands and clapping them together). This step is faded until elimination when the child acquires the skill with no guided help. After the presentation of the prompt the trainer gives the child a contingent immediate consequence such as praise for a correct response or, alternately, the trainer would provide an aversive response, such as turning head away for incorrect responses (Lovaas, 1987).

TRAINING FOR CHANGE AGENTS

The child's grandparents, his special education teacher and the teacher assistant were trained to implement discrete trial training using procedures similar to Koegel et al. (1978). The ABA specialist began the training with a 15 minute discussion that described the definitions and gave examples of antecedents, consequences, between trial intervals, and behavioral recording that are typically used in discrete trial training. The ABA specialist then modeled herself demonstrating correct and incorrect use of discrete trial training utilizing the attending skills on the Beginning Curriculum Guide provided in Behavioral Interventions for Young Children with Autism: A Manual for Parents and Professionals (Maurice, C., Green, G., & Luce, S.C., 1996) (see Table 1). The change agents were asked to identify each modeled trial as correct or incorrect and to verbally explain to the group why each was correct or incorrect. The change agents then participated in role-plays with the ABA specialist. Change agents alternated between role-playing as the child or the trainer. The ABA specialist provided change agents with feedback throughout the role play and suggested how to correct errors. Once the change agent demonstrated that they could correctly use the procedure for five trials consecutively, the change agent was directed to apply the procedure directly with the child while

teaching the beginning attending skills. Feedback was provided by the ABA specialist until the procedure was demonstrated for five more consecutive trials. Positive consequences employed for the child included small pieces of cereal combined with social praise and/or sips of juice combined with social praise. Negative consequences included the change agent turning his/her head away from the child or by telling him “no”. Data were recorded on data collection sheets provided by the Curriculum Guide in Behavioral Interventions for Young Children with Autism: A Manual for Parents and Professionals (Maurice, C., Green, G., & Luce, S.C., 1996). Following training, change agents initially utilized applied behavioral analysis in one to one settings either at home or at school.

Once the subjects mastered the basic skills, discrete trials began in the natural environment (while eating in the cafeteria, while playing at home, when riding in the car, etc.) to promote generalization and to teach new skills. Discrete trial training occurred approximately twenty hours per week (between home with the grandparents and the school with the special education teacher and teacher assistant). Change agents met weekly with the ABA specialist to compare data in an effort to move smoothly from objective to objective. Mastery for skill acquisition was set at 80% across ten consequence trials. Change agents ran discrete trials on the same skills identified as objectives from the curriculum guides. The special education teacher and assistant ran trials at school while the grandparents ran trials at home.

RESULTS

Before behavior intervention, the subject had mastered three attending skills (sits in a chair independently, makes eye contact in response to name, responds to “no hands”), one imitation skill (imitates gross motor movements), and seven receptive language skills (follows one step instructions, identifies body parts, identifies familiar people, identifies objects in the environment, points to pictures in a book, identifies environmental sounds). In the area of expressive language skills, he had mastered one skill (labels familiar people). In the pre-academic skill area the subject had mastered one skill (matching colors). He had mastered three skills in the area of self-help skills (drinks from a cup, uses a fork and spoon when eating, uses napkin).

After 12 weeks of behavioral intervention significant improvements (See Table 2) were visible. Of items on the Beginning Curriculum Guide provided in Behavioral Interventions for Young Children with Autism: A Manual for Parents and Professionals (Maurice, C., Green, G., & Luce, SC., 1996), the subject exhibited mastery of another attending skill (responds when given the instructions “Look at me”). In the imitation skills area he added one more

Table 1

Beginning Curriculum Guide

	Assessment #1	Assessment #2
Attending Skills		
Sits in a chair independently	X	X
Makes eye contact in response to name	X	X
Makes eye contact when given the instruction		
“Look at me”	–	X
Responds to the direction “Hands down”	–	–
Imitation Skills		
Imitates gross motor movements	X	X
Imitates actions with objects	–	X
Imitates fine motor movements	–	–
Imitates oral motor movements	–	–
Receptive Language Skills		
Follows one-step instructions	X	X
Identifies body parts	–	X
Identifies objects	–	X
Identifies pictures	X	X
Identifies familiar people	X	X
Follows verb instructions	–	X
Identifies verbs in pictures	–	X

Identifies objects in the environment	X	X
Points to pictures in a book	X	X
Identifies objects by function	–	–
Identifies possession	–	X
Identifies environmental sounds	X	–
Expressive Language Skills		
Points to desired items in response to “What do you want?”	X	X
Points to desired items spontaneously	–	X
Imitates sounds and words	–	–
Labels objects	–	–
Labels pictures	–	–
Verbally requests desired items	–	–
States or gestures yes and no for preferred and nonpreferred items	–	–
Labels familiar people	X	X
Makes a choice	–	–
Reciprocates greetings	–	–
Answers social questions	–	–
Labels verbs in pictures, others, and self	–	–
Labels objects by function	–	–
Labels possessions	–	–

Pre-academic Skills

Matches

Identical objects	–	–
Identical pictures	–	–
Objects to pictures	–	–
Pictures to pictures	–	–
Colors	X	X
Shapes	–	–
Letters	–	–
Numbers	–	–
Nonidentical objects	–	–
Objects by association	–	–
Completes simple activities independently	–	–
Identifies colors	–	–
Identifies shapes	–	–
Identifies letters	–	–
Identifies numbers	–	–
Counts by rote to 10	–	–
Counts objects	–	–
Self-help Skills		
Drinks from a cup	X	X
Uses fork and spoon when eating	X	X
Removes shoes	–	X
Removes socks	–	–

imitation skill (imitates actions with objects). In the category of receptive language skills, he acquired three new skills (identifies pictures, follows verb instruction, identifies possessions). Under expressive language he added three skills (points to desired items in response to “What do you want?”, points to desired items spontaneously, labels possessions). The subject displayed no growth in the area of pre-academic skills. He gained two skills in the area of self-help (removes shoes, toilet trained for urination).

Table 2

Beginning Curriculum Guide Skills; Pre and Post Intervention

Summary

Skill Category	Number of Skills in Category	Percentage of Skills Present Pre Intervention	Percentage of Skills Present Post Intervention	Percentage Shift
Attending	4	75%	100%	25%
Imitation	4	25%	50%	25%
Receptive Language	12	58%	83%	25%
Expressive Language	14	7%	29%	22%
Pre-Academic	17	6%	6%	0%
Self Help	8	38%	63%	25%
Total	59	35%	55%	20%

DISCUSSION

Due to the amount of time necessary to effect change with discrete trial training, parents and caregivers of children with TBI are encouraged to become active participants in their children’s therapy, often by continuing intervention procedures within the home setting. In this study, it would have been impossible for the subject to have had twenty hours of discrete trial training per week without assistance from his grandparents. The results of the study indicate that the combined interventions of discrete trial training and collaboration with home significantly increased the subject’s mastery of desired beginning curriculum guide skills from 35% to 55% (Table 2). The findings support the position that young children with TBI can obtain significant gains through the use of Applied Behavior Analysis with the application of discrete trial training occurring approximately twenty hours per week across settings.

These findings extend the research of Devlin and Harber (2004) who demonstrated discreet trial training can be implemented with fewer hours of intervention than seen in previous studies. This study also demonstrated that a person with little or no background in applied behavioral training can implement discreet trial training with success. The subject in this study exhibited significant gains but the effect of implementing discreet trial training and resulting placements in school environments should be discussed further. The benefits of discrete trial training are dependent upon individuals being able to implement the program with integrity.

This study provides implications for early intervention efforts for individuals with other disabling conditions, namely traumatic brain injury. Family members, teachers, and support staff at schools and preschools can be trained to implement and integrate discrete trial training into everyday curricula at homes, schools, and daycares. Intensive discrete trial training is an effective intervention strategy for children with traumatic brain injury.

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