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The Effects Of Systematically Fading Reinforcement While Maintaining Skills

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University of Northern Iowa

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THE EFFECTS OF SYSTEMATICALLY FADING
REINFORCEMENT WHILE
MAINTAINING SKILLS

A Thesis
Submitted
In Partial Fulfillment
of the Requirements for the Degree
Specialist in Education
in School Psychology

Jodi Suzanne Bronson
University of Northern Iowa
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ABSTRACT

A review of the literature describing treatment programs for young children with autism revealed two distinctly different strategies. One, the Lovaas approach (Lovaas, 1987), focused on an intense, one-on-one discrete trial training format implemented for approximately 40 hours per week. A prescribed curriculum targeted at social and communication skills is incorporated. The second program, TEACCH, emphasized an individualized curriculum selected after a careful assessment process to determine a person's strengths and limitations. Goals and objectives were subsequently implemented in highly structured special education classrooms where the focus was on antecedent control and the use of visually mediated strategies. Interviews with classroom teachers and educational consultants indicated problems with generalization, and specifically, the use of reinforcement when implementing the TEACCH program.

This study describes a single subject multiple baseline across skills with a five year old male child with autism who was placed in a self-contained classroom where components of structured teaching and the TEACCH philosophy were implemented. The purpose of the study was to determine the effectiveness of a fading procedure regarding reinforcement for skill acquisition, maintenance, and generalization.

Initially, a reinforcer assessment was conducted to identify the participant's preferred reinforcers. A dense schedule of reinforcement was implemented during initial stages of skill acquisition followed by a structured fading procedure after the skill was acquired at a predetermined level of mastery (i.e., 80% for three consecutive days).
Skills targeted for instruction included (a) the concept of 'beside' and (b) matching *pictures* of food items to *actual* food items.

The first skill was acquired after only six days of direct instruction. The participant was then able to demonstrate the skill in both the direct instruction setting and the generalization setting of independent work even after reinforcement was faded and only offered at the end of each session.

The second skill was monitored in three settings: (a) the direct instruction setting, (b) generalization setting of independent work, and (c) the generalization setting of lunch. This skill was monitored during lunch to observe whether the participant was utilizing the skill to communicate items desired within a natural context. The participant made steady progress acquiring this skill, however he did not reach mastery before the close of the academic school year. Thus, the reinforcement fading procedure was not implemented for this skill. Data collected during lunch, however, were promising and indicated the participant utilized this skill between 65%-85% of the time. In conclusion, a discussion focuses on possible implications for further research,
This Study by: Jodi Suzanne Bronson

Entitled: The Effects of Systematically Fading Reinforcement While Maintaining Skills

has been approved as meeting the thesis requirement for the

Degree of Specialist in Education

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DEDICATION

I would like to dedicate this study to all of the young children with autism and their families. Hopefully as a result of future research educators can continue to develop strategies and interventions that make their lives productive, meaningful, and most of all enjoyable.
ACKNOWLEDGEMENTS

I would like to acknowledge numerous people for their help and guidance throughout this thesis project. First and foremost, I would like to thank my committee members, Dr. Barry Wilson, Dr. Christopher Kliewer, and most of all Dr. Christine Macfarlane, my committee chair person. Without the guidance and support throughout, this project would not have been possible.

I would also like to thank the staff and students in Room 12 at River Hills School. It was truly my pleasure to be a part of the classroom three days each week. I have learned a lot about severe disabilities in my time at River Hills and thank the classroom staff for the opportunity to learn from them.

Finally, I would like to thank "John's" family for giving me the opportunity to work with their son throughout this project. I'm sure that I have probably learned more from "John" than I could have ever taught him. He was and still is an inspiration for me as I continue to read and study more about autism in young children.
# TABLE OF CONTENTS

LIST OF TABLES. ............................................................................................................. x

LIST OF FIGURES. ........................................................................................................... xi

CHAPTER 1. INTRODUCTION....................................................................................... 1

CHAPTER 2. LITERATURE REVIEW ............................................................................... 4

  Historical Review. ......................................................................................................... 5

  Kanner............................................................................................................................... 5

  Extreme aloneness. .......................................................................................................... 5

  Delayed speech acquisition. ........................................................................................... 6

  Noncommunicative speech. ............................................................................................. 6

  Rote memory. .................................................................................................................. 6

  Pronominal reversal. ....................................................................................................... 6

  Stereotypical behaviors. .................................................................................................. 6

  Maintenance of sameness. ............................................................................................... 6

  Normal physical appearance. .......................................................................................... 7

  Abnormalities during infancy. .......................................................................................... 7

  Asperger........................................................................................................................... 8

  Etiology.............................................................................................................................. 10

  Psychodynamic. ............................................................................................................. 10

  Behavioral Theory. .......................................................................................................... 12

  Biological Theory........................................................................................................... 13

  Current Diagnostic Criteria and Differential Diagnosis................................................. 15
Approaches to Intervention ......................................................... 17
Ivar Lovaas ................................................................. 17
Eric Schopler ............................................................... 24
  Environment ............................................................ 25
  Schedule ................................................................. 25
  Independent work ..................................................... 26
  Task orientation ....................................................... 26
Critique of Research .......................................................... 28
Comparisons: TEACCH and Lovaas .......................................... 33
Importance of Reinforcement .................................................. 35
  Operant Conditioning .................................................. 36
  Varieties of Reinforcement ........................................... 36
    Natural reinforcement .............................................. 37
  Schedules of Reinforcement ....................................... 38
  Individualized Reinforcement .................................... 38
  Assessing Reinforcers ............................................... 39
  Fading Reinforcement ............................................... 39
  Lovaas and Reinforcement ......................................... 41
  TEACCH and Reinforcement ........................................ 42
Importance of Generalization ............................................... 42
Field Research ............................................................. 43
Statement of the Problem .................................................... 44
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Results</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Reinforcer Assessment</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Skill 1</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Skill 2</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Direct Instruction</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Independent Work Setting</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>Lunch Setting</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>Changes in Instruction</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>Instructional Considerations for Skill 1 and Skill 2</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Anecdotal Records</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Termination of Research</td>
<td>70</td>
</tr>
<tr>
<td>5</td>
<td>Discussion</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>Skill 1</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>Strengths</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>Limitations</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>Recommendations</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>Skill 2</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>Strengths</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Limitations</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Recommendations</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Conclusions</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>Implications for Further Research</td>
<td>77</td>
</tr>
</tbody>
</table>
REFERENCES ............................................................. 78

APPENDIX A: Criterion for Diagnosing Autism from the Diagnostic and Statistical Manual of Mental Disorders-IV .......................... 85

APPENDIX B: Data Collection for Instructional Setting and Independent Work Setting/ Data Collection Sheet for Generalization/Lunch Setting for Skill 2... 88

APPENDIX C: Instructional Planning Worksheets .............................................. 91
<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. An Example of a Discrete Trial.</td>
<td>23</td>
</tr>
<tr>
<td>2. Reliability Checks for Skills 1 and 2.</td>
<td>53</td>
</tr>
<tr>
<td>3. Description of Phases Used in this Study.</td>
<td>59</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Diagram of the TEACCH based classroom where John was placed.</td>
<td>49</td>
</tr>
<tr>
<td>2. Example of John's independent work schedule card.</td>
<td>50</td>
</tr>
<tr>
<td>3. John's performance and rate of reinforcement during instructional time for Skill 1.</td>
<td>61</td>
</tr>
<tr>
<td>4. John's performance during independent work sessions for Skill 1.</td>
<td>63</td>
</tr>
<tr>
<td>5. John's performance and rate of reinforcement during instructional time for Skill 2.</td>
<td>65</td>
</tr>
<tr>
<td>6. John's performance during independent work sessions for Skill 2.</td>
<td>67</td>
</tr>
<tr>
<td>7. John's performance during the generalization/ lunch setting for Skill 2.</td>
<td>68</td>
</tr>
</tbody>
</table>
The field of education is currently serving large numbers of students who have many diverse needs. Both regular and special educators are confronting students with many challenges in the classroom. One specific disability educators are encountering is autism. This disability was first introduced in the literature during the 1940s. Since that time, a number of research studies have been conducted in this area.

Currently, autism is believed to be a disorder that presents itself prior to three years of age. In a recent report, Freeman (1996) reports that autism is generally thought to be the result of neuropathology affecting functioning of the brain. The current literature indicates there may be several different etiologies, largely biological in nature. A small portion of cases, around 10%, even appear to be the result of hereditary factors. Freeman also indicates the incidence of autism to be around two to four cases per 10,000 births. Autism is reported to be four times more common in boys than girls. The Diagnostic Statistical Manual of Mental Disorders (DSM), published by the American Psychiatric Association (APA), describes criterion for different disorders. In the fourth edition of this manual, (DSM-IV) it is reported that around 75% of all children diagnosed with autism have a comorbid disability of mental retardation; typically in the moderate range (IQ 35-50).

Students with autism display extreme difficulties with communication skills, social interactions, and often engage in restrictive and repetitive patterns of behavior (DSM-IV, 1994). As a result of these behaviors, and the often comorbid mental
retardation, students with autism have many complex educational needs. Over the last 50 years numerous intervention strategies have been developed for students with autism. These interventions have included behavioral therapy, drug therapy, music therapy, sensory integration therapy, facilitated communication, vitamin therapy, holding therapy, and auditory integration therapy. The empirical research on many of these interventions is quite limited, and some have been considered quite controversial if not questionable.

The importance of early intervention has been demonstrated. Several researchers discovered children who are subjected to interventions at an early age experience greater gains than those who do not receive early intervention (Fenske, Zalenski, Krantz, & McClannahan, 1985; Lord, Bristol, & Schopler, 1993). Early intervention programs have been supported federally by Part H of PL 99:457. These programs have been especially helpful because many children are identified prior to entering formal education.

Quite possibly, behavioral methods of early intervention have received the single most amount of attention in the literature over the years. This particular method of intervention focuses on the use of operant conditioning techniques to shape behaviors. As a result of behavioral treatment methods, many adaptive behaviors (e.g., language and social skills) have resulted in an increase, while many negative behaviors (e.g., aggression) have been found to decrease in occurrence (DeMyer, Hingtgen, & Jackson, 1981; Newsom & Rincove, 1989). Also, inherent in a program based on operant conditioning is the issue of reinforcement during the acquisition of new skills as well as the maintenance of skills.
This paper will provide a literature review of the historic development of autism, possible etiologies of autism, and current diagnostic criteria. In addition, the literature regarding one current behavioral approach to intervention, a method developed by Lovaas (1987), and a method of antecedent controlled intervention, TEACCH (Schopler, Mesibov, & Harsey, 1995) model will be reviewed. Additionally, the issue of reinforcement and the fading of reinforcement to maintain skills will be discussed.

A single subject multiple baseline research study is presented in chapters 3, 4, and 5. This study demonstrates the systematic fading of reinforcement for a child when transitioning from individualized teacher-directed instructional sessions to independent work periods (Schopler et al., 1995). This paper is completed with a discussion section regarding the research study and implications for further research.
Children, who have displayed characteristics that would now be classified as autistic like, have been discussed in the literature for centuries. Quite possibly the first child reported was Juan-Marc-Gaspard-Itard's "Wild Boy of Aiveryon." In 1801, when he was a young adolescent, this child was found in the wilderness of France. Itard (1962) later named him Victor and described him as being unable to focus attention, showing little affection, and even appearing deaf at times. He went on to describe him as seeing without noticing and hearing without listening. By focusing on routine and teaching self-help skills, which are of vital importance in special education still today, Itard was able to help Victor gain many skills and improved his quality of life.

Bruno Bettelheim (1967) refers to another early report of a possible autistic child. This report, made by John Haslam in 1809, discussed a boy admitted in 1799 to Bethlehem asylum. Reportedly, the boy was described as possessing good physical appearance, but exhibiting stereotypical motility, gaze avoidance, disinterest in social interaction, compulsion for object manipulation, and a phenomenal ability to recall musical tunes (Wing, 1981).

In 1911, over 100 years later, Swiss psychiatrist, Ernst Bleuler, gave the first definition to autism. As a psychiatrist, he primarily worked with people diagnosed with schizophrenia. He discovered that people with severe schizophrenia, live in their own world, virtually cut off from contact with the outside world. It would later be this detachment from society and focus on inner self that Bleuler (1950) would identify as
autism. Bleuler felt autism was really a symptom of childhood schizophrenia, as opposed to its own disorder. Some 30 years later, in 1943, this definition of autism by Bleuler, falling under the umbrella of schizophrenia, would be challenged.

**Historical Review**

**Kanner**

The first person to systematically research the disorder of autism was Leo Kanner. In 1943, he published an extensive report of 11 children ages 3 to 11 years, who displayed similar behavioral characteristics. He felt these children did not fall under the then current diagnostic criteria for autism. This definition, previously established by Bleuler (1950), was essentially a diagnosis of schizophrenia.

In his research, Kanner (1943) studied 8 boys and 3 girls. He discovered that even though there were differences related to degrees of disturbances, the family make up, and stages in development, there were clearly a number of common characteristics among these children. He ultimately found nine primary areas of similarities among these children, each of which is described below.

**Extreme aloneness.** Kanner (1943) concluded that the most apparent disorder of these children was their lack of ability to relate themselves in a typical manner to people and situations. There appeared to be an extreme aloneness experienced by these children manifested in the very beginning of life. Parents involved in Kanner's study reinforced this idea by reportedly referring to these children as "like in a shell," "happiest when left alone," "acting as if people weren't there," "perfectly oblivious to everything about him," and "failing to develop the usual amount of social awareness" (p. 242).
Delayed speech acquisition. Eight of Kanner's (1943) original 11 subjects reportedly developed the ability to speak either at the typical age, or after some delay. Three of the subjects, however, remained mute, never developing the ability to speak.

Noncommunicative speech. Another characteristic identified by Kanner (1943) involved those children who did acquire the ability to speak. Kanner reported their language lacked meaning and did not appear to have a communicative function. Much of their speech appeared to be "parrot-like." Kanner also spoke of the echolalic speech in many of these children.

Rote memory. Despite the somewhat delayed and noncommunicative function of speech, many of these children displayed excellent rote memory skills. Many could recite poems, songs, and even encyclopedia pages. However, these passages appeared to be meaningless to the children.

Pronominal reversal. In addition to the noncommunicative speech function, many children also displayed pronominal reversals seldom referring to themselves as "I." The child usually would speak about him or herself in terms of "you;" repeating pronouns just as they were heard by the child.

Stereotypical behaviors. The subjects thrived on and typically engaged in self-stimulatory, stereotyped and repetitive behaviors. These children appeared to display very repetitive behaviors, especially during play activities.

Maintenance of sameness. Yet another characteristic Kanner (1943) identified was the autistic child's obsessive desire for maintenance of sameness. It appeared any change to environment or schedule was very disturbing for these children. Changes in
routine often resulted in extreme despair lasting until sameness and completeness had been restored for the child.

**Normal physical appearance.** Kanner (1943) noted that physically these children appeared normal, with no instances of congenital anomalies. These children were not physically discriminate from their peers. Despite some clumsiness relating to gross motor skills, all subjects appeared to be skillful regarding fine motor skills as well.

**Abnormalities during infancy.** All of Kanner's (1943) 11 subjects reportedly displayed the above characteristics from the beginning of life. Many children appeared to be reluctant to respond to the outside world in infancy. This was marked by an unwillingness to "assume an anticipatory posture upon being picked up" or failing to adjust the body to the person holding him/her (p. 249).

Kanner (1943) later reduced all of these characteristics to involve two major categories; maintenance of sameness in children's repetitive routines and an extreme aloneness. Kanner determined that onset of these behaviors occurred within the first two years of life.

Throughout this seminal study, Kanner (1943) led readers to believe that autism differed from schizophrenia. He argued that schizophrenics withdraw from the world, while the autistic child fails to enter it in the first place. This notion of distinctness was instrumental in establishing autism as a separate disorder from schizophrenia.

Amazingly after more than 50 years of research, this original systematic description of autism, would essentially go unscathed. Despite some minor changes to the definition, autism today is described in many of the same terms that Kanner (1943)
used to describe it. The most distinctive change refers to Kanner’s belief that all subjects had a normal potential for cognition. Now it is common that 75% of autistic children are diagnosed with comorbid mental retardation (Rapin, 1991).

Asperger

During the 1940s, an Austrian researcher, Hans Asperger, was also researching the autistic psychopathy. The two researchers however, were remarkably unaware of each other's research. Unfortunately, Asperger’s study was published in German and was not translated into English until more than 50 years later (Frith, 1989). Regardless, these two researchers encountered surprisingly similar findings. Both studied cases of strange children who displayed similar fascinating features. Foundational to the disorder, both researchers agreed, was the social deficit that these children displayed. They also found that these children exhibited poor eye contact, engaged in social withdrawal or incompetence, delighted in routine, and engaged in stereotypic patterns of word and movement (Happe', 1994).

There were differences, however, in the research findings of these two landmark studies. One area that the two researchers disagreed on was the significance regarding the lack of meaningful communication. Asperger found that children he researched spoke fluently and stated they spoke "like little adults" (Happe', 1994, p. 12). Kanner (1943) on the contrary, found language deficits in the children with whom he worked. Another disagreement was in the area of motor development. Asperger found his subjects to have poor motor skills, both gross and fine. Kanner on the other hand reported that although some of his subjects were clumsy, they displayed good fine motor
skills. The final point that the two researchers disagreed upon was that of learning abilities. Asperger believed his clients were abstract thinkers, performing best when able to produce spontaneously (Happe', 1994). Kanner, on the other hand, believed his clients needed to learn in a rote manner.

The research of Hans Asperger would later provide the basis for the current diagnosis of Asperger's Disorder. This diagnosis, first used by Wing (1981) was introduced to encompass those children who did not fall under the umbrella of autism as described by Kanner in 1943. Asperger’s Disorder was recently cited in the DSM-IV (1994) and given a description under the category of Pervasive Developmental Disorders. Currently, Asperger's Disorder, is generally regarded as higher functioning autism and refers to individuals who appear to have better language abilities, more difficulty with motor actions, and often a capacity for more original thinking than traditional autism (Happe', 1994). Students diagnosed with Asperger's do, however, typically have severe impairments in social interaction, and restricted, repetitive and stereotyped patterns of behavior, interests and activities. They, however, do not typically display significant delays in language or cognitive development, nor do they develop age-appropriate self-help skills, adaptive behavior or curiosity about the environment in childhood (DSM-IV, 1994).

Distinctions between Asperger’s and autism appear to focus on matters of degree of characteristics, thus making it difficult to differentiate Asperger’s from high functioning autism. Happe' (1994) reports that researchers have yet to conduct a study that has effectively and satisfactorily distinguished Asperger’s Disorder and non-
Asperger’s autistic children. Problems with diagnosing Asperger’s as a distinct disorder, separate from higher functioning autism, is an area in need of further research.

Clearly the works of both Kanner and Asperger were foundational in the development of autism as a diagnosis. Further, their landmark studies led to a substantial amount of research in this field.

**Etiology**

After the initial definition and diagnostic criteria for autism were established by Kanner in 1943, many researchers turned their attentions from defining autism to attempting to understand why these children were behaving in such ways. Many theories developed regarding the etiology of autism. These included psychodynamic theories, behavioral theories, and biological theories.

**Psychodynamic**

One major school of thought permeating all of psychiatry during the 1950s, 1960s and early 1970s was the psychodynamic theory of disturbance. This theory supported the idea that autism was caused by psychodynamic conflicts between mother and child or by an extreme existential anxiety suffered by the child (Frith, 1989). Many researchers during this time believed autism resulted from parental attitudes, experiences in the home, relationships with family members, community experiences and even sociological factors.

Kanner (1943) was a proponent of this theory and linked cause to parental influence. In his initial study, Kanner described the parents of his subjects as being highly intelligent, sophisticated, and well educated. However, he went on to describe
their personalities as cold, formal, introverted, humorless, detached, highly rational and objective, as well as lacking warmth and affection.

Bettelheim (1967) was one of the most notable supporters of the psychodynamic theory. He, along with Kanner, coined the phrase “refrigerator mother” to describe the idea that children develop autism because of a maladaptive response to an unloving and even threatening environment. It was believed the child’s mother was typically at the root of autism and that it was caused by a breakdown in the bonding process between mother and child.

Clearly, the idea of parental causation, primarily the mother, was devastating and damaging for families of autistic children. Parents who clearly loved their children were led to believe they were the cause of their child’s suffering. Making matters even more complicated, the most widely recognized treatment options involved total separation of the child from parents. This often resulted in placement of the child into a residential facility where surrogate parents were provided.

Over time, many researchers have discredited this theory of etiology. Studies utilizing adequate experimental controls, have revealed that parents who have children with autism do not differ in terms of personality or social interaction from parents of normal children (Cantwell, Baker, & Rutter, 1978; Cox, Rutter, Newman, & Bartak, 1975; Freeman & Ritvo, 1984). Frith (1989) reported it is actually impossible for a child to develop autism from lack of sufficient love from the mother, or because the child feels threatened in life. She stated there is virtually no reason to believe that parents of autistic children love their children any less or put forth any less effort to nurture and educate
them. For the most part, this psychodynamic theory of etiology has been widely
discredited; however, there are still a few proponents even today (Schreibman, 1988).
Shwartz and Johnson (1985) report that psychogenic hypotheses are based on implicit
assumptions, rather than experimentally based theories, and thus are not amenable to
empirical validation.

**Behavioral Theory**

During the 1960s, another proposed cause of autism developed focusing on
behavioral theory or learning theory. This theory, formulated by Ferster (1961), centered
around the belief that severe behavioral deficits, characteristic of autism, were the result
of a faulty conditioning history. Because parents are primarily the people reinforcing the
child, this theory also implicated parents in causation. Ferster went on to state the autistic
child's failure or inability to learn was the result of “inadequate parenting” that prevented
social rewards such as praise and attention from becoming reinforcing for children.
Consequently, the parents provided more attention to, and differentially reinforced
negative and aversive behaviors. In addition, behaviors that did not impact the parents
directly, such as stereotypic behaviors, were typically ignored. This results in
reinforcement of these behaviors because if not extinguished, the child will often receive
environmental motivation to continue engaging in these behaviors.

Ferster (1961) discovered that like behaviors of other organisms, the behaviors of
autistic children are lawfully and predictably related to environmental events. Many
studies followed the work of Ferster and in 1987, Rutter and Schopler reported that
behavioral and educational methods of treatment were most effective for children with
autism. Lovaas and Smith (1989) also reported behavioral treatment has consistently been proven to improve functioning in autistic children.

Like the psychodynamic theory, the behavioral theory is not adequately supported by empirical research. Ferster's ideas have proven to be more beneficial in finding treatment options for autism, rather than to demonstrate explanations for it. Ferster's work (1961), however, ultimately served as a catalyst for the behavioral approach to intervention for autistic children. Lovaas (1987) would later embrace Ferster's findings when developing his renowned Lovaas method for early intervention.

Biological Theory

During the 1960s, as behavioral theory emerged, there was also a noticeable movement to explain autism through biological theory. In 1964, Rimland was the first to discount the psychogenic theory of etiology (Coleman & Gillberg, 1985). Rimland, however, unlike Ferster, believed in the neurological theory of autism. He attributed limited response repertoires in autistic children to the underarousal of the reticular activating system that regulates arousal in the brain. This theory lacks empirical validation; however, the notion that autism has a biological base has been widely accepted. Frith (1989) reported that the evidence for organic involvement in autism is overwhelming. She argued that frequent dysfunctions include abnormal electroencephalograms (EEG), the presence of epileptic seizures, and the persistence of certain infantile reflexes and stereotypic movements.

Genetic factors have also been explored in the research on etiology. Specific gene anomalies have not been identified; however, Rutter and Garmezy (1983) reported
siblings of autistic children have a 50 times greater chance of being autistic than does the
general population. Studies conducted with twins have shown that monozygotic twins
revealed a 95.7% rate of concordance of autism as opposed to a 23.5% rate in dizygotic
twins (Ritvo, Freeman, Mason-Brothers, Mo, & Ritvo, 1985).

In 1986, Warren, Foster, Margarettten, and Pace also conducted a study regarding
biological links to autism. These authors were able to link autism to T cell defects and
found that lymphocytes of people with autism essentially have a defective response to the
T cell mitogen con A.

Studies have also been conducted regarding the neurochemical makeup of people
with autism. Freeman and Ritvo (1984) found that nearly 30-40% of cases revealed
elevated levels of the cerebral neurotransmitter serotonin. Many people have been
treated successfully with fenfluramine as a result of these elevated levels of serotonin.

Currently, it is generally believed that a number of different biological causes
may increase the likelihood of autism (Happe', 1994). The increased research regarding
biological causes of autism will likely continue into the future with a focus on brain
abnormalities and specific areas of the brain typically effected. The implications for
biological findings in autism could be crucial to the development of treatment programs
and interventions for children with autism.

Determining the etiology of autism has been a difficult task and continues to be
somewhat of a mystery still today. Lovaas and Smith (1989) addressed this difficult task
when they stated that determining etiologies involves events that have happened in the
past. These events are difficult to measure and cannot be experimentally manipulated.
Researchers are forced into correlational or descriptive research, as opposed to experimental research.

Throughout the past 50 years, since Kanner's (1943) original study, there have been many theories as to the cause of autism. Only a few of the more prevalent ones have been mentioned here. However, most of these theories have come and gone as later research has dismissed previously proposed notions of etiology. For example, Schopler, Andrews, and Strupp (1979) generally dismissed the notion that autistic children were the offspring of upper middle class parents. They concluded that autistic children do not come from primarily higher social class families. These authors went on to state that children with autism can be found in any social class. Research since that time supports this position. Children from all racial, ethnic and social backgrounds have been diagnosed with autism (Freeman, 1996).

Although there is no known cure for autism, there is a general assumption that autism is caused by inborn physical factors within the person. The majority of explanations of autism today are related to biological factors including biochemical imbalances, genetic problems, physical factors, and brain damage. In general, autism is thought to be the result of a neurological disorder that ultimately affects functioning in the brain (Freeman, 1996).

Current Diagnostic Criteria and Differential Diagnosis

Over time and as a result of additional research, there have been minor changes in diagnostic criteria for the identification and diagnosis of autism. However, Kanner's definition (1943), developed over 50 years ago, largely provides the basis for diagnosis
The most recent version of the DSM (1994) lists autism under Pervasive Developmental Disorders. Rutter and Schopler (1987), report that autism is classified in this category because it is a severe mental disability involved in the developmental process itself, and because it arises in infancy. The DSM-IV (1994) reported that the most essential features of autism are the clear presence of abnormal or impaired development in social interaction and communication and a very limited repertoire of interests. To be diagnosed with autism, a child must display at least 6 (or more) items from these three sections described in the DSM-IV. A detailed description of these sections is provided in Appendix A.

As noted earlier, 75% of children who meet the criteria stated in the DSM-IV (1994) and who receive a diagnosis of autism will also receive a diagnosis of mental retardation. The most probable level of retardation is in the moderate range with an IQ ranging from 35-50.

Other disorders frequently emulate autistic characteristics. These include Asperger’s Syndrome, Semantic-Pragmatic Disorder, Rhett’s Disorder, Childhood Disintegrative Disorder, Childhood Schizophrenia, and Receptive Developmental Dysphasia. It is important to differentially diagnose autism and also look for possible characteristics of comorbidities in children who have had or have Phenalkatanuria (PKU), congenital rubella, tuberous sclerosis, lead intoxication, congenital syphilis, and Fragile-X Syndrome (Rutter, 1978).

After a differential diagnosis has been made, the next step is to discuss educational programming options for children with autism. This paper will specifically
research the past and current literature on two widely known programs for the treatment of young children with autism. Ivar Lovaas developed the Lovaas method and Eric Schopler and colleagues developed the TEACCH program. Both programs have desirable characteristics; however, there has been much controversy in schools and families over these two approaches to programming.

**Approaches to Intervention**

**Ivar Lovaas**

Ivar O. Lovaas became a dominant force in the field of autism in the 1960s and has remained a force ever since. In the early 1960s treatment options based on principles of operant conditioning were developed. Behavioral theory became popular and the work of Ferster (1961) was widely recognized. Operant conditioning was proposed as a treatment for autism. This is the basic notion behind what Ivar Lovaas would develop into the Lovaas method for children with autism.

Lovaas reviewed the literature and determined that the prognosis for people with autism was very poor. He decided to develop his methods of behavior modification as a treatment option for children with autism. At the time, there were no treatment options that substantially increased the functioning level of children with autism. Rutter (1970), for example, had previously conducted research on children with autism and found that only 1.5% of the group of 63 children he studied had reached "normal functioning" without any form of treatment or intervention. As a result of the poor prognosis for children with autism, and with the support of learning theory, Lovaas began in 1970 what would become his cornerstone research project.
Lovaas (1987) selected his subjects and began collecting his research data while working at the University of California at Los Angeles. He chose subjects based on the following criteria: (a) the child needed an independent diagnosis of autism from a medical doctor or a licensed Ph.D. psychologist, (b) a chronological age (CA) less than 40 months if mute and less that 46 months if echolalic, and (c) a prorated mental age (PMA) of 11 months or more at a chronological age of 30 months. After the subjects were chosen, Lovaas placed them into one of two groups; the experimental group or the control group. The experimental group received an intensive treatment consisting of more that 40 hours of one-on-one treatment each week provided by the Young Autism Project. Lovaas placed 19 subjects into this experimental group. He than assigned the remaining subjects to one of two control groups. Control Group 1, consisting also of 19 subjects received 10 hours or less of the same one-on-one treatment each week. Control Group 2 consisted of 21 subjects who were treated like control Group 1, but they were not treated directly by the Young Autism Project. All groups received treatment and were monitored for two or more years.

At the beginning of the study, Lovaas (1987) carried out several pretreatment measures. He compared the children in terms of mental age scores, behavioral observations recording the amount of stereotypic behaviors, appropriate play behaviors, and recognizable words. In addition, he conducted one-hour interviews with the parents about the early history of the child, gaining information about eight specific measures. These measures included the absence of recognizable words, the absence of toy play, lack of emotional attachment, apparent sensory deficit, absence of peer play, stereotypic
behaviors, tantrums, and the absence of toilet training. He also probed for information regarding abnormal speech during the interview. He continued to probe and gained information about the age of walking, number of siblings, socioeconomic status of father, sex, and any neurological examinations. Information obtained during these pre-treatment assessments would provide a framework of comparison for Lovaas' later findings regarding the success of his treatment.

The experimental group received 40 hours or more of intense one-on-one training each week. The therapists were typically graduate students who had been trained in using the Lovaas approach. One important aspect of the project was that therapy was conducted within the child's home. Parents were also very active in the treatment process and were encouraged to become trained so treatment could ultimately take place 365 days a year for almost all the subjects' waking hours (Lovaas, 1987). The first year of treatment typically focused on reducing stereotypic behaviors, building compliance to verbal requests, teaching imitation skills, establishing the beginning skills of toy play, as well as promoting the extension of treatment into the family. Lovaas also reported that in order to reduce stereotypic and aggressive behaviors, therapists first tried to extinguish these behaviors by ignoring them. If not successful, they used time-out, shaping more socially appropriate behaviors. They also delivered a loud "NO" or a slap on the thigh contingent upon the presence of the undesirable behavior. These aversives were not implemented in the control group because of "inadequate staffing" concerns.

During the second year of treatment, trainers focused on expressive and abstract language and interactive play with peers. Finally, for those students involved in training
for more than two years, the third year focused on teaching appropriate expression of emotions, observational learning, and pre-academic tasks. Pre-academic tasks included reading, writing, and arithmetic (Lovaas, 1987). After subjects in the experimental group reached kindergarten, their intensive training was reduced from 40 plus hours each week to 10 hours each week. Likewise, the involvement was further reduced to a consultative basis after the child reached first grade.

At the conclusion of his experiment, Lovaas (1987) looked at the educational placement and IQ scores of the children involved. He found that 47% of the subjects in the experimental group had successfully passed through normal first grade and obtained average or above average IQ scores. Eight of the subjects in this group passed through first grade in "aphasia" classes and received IQ scores within the mildly retarded range. Finally, only two children were placed in classes for autistic students scoring in the profoundly retarded range on the IQ test. This group gained an average of 30 IQ points over the subjects in control Group 1.

Lovaas (1987) also pointed out, that indeed the use of aversives produced dramatic results in relation to stereotypic behaviors. In an interview with Paul Chance (1974), Lovaas referred to this use of aversive behavior as a cure for self-destructive behavior, thus supporting the merits of aversives.

Lovaas (1987) reported 47% of the experimental group achieved "normal functioning" and successfully passed first grade. In contrast to the experimental group, only 25% of the control group subjects achieved normal functioning. Lovaas concluded-
that students will simply continue to manifest similar severe psychological disabilities later in life unless they are subjected to intensive behavioral treatment.

In 1993, when the subjects were between 9 and 16.25 years of age, McEachin, Smith, and Lovaas presented a follow-up study of the subjects used in the original study. Results from this study showed subjects originally placed in the experimental group had retained their previous gains. The authors also reported that eight out of the nine experimental subjects who had achieved the best outcome at age seven, were still indistinguishable from their normal developing peers when compared with IQ tests and adaptive behavior. Likewise, they reported both control groups achieved less favorable outcomes than did the experimental group and control group subjects received IQ scores 30 points lower than the experimental group subjects. All control group subjects were placed in special education classes, as opposed to 53% of subjects in the experimental group.

The 1990s have seen an unprecedented interest in Lovaas and his program. This is due, in part, to a book published in 1993-titled Let Me Hear Your Voice. Catherine Maurice, mother of two children diagnosed with autism, is the compelling author. Let Me Hear Your Voice is a very powerful story about one family's experience with intensive operant conditioning, otherwise known as the Lovaas approach. This family's story is also the basis for a research article by Perry, Cohen, and DeCarlo (1995). This research is a case study of the two Maurice children who were involved in Lovaas therapy. The authors state these two siblings "join the nine patients of Lovaas who recovered with intensive behavioral therapy" (p. 235). This book and article are
controversial as is Lovaas' original research study due to the references regarding implications of recovery from autism, which is currently classified as a life-long disorder. Shapiro and Hertzig (1995) refute the claims of recovery by Perry et al. (1995), by stating the outcome is based on only a 24-minute videotape of the two siblings playing with their older brother. Because there are no outcome measures and the cases were not seen and adequately evaluated during follow-up, Shapiro and Hertzig caution readers to treat these findings as a case study.

Today, Lovaas' current treatment approach looks much like he described it in his original research study of 1987. Steve Buchman describes the Lovaas method in a 1995 issue of the Indiana Resource Center for Autism Newsletter. The program is described as consisting of 30-40 hours each week of therapy, 4-6 hours each day, 5-7 days each week of one-on-one training for two full years.

This method based in operant conditioning theories, focuses on a discrete trial format for teaching skills. The discrete trial consists of three basic parts; (a) requesting or commanding an action, (b) a response, and (c) the presentation of a reward if a correct response is elicited or a sharp "NO" if an incorrect response occurs (Buchman, 1995). An example of a discrete trial is provided in Table 1.

The curriculum for this intensive therapy is described in Lovaas' book titled Teaching Developmentally Disabled Children: The Me Book. This book addresses the following topics: (a) basic information; (b) getting ready to learn; (c) imitation, matching, and early language; (d) basic self-help skills; (e) intermediate language; (f) advanced language; and (g) expanding your child's world.
<table>
<thead>
<tr>
<th>Component of Discrete Trial</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antecedent or request for a behavior</td>
<td>&quot;Johnny, touch pencil.&quot;</td>
</tr>
<tr>
<td>Behavior</td>
<td>Johnny touches pencil.</td>
</tr>
<tr>
<td>Consequence for a behavior (Praise or loud &quot;NO&quot;)</td>
<td>&quot;Good job, Johnny!&quot;</td>
</tr>
</tbody>
</table>

This Lovaas approach involves a team of at least three people, usually consisting of graduate or undergraduate students who have been trained in the Lovaas approach, other individuals who have been properly trained, along with the parents. Lovaas feels it is most important to begin this therapy in the home with a one-on-one approach before the child enters a school environment.

It should be noted here that the expense of using the Lovaas method is quite costly. Hobbs, Blalock, and Chambliss (1995) reported that the average monthly cost of providing Lovaas therapy for one child is around $1237. Lovaas justifies the expense of his program by stating that his program would cost about $40,000 over two years; only a fraction of the nearly $2 million that life-long institutionalization would cost for these students (Lovaas, 1987).

The primary focus of the Lovaas program involves operant conditioning and each child essentially follows the curriculum outlined in The Me Book. Schopler also has a very comprehensive approach for educating children who have autism. However, this
program, referred to as the TEACCH model, is much different from Lovaas' approach. Schopler and the TEACCH approach is discussed in the next section.

Eric Schopler

The Lovaas approach to treatment did appear to address consequences of behavior. Eric Schopler, on the other hand, placed particular focus on the antecedent stimuli occurring before a behavior. Schopler's program began as a research project in the mid 1960s. In 1972, Schopler founded the Treatment and Education of Autistic and related Communication Handicapped Children in North Carolina. This method of treatment, later identified as the TEACCH model, is currently a statewide program in North Carolina for autistic children. Since its inception in 1972, there have been numerous regional sites established around the country. TEACCH is a developmental approach recognizing the differences among children regarding the rate and nature of development across several different skill areas (Lord et al., 1993).

The TEACCH model is a comprehensive program offering the following services: (a) diagnostic evaluation; (b) individualized curriculum development; (c) social skills training; (d) vocational training; (e) parent counseling and training; and (f) consultation to classrooms, group homes, and other community agencies (Division TEACCH, 1997). Therapists, counselors, and teachers involved with the TEACCH model have undergone extensive training in order to be knowledgeable and effective in this approach. The primary goal of the TEACCH program is to prevent unnecessary institutionalization by helping to prepare people with autism to live and work effectively at home, at school, and in the community (Division TEACCH, 1997). Ultimately, this is
accomplished through the *structured teaching* approach to education. Schopler et al. (1995) describe *structured teaching* as involving four specific components including; (a) physical organization of the environment, (b) schedules, (c) independent work systems, and (d) task orientation.

**Environment.** Specifically, the physical organization component focuses on establishing consistent, visually clear areas and boundaries within one's environment. There are many ways this can be done including arranging classroom furniture to create logical boundaries and by placing tape on the floor to identify boundaries. Also of primary importance is a transition area within the environment where students can go to see what the next activity will be. This is also the most logical place to incorporate the schedule component of structured teaching.

**Schedule.** The schedule is really the cornerstone of the TEACCH approach and can take many forms depending on the functioning level of the child. Some children, at lower levels of functioning, may need an object-to-object schedule where they match actual objects to what is going to happen next. For example, if the child is going to physical education, the child might be given a ball to indicate it is time for physical education. As a child develops and becomes familiar with the schedule, he or she may be able to replace the object schedule with a picture schedule. As the child becomes increasingly independent, a written schedule may even become feasible. Color coded schedules or number schedules might also be incorporated. The schedule ultimately allows students to anticipate and predict the upcoming events, creating a very predictable environment.
Independent work. The next component of structured teaching involves the individual work period. During this work session, the child can benefit from one-on-one instruction, or, depending on the functioning level of the student can work independently. The goal for this component is to help the child work towards independence and to understand what is expected.

Task orientation. Finally, the task orientation component involves instructional aids that may help the child complete tasks. Often jigs are made for students to perform tasks more independently. Jigs are devices or templates that are used to guide a person through a task. The jig helps to ensure successful completion of a task. For example, a wooden box with a stapler attached to the top would ensure a stack of papers get stapled correctly. Much creativity can be used in developing jigs for many different types of tasks.

Along with the above mentioned techniques, the TEACCH philosophy for managing behaviors focuses on making the world predictable and less confusing as well as modifying the environment due to the student's deficits. By utilizing components of a structured teaching approach and accommodating the learning environment to fit the student’s specific needs, many behavior problems and frustrations are simply avoided (Lord et al., 1993).

TEACCH also places primary focus on the component of family. Other family members are involved in order to help create an environment that will facilitate learning for the child with autism at home. Schopler (1987) reported ultimately TEACCH strives to establish a collaborative parent-professional relationship. This is accomplished by
focusing on equal recognition of parents’ and professionals’ social roles while penetrating across the interpersonal, educational, and political arenas of their lives.

Parent collaboration is encouraged in the following ways: (a) the use of one-way observation windows where parents are encouraged to observe their child in class, (b) a policy of open records where parents are encouraged to view their child’s records, and (c) parent-classroom collaboration where parents can serve as assistants in the classroom.

Yet another component of the TEACCH model is that it assumes a direct relationship between assessment and intervention (Lord et al., 1993). Interventions are based on skills the child already has demonstrated in daily life and programs are individualized based on information gathered through assessment.

The importance of visual aids within the environment is stressed throughout structured teaching. This is very important because many children with autism see their world in pictures, as opposed to words. Grandin (1995) addressed this she discussed the benefits of the TEACCH program’s efforts to utilize visual methods for organization. Grandin felt it is important to emphasize educators should never burden visual thinkers by presenting them with long strings of verbal information. These can be very confusing for many students with autism.

The effectiveness of the TEACCH program rested largely on anecdotal research. However, in 1987, Schopler evaluated the success of the TEACCH program by administering a questionnaire to families involved with the TEACCH program. Results showed parents found the program to be very helpful. On a scale of 1-5, with 5 being the most helpful, the mean rating of helpfulness was reported as 4.6.
The study reported the institutionalization rate of students with autism who had been served by TEACCH programs was 8%. This is a remarkable finding as previous studies have reported institutionalization rates as high as 74% for students with autism (Lotter, 1978).

Empirical research supporting the TEACCH program focuses largely on the component of structured teaching. Schopler, Brehm, Kinsbourne, and Reichler (1971) found use of structured teaching yielded improvements in attending, affect, and general behavior within the structured learning situation. More recently, Volmer (1995) indicated a need for students with autism to be provided with adequate structure and visual cues via structured teaching in the classroom.

Critique of the Research

Lovaas' research was reported in 1987 and 1993. Since then critical feedback has accumulated regarding these studies. Criticisms have been made regarding subject selection into treatment vs. control groups, the notion of "recovery" from autism, the representativeness of the subjects, and the use of aversives.

Schopler, Short, and Mesibov (1989) reported Lovaas attempted to skew the selection to include higher functioning children in the experimental group. The authors felt he attempted to produce more positive results in four ways. The first was by using a prorated mental age (PMA) instead of a ratio IQ to determine intellectual functioning. Using a PMA gives the appearance of lower functioning than does the ratio IQ. The second way was by including only children who had chronological ages of 40-46 months at the time of their initial evaluation and only if they demonstrated echolalia. This is
surprising since echolalia is widely recognized as a characteristic of students who are typically higher functioning. Grandin (1998) also addressed this finding as well by stating students who engage in echolalia have a higher potential for language than those students who do not exhibit echolalia, ultimately resulting in higher functioning students. Thus, Schopler et al. (1989) believe Lovaas excluded subjects who were lower functioning. The third piece of evidence is provided by Lovaas' sample of students. Lovaas reported a mean PMA of 18.8 for his subjects in the experimental group. When converted to an IQ score, this would result in a mean IQ of 63. This is a considerably higher score than had been reported for children in previous studies. For instance, DeMyer et al. (1974) reported a mean ratio IQ of 45 for a group of students with autism. Likewise, Lotter (1966) reported two thirds of autistic students with whom he worked, had ratio IQ scores falling under 55.

Finally, Schopler et al. (1989) felt because of the high ratio IQ, pretreatment measures underestimated the subjects' level of intellectual functioning. Schopler et al. argued assessments used by Lovaas used for pretesting purposes, specifically the Bayley Scales of Infant Development (Bayley, 1955), Stanford Binet (Thorndike, 1972), and the Cattell Infant Intelligence Scale (Cattell, 1960), resulted in low pre-testing scores for children with autism. Ultimately, the authors felt these subjects were clearly not average or even below-average children with autism; thus the group was non-representative.

Other critics have also referred to the problem of the representativeness of Lovaas' sample. Mesibov (1993) referred to various problems including the different cut-off ages for echolalic and mute children. The control group had fewer higher functioning clients
than one would expect in groups of that size and Lovaas used different testing protocols for participants in different groups. Kazdin (1993) stressed in replication studies, more standard diagnostic instruments should be used to delineate impairment, including the full range of diagnosable disorders. He also advised the use of a broad assessment battery to evaluate the scope of impairment and functioning that children and adolescents with autism experience.

Many critics have referred to the question raised regarding the selection of subjects into treatment versus control groups. Mesibov (1993) reported people must be careful in interpreting these results because the subjects were not randomly distributed among the three groups. The only way to really insure the absence of bias is through random assignment. Others have expressed similar concerns regarding the methods group placement. Kazdin (1993) also argued that in the event of replication, subjects should be randomly assigned to conditions. Foxx (1993) also responded to results reported by Lovaas by asserting a methodological problem; that is "the assignment of subjects to the experimental and control groups was not random" (p. 375). Baer (1993), however, supported Lovaas and his methods of assignment. Baer suggested it was not possible to randomly assign subjects to the control and experimental groups because the experimental group required such massive amounts of resources. Furthermore, he felt the subjects were randomly split. By assigning cases on the availability of resources, essentially, cases to each group equaled out in the end. He concluded Lovaas utilized functionally random assignment. He goes on to report it is typical practice for many
researchers to suspend the rules and impose individual judgments in their place when the outcome of following the rules of a specific design are undesirable.

Other criticisms have surfaced regarding the claim that the intensive therapy cured 47% of autistic children, or that 47% of these children who entered therapy now achieved normal intellectual and educational functioning (Lovaas, 1987). Mundy (1993) addressed this by asking whether intervention resulted in complete remission of autistic symptoms in a subsample, or did it simply result in a subsample that displayed symptoms typically presented by higher functioning children with autism. Mesibov (1993) worried readers might jump to the conclusion these children have been cured. He states although McEachin et al.'s findings are impressive, they are far from demonstrating normal functioning. Mesibov (1993) goes on to argue that McEachin et al. (1993) have, by only including regular class placement and IQ scores as criteria for normal functioning, left out several skills relating to normal functioning of children. These included but were not limited to the student's social interactions, friendships, social communication and conceptual abilities.

The critical need for replication reoccurs throughout the literature. Lovaas, Smith, and McEachin (1989) report, that indeed, their study needs to be replicated by independent researchers. Foxx (1993) also felt the Lovaas study will continue to be associated with polarization and controversy until their dramatic effects are replicated. He goes on to report he would like to believe the reports, however, cannot do so until independent verification has been provided. In his commentary, Kazdin (1993) noted an
urgent need to replicate the original study and since Lovaas treatment can potentially
effect marked change in individuals, replication should be a very high priority.

In response to these cries for replication, Smith, McEachin, and Lovaas (1993) offer some insights. They state one of the problems with replication is the logistical
difficulty involved with replication of the study. They report that essentially, one must
acquire hands-on supervised training to provide competent treatment and proper
assessment involves extensive training and preparation. They also report that efforts to
replicate their study would involve substantial amounts of time. They recognize few
people are willing or able to commit to at least five years required for replication. Even
in the initial study, Lovaas (1987) reported that it would be unlikely for replication of the
experimental group treatment to occur without extensive theoretical and supervised
practical experience. This experience should involve one-to-one behavioral treatment
with developmentally disabled clients.

Birnbrauer and Leach, however, made a replication attempt, in 1993. Their
program was called the Murdoch Early Intervention Program (MEIP). The purpose of
this project was to replicate Lovaas' original intensive early intervention study; however,
the authors point out some key differences. Birnbrauer and Leach reportedly chose not to
use aversives despite Lovaas' claims that it is unlikely that treatment effects could be
replicated without this component (Lovaas, 1987). The MEIP program also implemented
careful monitoring of stress levels of parents and families. They made extensive efforts
to attend to personal and family needs of those involved. They also chose to reduce the
intensity of the treatment from 40 hours per week to an average of 28.7 hours each week.
In addition, their subjects received treatment for an overall shorter amount of time. The subjects in the original study reportedly received intense therapy for an average of two and a half years before entering first grade (McEachin et al., 1993), where participants in the MEIP program typically were enrolled in preschool during their second year, without support from the MEIP project. The results of the program, after two years of implementation, showed that four of the nine experimental children made substantial improvements while one child out of five in the control group made significant progress (Birnbrauer & Leach, 1993).

Gresham and MacMillan (1997) provide possibly the most damaging piece of literature against the original Lovaas study. These authors attack the 1987 research study according to threats involving experimental validity, specifically internal, external, and construct validity. The authors report that as a result of the threats to experimental and external validity, this program cannot be utilized by school districts with fidelity. The authors go on to state that implementation of this program is unlikely to yield results similar to those acknowledged by Lovaas.

Throughout the literature review regarding Lovaas and TEACCH, although there was a substantial amount of literature regarding the critique of Lovaas, there was very little literature specifically evaluating the TEACCH program.

**Comparisons: TEACCH and Lovaas**

TEACCH essentially focuses on a *philosophy* of educating young children with autism. The crux of this philosophy involves the use of structured teaching methods. These methods involve establishing a predictable environment for the child, very
structured in nature. Mesibov (1991) reports that structured teaching also involves focusing on how well the autistic person can understand the environment and make sense of the expectations of the environment, rather than the principle of reward. The TEACCH program intends to help clarify tasks and boundaries, implement developmentally appropriate schedules, and establish positive and predictable routines. This summarizes the underlying philosophy that drives the program. Thus, individuals are placed in a classroom that operates under the philosophy of structured teaching. Within this classroom, a variety of curriculum choices can be implemented according to the needs of students.

On the other hand, Lovaas has developed a program with basic theoretical assumptions regarding operant conditioning. However, this program has a curricular model. The Me Book essentially provides the basic curriculum for all children. This curriculum specifically addresses the following areas: receptive language, reduction of disruptive behavior, nonverbal imitation, matching and sorting, object and behavior labeling, verbal imitation, abstract concepts, sentence structure and descriptions, pre-academics, social language, play skills and peer integration, self help skills, and finally community and school (Lovaas, 1981). It is also important to note the Lovaas method implemented primarily within the home, unlike TEACCH, which is conducted largely within the classroom environment. The duration and intensity of treatment with Lovaas is also much more comprehensive than TEACCH, since it encompasses most of the child’s waking hours and requires constant supervision and implementation by the trainer.
The differences presented between these two programs provide important ideas for program options. Although there is not research regarding the merging of characteristics from both programs into one eclectic program, such a merger seems reasonable. Heartland Area Education Agency in Johnston, Iowa piloted a program that focuses on merging these two programs. Results, however, are not yet available.

**Importance of Reinforcement**

One important component of any program designed to teach children with autism, whether it is TEACCH or Lovaas, is the issue of reinforcement. The field of education and specifically special education has been evaluating the efforts of reinforcement for decades. Although TEACCH and Lovaas both address the issue of reinforcement, the information regarding the systematic fading of reinforcement for the maintenance of skills is very limited in relation to both specified programs. Nonetheless, the fading of reinforcement is an important consideration in the education of children with autism.

Reinforcement can be useful in decreasing negative behaviors such as self-abusive behaviors or stereotypic behaviors or increasing target behaviors including eye contact or verbal speech. Students with autism frequently need external rewards in order to work diligently to complete tasks. What same-age peers might find intrinsically reinforcing, many children with autism will not find rewarding (L. Williams, personal communication, December 1, 1997). It is important to identify potential reinforcers and determine an individual schedule of reinforcement. It is also important to have a menu of reinforcement options available for the child due to the dynamic nature of reinforcing
children with autism. Potential reinforcers can change from task to task and even from minute to minute when working with students who have autism.

**Operant Conditioning**

One specific area of reinforcement that has received much attention in the history of education and is closely tied to interventions for children with autism is that of operant conditioning. In 1950, B. F. Skinner, the person generally considered to be responsible for developing operant conditioning, found all behavior can be thought of as occurring between two sets of environmental influences. These two influences involved antecedents, which occur prior to the behavior, and consequences, which follow the behavior. Operant conditioning is widely used in the area of special education and is often identified with the behaviorist approach to human behavior.

Over three decades ago, Ferster (1961) discussed the importance of reinforcement and behaviorism when addressing the etiology of autism. Ferster reported that the inability to learn was the result of parents who differentially reinforced negative and aversive behaviors. Ferster’s theory later provided a basis for Lovaas’ approach to educating children with autism.

Hallahan and Kauffman (1997) also reported that during the 1960s and 1970s operant conditioning was used to teach children with autism. This study specifically focused on using operant conditioning in regards to language development.

**Varieties of Reinforcement**

One important aspect of changing the behavior of children relates to how willing the child is to work for or towards a reward. Hallahan and Kauffman (1997) discussed
many varieties of reinforcement that should be considered when working with children including social, activity, token, tangible, and edible rewards.

Social reinforcement involves verbal praise, smiles, handshakes, nods, and gentle pats on the back. Activity reinforcement, another type of reinforcement, involves the opportunity to engage in a reinforcing activity following the completion of a task. These could include time at the computer, listening to music, or extra story time. Token reinforcement is contingent upon the performance of a specific behavior or task. Typically, students receive tokens or coins of some type that can be accumulated and later traded in for items such as activity time, stickers, soda, or popcorn. Yet another type of reinforcement includes tangible reinforcers. These can include a variety of items including stickers, pencils, markers, or certificates. Finally, there is a strand of reinforcers called edible reinforcers, which include edible items such as popcorn, pretzels or candy.

Sometimes reinforcers are classified into two general categories. Primary reinforcers are those such as food or water which, by their nature, are usually reinforcing in the absence of any prior learning history (Azaroff & Mayer, 1986). Secondary reinforcers are those reinforcers that have become reinforcing as a result of learning history and are likely to promote repetition of behaviors. Examples of secondary reinforcers might include enjoyable activities or tangible reinforcers.

Natural reinforcement. Another type of reinforcement used with children with autism involves natural consequences. In their study regarding language acquisition for young children with autism, Koegel, Koegel, and Surratt (1992) found natural reinforcers
of language yielded more responses and better language skills than did sessions incorporating artificial rewards.

**Schedules of Reinforcement**

Several schedules of reinforcement can be implemented. Woolfolk (1995) identified five differing schedules of reinforcement: continuous, fixed interval, variable interval, fixed ratio, and variable ratio schedules.

Continuous reinforcement is desirable when children are learning new skills and involves reinforcing the child after every response. Fixed-interval involves reinforcing after a specified period of time. Variable-interval provides reinforcement after varying lengths of time. Fixed ratio occurs when students are reinforced after a specified number of responses and finally a variable ratio schedule of reinforcement involves reinforcing students after a varying number of responses. It is desirable to provide a dense schedule of reinforcement when skills are initially acquired. Variable schedules of reinforcement, however, are generally desired when supporting the maintenance of skills. This is due to the unpredictable nature of a variable schedule.

**Individualized Reinforcement**

Dyer (1987) found students with autism were more responsive during direct teaching sessions after which they chose their own reinforcer. This provided strong evidence for the need to individually assess and continuously evaluate potential reinforcers for children with autism. Furthermore, Favell and Cannon (1976) discovered staff who worked with children were unreliable when making predictions as to which toys could serve as reinforcers for those children. Students picked completely different
toys than the teachers had chosen as potential reinforcers. Again, this supports the importance of individually administering some type of reinforcer survey to students with autism.

Assessing Reinforcers

Many children with autism have experienced communication difficulties and sometimes exhibit interfering behaviors that make it difficult to assess potential reinforcers. There are several possible ways to assess reinforcers in students with severe disabilities. These include observing the child during a free play session, asking the parents or simply asking the child. After potential reinforcers have been identified, Young, Kemblowski, Blair, and Macfarlane (1992) have recommended conducting a reinforcer preference activity which involves presenting all reinforcers and evaluating the approach time and positive affect of the students for each reinforcer. Reinforcers and their effectiveness should be continually monitored and re-evaluated (Dyer, 1987) which can be accomplished by administering a reinforcer evaluation such as the one developed by Young et al. (1992). The teacher or parent systematically assesses reinforcers by asking a series of questions regarding the effectiveness of particular reinforcers and then ranks them in terms of that effectiveness.

Fading Reinforcement

The ultimate goal of many educational programs, including those for children with autism, is to have children function and perform skills independently without continued reinforcement. Fading the use of reinforcement while maintaining target behaviors is equally as important as identifying potential reinforcers. Upon conducting a
literature review, several studies discussed fading of reinforcement in order to facilitate independence in research participants.

Morgan, Young, and Goldstein (1981) conducted a study investigating the effect of fading external reinforcement for three students with behavior disorders mainstreamed into general education classrooms. These authors utilized a two-step fading procedure. First, the number of appropriate behaviors needed to earn the reinforcement was increased. Second, the reinforcement was eliminated. These authors found the students were able to maintain many of the appropriate behaviors when the criteria for reinforcement were increased. However, all three students showed a slight decrease in performance when reinforcement was eliminated.

Another study, conducted by Smith, Nelson, and Young (1988) used fading procedures with students with behavior disorders. These authors found using a self-management system of reinforcement, along with a fading procedure involving increased time between reinforcement, students were successful in eliminating disruptive behaviors.

Likewise, Hagopian, Fisher, and Legacy (1994) conducted a study investigating the effects of dense and lean schedules of noncontingent reinforcement as well as fading procedures when attempting to eliminate destructive behaviors in identical quadruplets. A gradual step process was utilized during fading procedures, involving noncontingent reinforcement in the form of attention that was given at increasingly lower rates of frequency. Findings indicated that dense schedules of reinforcement are needed at the
outset of treatment however, with a systematic fading system, the effectiveness of lean schedules can be greatly enhanced.

In conclusion, research regarding fading procedures while maintaining skills is limited. The studies reviewed support the need for a dense schedule of reinforcement during skill acquisition and a variable schedule of reinforcement as during maintenance. Self-monitoring techniques have also been proven effective. Findings also indicate a need for some form of reinforcement in order for skill maintenance to occur.

**Lovaas and Reinforcement**

Due to the discrete trial nature of the Lovaas approach, reinforcement during the acquisition of new tasks is indeed continuous in nature throughout this method. The operant method of conditioning involves a consequence for each behavior emitted by the child. As stated earlier, this consequence is largely centered around verbal praise for correct responses or loud “NO’s” for incorrect responses. Feedback is immediate and continuous. The systematic fading of reinforcement is not specifically addressed. Table 1 depicts the Lovaas approach to the acquisition of new skills.

In his original study, Lovaas (1987) did not specifically address the importance of systematically fading reinforcement during maintenance stages of skill development. However, Anderson, Taras, and O'Mally Cannon (1996) stated that in an applied behavior analysis program, very similar to Lovaas, therapists should reinforce every correct response when teaching new skills. After the skill has been demonstrated, the frequency and amount of reinforcers should be reduced. These authors concluded that an intermittent schedule of reinforcement results in more lasting change over time. These
authors do not suggest how to systematically fade reinforcers to generalize the
maintained skill across settings. In fact, one criticism of operant conditioning approaches
to the attainment of new skills is this issue of generalization across settings. Butera and
Haywood (1995) substantiated these claims and have discussed the drawbacks of operant
conditioning as restricted to the contingently reinforced situation in which behavior is
shaped. These authors go on to state there is little generalization of target behaviors
across settings or persons.

TEACCH and Reinforcement

There is little information in the TEACCH program itself, or in the literature on
structured teaching that specifically addresses the issue of reinforcement. In TEACCH
training materials, there is a brief notation regarding reinforcement and its use following
the completion of independent work activities. Statements emphasize the concept of
finished work as an organizer and motivator for productivity and that reinforcement
should signify the end of a work activity (TEACCH training materials, 1996). However,
like the Lovaas research, little is written in TEACCH documents regarding the systematic
fading of reinforcement for maintained skills and how to transfer skills across settings.

Importance of Generalization

Not only is it important to fade the frequency of reinforcement to facilitate
independence, but educators should focus on the generalization of acquired skills. This is
especially true when working with students who have autism and need immense structure
to function. Generalization of acquired skills is often difficult. Kazdin (1980) describes
stimulus generalization as being the “transfer of a trained response to situations or
stimulus conditions other than those in which training has taken place. The behavior generalizes to other situations” (p. 368). Researchers have found the likelihood of generalization is increased through fading of reinforcement and through the expansion of stimulus control (Kazdin, 1980; Stokes & Baer, 1977).

Field Research

In order to obtain more information regarding reinforcement and generalization while programming for children with autism, Bronson (1997) conducted several interviews with teachers and an educational consultant who worked extensively with students with moderate and severe disabilities, including autism. All professionals interviewed were involved in TEACCH based programs and all had received extensive training in the TEACCH philosophy. That is, each person had attended training of at least one week in length conducted by TEACCH trainers. Specifically, training included working with actual students with autism and utilizing skills learned in training throughout the week with those students. Several students were incorporated into training to provide trainees with the opportunity to work with a student that most closely resembled the student population with whom each trainee worked. Certified TEACCH trainers who have received extensive training in the TEACCH philosophy conducted training.

This issue of reinforcement and, specifically, the systematic fading of reinforcement in the Lovaas program was not addressed by Bronson (1997). This occurred due to the limited number of Lovaas-based programs in the same geographic area: that is, participants using Lovaas programs could not be located for interviews.
Information gathered during the interviews with TEACCH professionals indicated similarities to Butera and Haywood's (1995) claim regarding the inability to generalize skills learned in an operant conditioned setting to other settings. Specifically, Williams (personal communication, November 10, 1997) identified problems in TEACCH classrooms when students were asked to move from the acquisition stage of a skill or the direct teaching portion of the day to the independent work task where the child is asked to perform skills independently void of teacher interaction and reinforcement. The information gathered during these interviews led specifically to the identification of a problem in the transfer of reinforcement to this independent work period.

Statement of the Problem

Following interviews with teachers in TEACCH classrooms and the limited literature specifically addressing reinforcement in programs for children with autism, it became apparent that there was a need for further research in this area. It had been reported students in TEACCH classrooms had difficulty transferring reinforcement strategies from direct teaching interactions where reinforcement was immediate to independent work sessions where reinforcement was often delayed and contingent upon the completion of work. Systematic fading of reinforcement appeared to be absent making generalization difficult from direct teach sessions to independent work sessions. This issue of a breakdown in reinforcement has profound implications for the maintenance and generalization of skills previously displayed in direct teach settings. As
stated earlier, one common goal for all children with autism is the ability to perform skills independently across different settings.

**Research Objectives**

There are several research objectives for this study involving the issue of reinforcement within a TEACCH program for children with autism.

1. Identify TEACCH classrooms in a mid-sized community.

2. Identify potential reinforcers for a child in a TEACCH setting using the reinforcer assessment developed by Young et al. (1992).

3. Using the TEACCH model with one child, assess the acquisition of new behaviors for the child in two settings.

4. Systematically fade the use of reinforcers during the instructional settings while promoting the maintenance of acquired skills in independent work/generalization settings.

5. Train classroom personnel in the use of the reinforcement strategy.
CHAPTER 3

METHODOLOGY

Participants

Student

Throughout this chapter, the research participant will be given a pseudonym and will subsequently be referred to as “John.” At the time of the study, John was five years old and had received a medical diagnosis of autism. At the beginning of the study and throughout the study, John was served in a self-contained special education classroom. At the onset of the study, John had been receiving special education services for approximately 10 months.

John was a nonverbal child who interacted very little with his peers. He primarily pointed to communicate and at the time of the study had not been introduced to any augmentative communication devices. John enjoyed sitting in one particular corner of the room and often engaged in stereotypic behaviors. John excelled in fine motor tasks including puzzles, pegs, and stringing beads. He was often asked to perform these tasks during independent work sessions. John also displayed pica behaviors. He frequently would attempt to eat crayons and cotton and often chewed on books and shelves. He was closely monitored for this. Occasionally John would tantrum and throw himself on the ground. The impetus for this behavior was often not recognizable to the classroom staff. John lived with his mother and father and had a younger female sibling who was also receiving early childhood special education services for developmental delays.
Classroom Personnel

The personnel involved in the classroom consisted of a female teacher who held a Bachelor's degree in special education with 25 years of teaching experience, as well as two paraprofessionals. The classroom teacher had received training in the TEACCH philosophy of educating young children with autism. The training consisted of one week of intensive training conducted by certified TEACCH trainers. Paraprofessionals in the classroom were also familiar with TEACCH philosophies and the specific components of structured teaching.

Setting

The setting for this study involved a special education facility located in a midwestern city of approximately 30,000 inhabitants. There was also a mid-sized university located in the community and thus the facility was the site for many practica experiences by college students.

The school was a public school for students with moderate, severe, and profound disabilities. The school served about 150 students from birth through age 21 and was funded by the regional area education agency. Curriculum focused on vocational and independent living skills. In addition, the TEACCH philosophy and components of structured teaching were used in several classrooms by staff members who had completed TEACCH training.

Classroom Setting

The classroom where research was conducted was a self-contained special education classroom with seven male students. All students were between the ages of
three and five years old and had a variety of disabilities. Two students, including John, were diagnosed as having autism. Four other students had been diagnosed with mental disabilities and one student was listed as non-categorical. All children had received 3.6 weighting levels, for purposes of state funding. The 3.6 weightings correlated with service delivery, indicating a need for immense one-on-one attention.

The classroom environment was designed utilizing components of structured teaching. Each child had an independent work setting isolated from peers as well as the rest of the room. There was a free play area and a group-like area where opening was held and story time was conducted. There was also a large table used for breakfast and lunch meals as well as direct instruction of skills for each child. The classroom layout is depicted in Figure 1. In addition to the physical structure of the room, each child used some form of a daily schedule. John used a mixture of an object/symbol schedule that involved matching one card displaying either an object or a symbol to its proper location. For instance when it was time for play, a staff person would hand him the play card which consisted of a string glued to the card, symbolizing play. Following this, John would take it to the play area and place it on the Velcro strip at the entrance into the play area. This signified he was participating in an activity in that section of the room. When requested to go to independent work, John was given the card with a small workbox on it, symbolizing work. He would then place it on the Velcro box next to the model card signifying independent work. This was located above the table where he conducted independent work. A sample schedule card of John's is depicted in Figure 2.
Figure 1. Diagram of the TEACCH based classroom where John was placed.
Figure 2. Example of John's independent work schedule card.

An actual small box was placed on the card.

It should be noted that when the researcher worked with John during direct instruction this was called “teacher time.” He was handed a picture of the researcher, which he took to the table where direct instruction took place. All children in the classroom were using some version of this schedule strategy.

**Researcher and the Researcher’s Role**

The primary researcher for this study was a graduate student fulfilling the requirements for the degree of Specialist in Education in School Psychology. This researcher had a Master’s degree in Educational Psychology and Bachelor’s degrees in Elementary Education and Early Childhood Special Education. The researcher also had two years of teaching experience in the area of Early Childhood Special Education.
Role of Instructor

The researcher was directly involved in the instruction with John. The researcher’s role throughout this study involved teaching two skills directly to John in a one-on-one instructional setting.

Role of Observer

The researcher also served as the primary observer for this study. Data were collected by the researcher in the instructional setting, the independent work setting, and the lunch setting.

Role of Trainer

When instruction focused on the second skill, the researcher was responsible for training classroom personnel to use the recording strategy in the generalization setting.

Reliability

In addition to the researcher conducting observations, another observer conducted reliability checks throughout the study. This observer had a Bachelor’s degree in psychology and was enrolled in a graduate program in counseling.

The reliability observer was trained by the researcher regarding data collection procedures for this study. Examples of recording sheets can be found in Appendix B. Training consisted of explaining the target behavior and describing what constituted independent responses for each of the two behaviors. Specific behaviors were also shown regarding what constituted modeling, verbal, partial physical, and full physical prompts. Following this, the data collection sheet was introduced and described in detail.
Finally, she was taught how to record appropriate responses for both independent work settings as well as generalization settings.

Reliability checks were conducted throughout the study. These involved having the reliability observer come into the classroom and record data during both the direct teach sessions and generalization settings including independent work periods and lunch periods. Following these sessions, data were compared and evaluated. A graph depicting the dates reliability checks were made and the percentages of agreement can be found in Table 2. The following formula (Kazdin, 1982) was used to calculate reliability:

\[
\frac{\text{Number of agreements}}{\text{Number of agreements} + \text{Number of disagreements}} \times 100 = \% \text{ of agreements.}
\]

**Research Design**

Due to the limited number of people with autism in this community and the nature of the intervention, a single subject research design was implemented. Specifically, the design involved a multiple probe baseline across skills (Kazdin, 1982). The design was carried out with one participant across two differing skills. Each skill was monitored in a direct instruction setting as well as a generalization setting, that is, independent work. The second skill was monitored in an additional generalization setting, that is, the lunch setting. After baseline data were collected regarding the first target skill and the reinforcement strategy was being used for Skill 1, baseline data were gathered regarding Skill 2.
Table 2

Reliability Checks for Skills 1 and 2

<table>
<thead>
<tr>
<th>Dates</th>
<th>Skill</th>
<th>Setting</th>
<th>Coefficient</th>
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<tbody>
<tr>
<td>2/6</td>
<td>1</td>
<td>direct instruction</td>
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</tr>
<tr>
<td>2/6</td>
<td>1</td>
<td>independent work</td>
<td>1.0</td>
</tr>
<tr>
<td>2/25</td>
<td>1</td>
<td>direct instruction</td>
<td>1.0</td>
</tr>
<tr>
<td>2/25</td>
<td>1</td>
<td>independent work</td>
<td>1.0</td>
</tr>
<tr>
<td>3/4</td>
<td>1</td>
<td>direct instruction</td>
<td>1.0</td>
</tr>
<tr>
<td>3/4</td>
<td>1</td>
<td>independent work</td>
<td>1.0</td>
</tr>
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<td>independent work</td>
<td>1.0</td>
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<td>3/11</td>
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<tr>
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</tr>
<tr>
<td>3/11</td>
<td>2</td>
<td>lunch setting</td>
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</tr>
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<td>independent work</td>
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<tr>
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</tr>
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<td>lunch setting</td>
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</tr>
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<td>1</td>
<td>independent work</td>
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</tr>
<tr>
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<td>direct instruction</td>
<td>1.0</td>
</tr>
<tr>
<td>4/22</td>
<td>2</td>
<td>independent work</td>
<td>1.0</td>
</tr>
<tr>
<td>4/22</td>
<td>2</td>
<td>lunch setting</td>
<td>.80</td>
</tr>
</tbody>
</table>
Research Variables

The independent variable for this study involved the rate of reinforcement delivered to the participant by the researcher. A strategy was set up to systematically fade the use of reinforcement. The dependent variable during both portions of the study was the demonstration of target skills during instructional settings and generalization settings including independent work settings and the lunch setting for Skill 2.

Procedures

Skill Identification

The teacher was asked to determine skill deficits John displayed that could be focused on during instruction. The following information describes the chosen skills and the rationale for each.

The first skill identified involved the ability to match pictures or schedule cards beside others. John was not able to match beside and consistently erred by instead matching on top. This inhibited his ability to function throughout the TEACCH setting where he was frequently asked to match his schedule card beside. The skill was taught three days each week for four weeks with the exception of two days when the researcher had other commitments and one day when school was cancelled for weather-related conditions.

The second skill targeted for instruction was also identified by the classroom teacher. This skill involved identifying food items by matching pictures of food to actual food items. This skill was chosen due to problems classroom personnel were having with John during lunch periods. Essentially, John was not choosing items he would eat for
lunch and the teacher suggested this might give him a way to communicate what he wanted to eat. This skill, like Skill 1, was the focus of three direct teach sessions each week. This skill was monitored, however, in two generalization settings: the independent work setting and the lunch setting.

**Instructional Procedures**

The instructional procedures involved teaching John the target skills during one-on-one instructional settings. The following prompt hierarchy was used in order to systematically teach the target skills: verbal prompt, model prompt, partial physical prompt and full physical prompt (Wolery, Ault, & Doyle, 1992). This hierarchy was used during instruction of both skills. When John demonstrated independent skill performance with 80% accuracy for three sessions, the fading procedure was implemented.

Although the hierarchy was used for both skills, the instructional procedures differed for each skill. Specific instructional procedures for each skill are described in detail. Additional information regarding instructional plans can be located in Appendix C.

**Skill 1**

Regarding the first skill of matching pictures *beside*, John began by matching one picture given two picture choices arranged vertically on each page. One picture served as a distracter, the other picture was the correct response. Correct responses were randomly rotated between the top and bottom position. He gradually increased his ability to match pictures given several distracters on each page. Again, the correct response and
distracters were positioned vertically to the left side of the page. The right side of the page was left blank to allow for position the card beside the correct answer. Also, placement of the correct response varied trial by trial so as to eliminate the possibility of a "preferred placement" answer.

The prompt hierarchy, (Wolery et al., 1992) described earlier was put in place for Skill 1. Initially all prompted responses were reinforced. As instruction progressed, John was only reinforced for independent and verbal prompted responses. The reinforcement procedure is described in detail in Table 3.

This skill was monitored during independent work sessions throughout the entire study even though direct instruction was eliminated for this skill after four weeks.

Skill 2

The nature of the second skill, matching and choosing food items, was greatly different from the first skill. Real or life-like food items were placed in jars. The jars used were made of clear plastic and held approximately 8 ounces of liquid. All jars had lids and were identical in nature. In addition, each jar had a strip of Velcro on the outside of the jar where a picture of the food item could be placed to indicate a match and thus a choice. The skill ultimately involved having John match the picture with the actual food item. In order to make this a manageable task, seven food items were identified. Items were chosen using two criteria; (a) the item had to be a food item John previously displayed a likeness for, and (b) the item had to be one that frequently appeared on the lunch menu. Chosen items included the following: hot dogs, bread, crackers, apples, cheese, cookies, and chips.
The nature of the second skill did not lend itself to the same type of reinforcement as Skill 1. Since the skill involved choosing food and one of the generalization settings was the lunch setting, it was inappropriate to provide reinforcement in the form of candy. It was hoped that getting to eat the chosen item, especially during lunch, would be sufficient for reinforcement.

For Skill 2, the instructor presented John with two jars, each containing a food item from the seven. He was then given one of the pictures and told to match the picture with the item. Choice making was not an issue at this point. Rather, the focus was on teaching John to accurately identify a food item by matching the picture to the item. As stated previously, the intent was to give John a means by which to communicate wants, desires, and needs. Therefore, upon successful completion of a match, a small sample of the food item was administered as a reinforcer. Just as was described for Skill 1, there was a prompt hierarchy in place. Initially all prompted responses were reinforced. As instruction progressed, John was only reinforced for independent and verbal prompted responses. Refer to Table 3 for the prompt hierarchy.

Reinforcer Identification

Initially, the researcher conducted a reinforcer assessment and preference activity (Young et al., 1992) with John to identify several reinforcers that could be used throughout the study. In addition, mild social praise (e.g. “Nice work, John”) was implemented throughout the study and did not serve as a part of the fading procedure.
Reinforcement Schedule

After baseline, a continuous schedule of reinforcement was implemented in the instructional setting (e.g., fixed ratio 1:1). Initially, John was reinforced for all prompted responses. Following this, other phases were incorporated, which provided reinforcement for more independent responses. These phases are detailed in Table 3. After the participant demonstrated independent skill performance, (i.e., no prompts needed) the reinforcement was faded on a fixed ratio schedule (e.g., 2:1, 3:1, 4:1). This fading procedure continued until John was able to perform the same number of trials correctly in the instructional setting as in the independent work or generalization setting. Thus, reinforcement could be delayed in the instructional setting for the same amount of time as it was during the independent work setting.

In order to accurately document task acquisition across the instructional setting and the independent work setting, an equal number of opportunities to exhibit the skill were available during both settings. For example, if 15 trials were presented during the instructional setting, 15 trials were also available during independent work. Following information gathered during the beginning phases of Skill 2, it became necessary to collect more data. During generalization in the lunch setting, it became obvious that in addition to documenting whether John chose a food item or not, it was important to document whether the chosen food item had been targeted during instruction. Ultimately, the researcher wanted to know if food items that were targeted during instruction were chosen and eaten more frequently than non-targeted items. This was not anticipated initially and was therefore added after instruction began.
Table 3

Description of Phases Used in this Study

<table>
<thead>
<tr>
<th>Phase</th>
<th>Reinforcement Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>No reinforcement administered</td>
</tr>
<tr>
<td>Phase I</td>
<td>Reinforced for all prompted responses including full physical, partial physical, model,</td>
</tr>
<tr>
<td></td>
<td>verbal prompt and independent responses</td>
</tr>
<tr>
<td>Phase II</td>
<td>Reinforced only for responses requiring model prompts, verbal prompts or independent</td>
</tr>
<tr>
<td></td>
<td>responses</td>
</tr>
<tr>
<td>Phase III</td>
<td>Reinforced only for responses requiring verbal prompts or independent responses</td>
</tr>
<tr>
<td>Phase IV</td>
<td>Reinforcement faded on a fixed ratio schedule of (2:1, 3:1, 4:1, 5:1)</td>
</tr>
</tbody>
</table>
CHAPTER 4

RESULTS

Reinforcer Assessment

Results of the reinforcer analysis indicated several items as potential reinforcers for John. Nine items were assessed: candy (Smartees), saltine crackers, pop (Mountain Dew), lengths of ribbon to play with, oreo cookies, popcorn, rubber stamps, stickers and markers. Some items were suggested by the classroom teacher and some were determined by the researcher. The candy (Smartees) was clearly identified as the most powerful reinforcer and was chosen as the preferred reinforcer by the researcher.

As noted earlier, two skills were identified by the teacher as appropriate for instruction for John. The first skill involved matching pictures beside, in order to increase John's ability to function in the TEACCH classroom. The second skill involved having John appropriately match pictures of food items to jars with actual food items. This skill was also aimed at helping John to communicate food items he desired during lunch periods. Results pertaining to both skills are described in detail.

Skill 1

Figure 3 depicts the participant’s acquisition of this skill during direct instruction and the rate of reinforcement administered. The first two sessions of baseline data indicated a lack of skill performance (8%). On the final session of baseline, John demonstrated an increased performance (48%). The researcher determined there was, however, a need to begin direct instruction for this skill. The graph displays John's increased performance of Skill 1 across 13 data points.
Figure 3. John's performance and rate of reinforcement during instructional time for Skill 1.
John met the goal of performing Skill 1 independently, that is without prompts, on 80% of trials for three consecutive days after only six days of direct instruction. John's skill performance was maintained at 90% or better throughout phases II, III and IV of the study. Initially, reinforcement (i.e., candy) was administered using a dense rate. After acquisition of Skill 1 to the pre-established criteria, the fading procedure began. Clearly, John's task performance was maintained even during the fading procedure. Figure 4 depicts the participant's corresponding performance of this skill during the independent work setting. This graph (Figure 4) indicates similar task performance with the previous graph depicting direct instruction. However, John's performance during the first four days of instruction was inconsistent during independent work. On the fifth day, however and on 22 of the subsequent 23 sessions, John maintained a high level of performance completing the task on 100% of trials administered. Again, data were collected during this setting throughout the entire study, even after direct instruction was discontinued. Thus, the additional data points.

Analysis of the data from Skill 1 indicates the fading procedure was indeed effective. Further, John was able to maintain the skill during independent work sessions void of reinforcement except upon task completion. The results of the fading procedure are clearly identified in Figure 3. It should be noted after direct instruction was discontinued, John only received reinforcement (i.e., free/play time) following completion of the entire task during independent work.
Figure 4. John's performance during independent work sessions for Skill 1

Independent Work-Skill 1

- Correct

B=Baseline   I=Phase I
II=Phase II   III=Phase III

Sessions
Free play was used as the reinforcer following independent work instead of the candy. This was used in order to maintain consistency with other independent work sessions throughout the day after which the classroom teacher always used free/play time as the reinforcement.

**Skill 2**

This skill, like Skill 1, was the focus of three direct teach sessions each week. This skill was monitored, however, in two generalization settings: (a) the independent work setting and (b) the lunch setting. Due to the complexity of Skill 2, each area will be described in terms of gains.

**Direct Instruction**

Direct instruction for this skill occurred for seven consecutive weeks. Figure 5 depicts the rate of skill acquisition. Clearly, this skill was not acquired at the same pace as Skill 1; however, John maintained slow and consistent progress as documented by the trendline. Again, a goal of 80% accuracy on three consecutive days was set to indicate proper skill acquisition after which the fading procedure could be introduced. As can be seen from the graph (Figure 5), John did not demonstrate this level of competency before the school year ended. He did, however, perform the skill at 75% accuracy for two consecutive days after which time he dropped to 70%. He followed this with two more days at 75% and again dropped to 70% on the last session. As a result, the fading procedure for thinning reinforcement was not implemented for Skill 2.
Figure 5. John's performance and rate of reinforcement during instructional time for Skill 2.
Independent Work Setting

During the setting for Skill 2, progress was comparable to the instructional setting. Steady progress occurred and is depicted in Figure 6. Here again, at the time the study was terminated, John was performing the skill independently on between 60-75% of trials.

Lunch Setting

John was observed in a generalization setting of lunch, which occurred in the classroom. The students ate at the large table in the center that is also used for direct instruction. This table can be located on Figure 1. John was observed during this setting on 17 different sessions. He made ambitious growth in choosing and eating his choice of food items during lunch. Figure 7 depicts the growth rate of choosing and eating items during the lunch period. Baseline data for this setting indicated that John was not performing this skill at all. The following sessions were encouraging and after 17 days of data, John only performed below 50% on four sessions. In addition to the information provided in Figures 4, 5 and 6, there was also information gathered regarding food items chosen and eaten during lunch and the frequency of targeted items chosen that were targeted during instruction. It was found that on 17 days of data collection, John chose 25 different food items. Of those food items, 11 out of 25 were items specifically targeted during direct instruction. Likewise, 14 of those items were not specifically targeted.
Figure 6. John's performance during independent work sessions for Skill 2.
Figure 7. John's performance during the generalization/lunch setting for Skill 2.

Generalization / Lunch Setting-Skill 2

- Correct

% of trials chosen and correct choice

Sessions

Baseline

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Changes In Instruction

John’s attendance during instruction for Skill 2 was sporadic. He missed several days during this eight-week period due to illnesses. There was one period of time when he was not in school for 10 consecutive days. This absence is noted in Figures 5, 6, and 7 with scale breaks on the horizontal axes. It should also be noted that following his return to school, John displayed several behavior problems. Tantrums were evident and involved dropping to the floor, refusing to go to the work area, and screaming. Also, there was an immense increase in stereotypic behaviors. As a result, it became necessary during week five of direct instruction to reinforce appropriate behaviors (e.g., coming to direct instruction independently, an absence of screaming, having ‘quiet feet’) as well as skill performance. Appropriate behaviors were reinforced with candy, which had previously been identified as a powerful reinforcer during the acquisition of Skill 1. Skill performance for Skill 2, however, continued to be reinforced with the food items. This change is clearly noted on Figure 5.

Another change involved the researcher’s physical presence during independent work time for Skill 2. Due to the nature of the skill, the researcher needed to set up performance opportunities throughout the session. The contact was limited to physical proximity only, there was not verbal interaction between the researcher and John during this time. However, it should be noted the researcher was not present at all during independent work for Skill 1.
Instructional Considerations for Skill 1 and Skill 2

Throughout instruction for both Skill 1 and Skill 2 a time span of approximately 15-20 minutes occurred between direct instruction and independent work. This helped eliminate the possibility of an inflated performance during independent work directly related to the recency of direct instruction. Free play was always used as the activity to separate the two settings.

Anecdotal Records

Throughout the course of this study, the researcher communicated frequently with the classroom teacher and paraprofessionals. Information exchanged largely focused on illnesses, behavior problems, and information received from John’s parents regarding happenings in the home. Additionally, while working with John, specific events or behavioral states were briefly noted by the researcher in the form of field notes (e.g., seemed tired or defiant).

Termination of Research

This study was ended after four months of instruction due to the conclusion of the academic school year. It should also be noted that John left school 10 days prior to the end of the school year to go on a family vacation out-of-state.
CHAPTER 5

DISCUSSION

The purpose of this study was to determine the effectiveness of a fading procedure regarding reinforcement for skill acquisition, maintenance, and generalization. Specifically, the goal was to observe the use of this procedure with a young child with autism, who was educated in a center-based special education program where TEACCH philosophies were incorporated. Findings were positive regarding the fading procedure and generalization for Skill 1. Skill 2, however, was not acquired at the pre-determined goal level. Thus the fading procedure was not implemented. Several topics for discussion, however, have surfaced as a result of Skill 2.

Fading reinforcement using a fixed ratio schedule was effective and resulted in maintenance of the desired skill. This procedure used for Skill 1 produced similar results to those found by Morgan et al. (1981). These authors however faded reinforcement across a lengthier amount of time, approximately fifteen days, in comparison to six days in this study for Skill 1. In addition, findings for both Skill 1 and Skill 2 regarding the effectiveness of an initial dense schedule of reinforcement in relation to skill acquisition were similar to findings reported by Hagopian et al. (1994). Therefore it appears that fading reinforcement is a necessary and viable component of best practice. Further, the schedule for fading reinforcement may be more intense than originally thought. Professional educators must systematically gather data to determine an appropriate schedule for fading reinforcement and make informed, individualized adjustments based on student need and performance.
Skill I

As a result of the first phase of this study, several conclusions were made. Skill I focused on the concept of “beside” and having John correctly match pictures that demonstrated *beside*.

**Strengths**

This task was acquired by the participant at a level of 80% accuracy within four weeks of direct instruction. The reinforcer used during this phase, candy (Smartees), retained its reinforcing quality throughout the study. Interestingly, it should be noted that this skill was generalized into the independent work setting and performed at 100% accuracy after only five days of direct instruction. The skill, however, was not always performed at 100% accuracy during the direct teach setting. Although direct instruction on Skill 1 was terminated after the fading procedure was completed, this skill continued to be monitored throughout the generalization setting. This provides evidence for the importance of monitoring skills that may have already been acquired to ensure maintenance.

**Limitations**

One limitation that should be addressed is the limited scope of this skill. There were thirty pictures used for direct instruction of this skill and the goal was to simply match the picture beside. There was no instruction regarding picture meaning. Thus, it is unlikely that John understood the intent of the pictures, only the task to match beside.
Recommendations

As a result of this study, several recommendations can be made regarding Skill 1. It is important to note this task was acquired quickly during the direct instruction portion and may be an indicator that teachers can begin fading reinforcement much sooner than what occurred in this study. It may also indicate that skills which students are in the process of acquiring can be incorporated into the independent work setting much sooner. Finally, one last recommendation made as a result of Skill 1 is that for some skills, the student may tolerate a more aggressive fading procedure. The fading procedure that was used for this study involved a 1:1 schedule indicating that for each correct independent response, reinforcement was administered and progressively moved up to 2:1, 3:1, 4:1, and finally 5:1. After the fading procedure began, John was very consistent in engaging in the task and it is possible that he might have tolerated a more aggressive fading procedure.

Skill 2

As stated earlier, Skill 2 was determined by the teacher and involved correctly identifying pictures of food with actual food items, in hopes that John would be able to engage in this activity during the lunch setting. This skill was more complex and did not lend itself, as easily to the instructional procedure.
Strengths

Even though John did not meet the fading criteria for Skill 2 during direct instruction, it was observed during the generalization setting of lunch as a being an ambitiously acquired skill. The trendline, as seen in Figure 7, indicates John made ambitious growth during this generalization setting. This is very encouraging, as ultimately, the generalization setting is where the skill will need to be performed in the future.

Limitations

Due to the nature of Skill 2, candy was discontinued as the instructional reinforcer and the food items, which were previously indicated as reinforcers, were now used. Initially, the food items appeared to be reinforcing, however this skill was acquired at a much slower rate than the first skill. This change in reinforcement may have attributed to the slower rate of acquisition.

Another limitation of this skill involved its comprehensive nature. In order to make the skill manageable, only seven items were targeted for instruction. This was only a few of the hundreds of food items offered throughout the year on the lunch menu. Due to the variety on the lunch menu, teaching identification of food items was a colossal task.

Another limitation of this skill involves the sporadic attendance pattern. As noted on Figure 5 by a scale break, there was a period of ten consecutive days when John was not attending school. This absence appeared to have several implications. Upon his return, John was not willing to function throughout the day using the daily schedule that
had been implemented. He would tantrum when given a schedule card and would frequently need one-on-one assistance to complete a schedule transition. There were also behavior problems noted regarding tantrums, which made direct instruction very difficult. In addition, a significant increase in stereotypic behaviors made direct instruction difficult.

Recommendations

As a result of this study, several recommendations can be made regarding Skill 2. It is important to note that this skill was very functional and served a very important purpose. However, it did not lend itself, due to both the magnitude and the nature of the reinforcement, to a direct teach session. Some skills are simply best taught during the setting in which they are most appropriate. This is one consideration of the TEACCH philosophy in general. The structure of the direct teach sessions and the independent work setting does not lend itself to developing skills in naturally occurring settings.

Another recommendation involves reducing the possibility of skills needed for instruction. Ultimately, in order to teach this skill on a more feasible scale, it may be better implemented during a snack time where there is more control over food items.

Another recommendation would account for environmental factors when analyzing skill acquisition. It is important to note when children are absent, sick, or undergoing difficult home situations. There are multitudes of factors that can influence skill acquisition.
Conclusions

Several possible conclusions can be made regarding Skill 1 and Skill 2 and the subsequent inability for John to acquire Skill 2. One possible contributing factor is that the nature of Skill 1 was well suited for the direct teach setting and could easily be performed during independent work. It's possible that because Skill 2 did not lend itself as well to direct instruction, acquisition ultimately suffered.

Another contributing factor relates to incidental opportunities for John to perform Skill 1 across many transitions throughout each day. The teacher chose the skill of placing a picture 'beside' because the structure of the TEACCH classroom requires a student to take a picture schedule card with them during each transition period. For example, a child ends playtime by receiving another card from an adult representing the next activity. With the picture card in hand, the child moves to the next area, locates the existing picture card identifying the area, and places his card 'beside' it. That action completes the transition and provides the child with the antecedent stimulus to enter the area and begin the task. Thus, John practiced 'beside' each time he moved to the next task/activity. Although John was able to perform Skill 2 during the lunch setting, he was not given as many incidental opportunities to perform the skill because numerous opportunities to request food was not a naturally occurring part of his day or the classroom. Specific data were not gathered for the number of incidental opportunities given for Skill 1, however that would be beneficial in future studies.

Finally, the difference in acquisition could be related to the fact that during independent work, there was still physical involvement of the researcher which
approximated the researcher’s presence during direct instruction. Due to the nature of this skill, (i.e., presenting two food choices each in a glass jar) the researcher needed to set up each performance opportunity. There was no verbal interaction or teaching occurring during this time, however the researcher was not present at all during independent work sessions for Skill 1. Further, John could not work at his own pace. Independent work stalled while the researcher set up the next response opportunity.

**Implications for Future Research**

Several implications for further research have been extrapolated from this study. Each is described below.

This study was conducted with one child who had been diagnosed with autism. Clearly, there is an obvious need for this study to be replicated with more children who have autism in order for claims to be substantiated. It should also be replicated with students who have varying degrees of the characteristics frequently identified with autism. In addition, it should be conducted across several skills and generalization settings.

This study was also conducted within a relatively short time frame (four months). Future research conducted in this area should be conducted in a longer time frame, possibly over an entire school year.

Future research should also focus on a consistent link between skills taught at school and skills reinforced in the home setting. A conscious effort should be made to teach caregivers the skills needed to reinforce skills learned at school in the home setting.
REFERENCES


Chance, P. (1974). After you hit a child, you can't just get up and leave him; you are hooked to that kid: A conversation with Ivar Lovaas about self-mutilating children and how their parents make it worse. Psychology Today, 76-84.


Morgan, D., Young, K. R., & Goldsetin, S. (1981). Teaching behaviorally disordered students to increase teacher attention in mainstreamed classrooms. Salt Lake City, UT: Department of Special Education. (ERIC Document Reproduction Service No. ED 244 500)


Appendix A

Criterion for Diagnosing Autism from the Diagnostic and Statistical Manual of Mental Disorders-IV
In order to be diagnosed with autism, the DSM-IV states that a child must display at least 6 (or more) items from sections 1, 2, and 3 with at least two from the first section and subsequently one from sections 2 and 3.

Section 1 describes a qualitative impairment in social interaction marked by:

(a) impairment in use of several nonverbal behaviors such as eye-to-eye gaze, facial expressions, body postures, and gestures to regulate social interaction,

(b) failure to develop peer relationships appropriate to developmental level,

(c) lack of spontaneous seeking to share enjoyment, interests or achievements with other people; and or

(d) a lack of social or emotional reciprocity.

Section 2 describes a qualitative impairment in communication manifested by

(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; and or

(d) a lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level.
Section 3 describes the engagement in restricted repetitive and stereotyped patterns of behavior, interests, and activities marked by

(a) an encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus,
(b) an apparently inflexible adherence to specific, nonfunctional routines or rituals,
(c) stereotyped and repetitive motor mannerisms; and or
(d) a persistent preoccupation with parts of objects.

In addition to the above criteria, the child experience have delays or abnormal functioning in at least one of the following areas, with onset prior to age 3 years: (1) social interaction, (2) language as used in social communication (3) symbolic or imaginative play. The child's disturbance also must not be better accounted for by Rett's Disorder or Childhood Disintegrative Disorder.
Appendix B

Data Collection for Instructional Setting and Independent Work Setting

Data Collection Sheet for Generalization/Lunch Setting for Skill 2
Data Collection Chart for Instructional Setting and Independent Work Setting

<table>
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<th>Date</th>
<th>TRIALS</th>
<th>Reinforcement</th>
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Number of trials completed independently =

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Number of trials completed independently =
### Data Collection Sheet for Generalization/Lunch Setting for Skill 2

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Appendix C

Instructional Planning Worksheets
Instructional Planning Worksheet

Learner: John Phase: Baseline Skill: #1

Instructional Objective: Given a card with a picture on it and the command, "John, find (whatever the picture is) and put beside, John will find the corresponding picture and place it beside on the Velcro strip.

Instructional setting: Direct Instruction with researcher

Materials: individual picture cards/ corresponding cards, "teacher time" schedule card and "play" schedule card

Reinforcer and schedule: There will be no reinforcement given.

Level of prompts that will be reinforced: no prompting- baseline

Instructional sequence:

1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with an 8 1/2" x 11" piece of tagboard that has two pictures on it with corresponding empty boxes with Velcro placed beside.
3. John will be given an individual card (2"x2") with one of the pictures on it and asked to "Find (whatever the picture is) and put beside."
4. If John hasn't responded in 20 seconds, the trial will be recorded as an incorrect answer and another trial will be administered.
5. If John responds correctly, the trial will be recorded as a correct response.
6. If the response is correct the researcher will then pull the card off in order to eliminate the possibility of the next response being correct simply due to process of elimination.
6. John will be given another trial with a different individual card.
7. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)
8. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
Instructional Planning Worksheet

Learner: John  Phase: 1  Skill: #1

Instructional Objective: Given a card with a picture on it and the command, "John, find (whatever the picture is) and put beside, John will find the corresponding picture and place it beside on the Velcro strip.

Instructional setting: Direct Instruction with researcher

Materials: individual picture cards/ corresponding cards, "teacher time" schedule card and "play" schedule card

Reinforcer and schedule: Reinforcement in the form of a piece of Smartee candy will be given for every response including all prompted responses

Level of prompts that will be reinforced: full physical, partial physical, model, verbal and independent prompts

Instructional sequence:
1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with an 8 1/2" x 11" piece of tagboard that has two pictures on it with corresponding empty boxes with Velcro placed beside.
3. John will be given an individual card (2"x2") with one of the pictures on it and asked to "Find (whatever the picture is) and put beside."
4. If John hasn't responded in 20 seconds, the least level of prompts will be tried- he will be given a verbal prompt. If he responds correctly, he will be reinforced with a piece of Smartee candy.
5. If John hasn't responded in 20 seconds, the next level of prompt will be administered. He will be given a model. If he responds correctly, he will be reinforced with a piece of Smartee candy.
6. If John hasn't responded in 20 seconds, he will be given a partial physical prompt. If he responds correctly, he will be reinforced with a piece of Smartee candy.
7. If John hasn't responded in 20 seconds, he will be given a full physical prompt. He will be reinforced with a piece of Smartee candy.
8. If the response is correct the researcher will then pull the card off in order to eliminate the possibility of the next response being correct simply due to process of elimination.
9. John will be given another trial with a different individual card.

10. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)

11. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
Instructional Planning Worksheet

<table>
<thead>
<tr>
<th>Learner: John</th>
<th>Phase: II</th>
<th>Skill: #1</th>
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**Instructional Objective:** Given a card with a picture on it and the command, "John, find (whatever the picture is) and put beside, John will find the corresponding picture and place it beside on the Velcro strip.

**Instructional setting:** Direct Instruction with researcher

**Materials:** individual picture cards/ corresponding cards, "teacher time" schedule card and "play" schedule card

**Reinforcer and schedule:** Reinforcement in the form of a piece of Smartee candy will be given only for responses meeting phase criteria (see below)

**Level of prompts that will be reinforced:** model, verbal and independent prompts

**Instructional sequence:**
1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with an 8 1/2" x 11" piece of tagboard that has two pictures on it with corresponding empty boxes with Velcro placed beside. John will be given an individual card (2"x2") with one of the pictures on it and asked to "Find (whatever the picture is) and put beside."
4. If John hasn't responded in 20 seconds, the least level of prompts will be tried- he will be given a verbal prompt. If he responds correctly, he will be reinforced with a piece of Smartee candy.
5. If John hasn't responded in 20 seconds, the next level of prompt will be administered. He will be given a model. If he responds correctly, he will be reinforced with a piece of Smartee candy.
6. If John hasn't responded in 20 seconds, he will be given a partial physical prompt. If he responds correctly, he will receive no reinforcement for this response.
7. If John hasn't responded in 20 seconds, he will be given a full physical prompt. He will not be reinforced for this response.
8. If the response is correct the researcher will then pull the card off in order to eliminate the possibility of the next response being correct simply due to process of elimination.
9. John will be given another trial with a different individual card.
10. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)

11. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
### Instructional Planning Worksheet

#### Learner: John  Phase: III  Skill: #1

**Instructional Objective:** Given a card with a picture on it and the command, "John, find (whatever the picture is) and put beside. John will find the corresponding picture and place it beside on the Velcro strip.

**Instructional setting:** Direct Instruction with researcher

**Materials:** individual picture cards/ corresponding cards, "teacher time" schedule card and "play" schedule card

**Reinforcer and schedule:** Reinforcement in the form of a piece of Smartee candy will be given only for responses meeting phase criteria (see below)

**Level of prompts that will be reinforced:** verbal prompts and independent responses

**Instructional sequence:**

1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with an 8 1/2" x 11" piece of tagboard that has two pictures on it with corresponding empty boxes with Velcro placed beside.
3. John will be given an individual card (2"x2") with one of the pictures on it and asked to "Find (whatever the picture is) and put beside."
4. If John hasn't responded in 20 seconds, the least level of prompts will be tried- he will be given a verbal prompt. If he responds correctly, he will be reinforced with a piece of Smartee candy.
5. If John hasn't responded in 20 seconds, the next level of prompt will be administered. He will be given a model. If he responds correctly, he will not be reinforced.
6. If John hasn't responded in 20 seconds, he will be given a partial physical prompt. If he responds correctly, he will receive no reinforcement for this response.
7. If John hasn't responded in 20 seconds, he will be given a full physical prompt. He will not be reinforced for this response.
8. If the response is correct the researcher will then pull the card off in order to eliminate the possibility of the next response being correct simply due to process of elimination.
9. John will be given another trial with a different individual card.
10. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)
11. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
Instructional Planning Worksheet

Learner: John  Phase: IV  Skill: #1

Instructional Objective: Given a card with a picture on it and the command, "John, find (whatever the picture is) and put beside, John will find the corresponding picture and place it beside on the Velcro strip.

Instructional setting: Direct Instruction with researcher

Materials: individual picture cards/ corresponding cards, "teacher time" schedule card and "play" schedule card

Reinforcer and schedule: Reinforcement in the form of a piece of Smartee candy will be given only for independent responses. Reinforcement will be administered on a fixed ratio of 2:1 (two correct responses for one reinforcer)

Level of prompts that will be reinforced: independent responses

Instructional sequence:
1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with an 8 1/2" x 11" piece of tagboard that has two pictures on it with corresponding empty boxes with Velcro placed beside.
3. John will be given an individual card (2"x2") with one of the pictures on it and asked to "Find (whatever the picture is) and put beside."
4. If John responds correctly, he will not receive reinforcement for the first response. He will, however be reinforced for every other correct response (FR=2:1)
5. If John hasn't responded in 20 seconds, the least level of prompts will be tried- he will be given a verbal prompt. If he responds correctly, he will not be reinforced for this response.
6. If John hasn't responded in 20 seconds, the next level of prompt will be administered. He will be given a model. If he responds correctly, he will not be reinforced.
7. If John hasn't responded in 20 seconds, he will be given a partial physical prompt. If he responds correctly, he will receive no reinforcement for this response.
8. If John hasn't responded in 20 seconds, he will be given a full physical prompt. He will not be reinforced for this response.
9. If the response is correct the researcher will then pull the card off in order to eliminate the possibility of the next response being correct simply due to process of elimination.

10. John will be given another trial with a different individual card.

11. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)

12. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
### Instructional Planning Worksheet

<table>
<thead>
<tr>
<th>Learner:</th>
<th>John</th>
<th>Phase: IV</th>
<th>Skill: #1</th>
</tr>
</thead>
</table>

**Instructional Objective:** Given a card with a picture on it and the command, "John, find (whatever the picture is) and put beside, John will find the corresponding picture and place it beside on the Velcro strip.

**Instructional setting:** Direct Instruction with researcher

**Materials:** individual picture cards/ corresponding cards, "teacher time" schedule card and "play" schedule card

**Reinforcer and schedule:** Reinforcement in the form of a piece of Smartee candy will be given only for independent responses. Reinforcement will be administered on a fixed ratio of 3:1 (three correct responses for one reinforcer)

**Level of prompts that will be reinforced:** independent responses

**Instructional sequence:**

1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with an 8 1/2" x 11" piece of tagboard that has two pictures on it with corresponding empty boxes with Velcro placed beside.
3. John will be given an individual card (2"x2") with one of the pictures on it and asked to "Find (whatever the picture is) and put beside."
4. If John responds correctly, he will not receive reinforcement for every third correct response (FR=3:1).
5. If John hasn't responded in 20 seconds, the least level of prompts will be tried- he will be given a verbal prompt. If he responds correctly, he will not be reinforced for this response.
6. If John hasn't responded in 20 seconds, the next level of prompt will be administered. He will be given a model. If he responds correctly, he will not be reinforced.
7. If John hasn't responded in 20 seconds, he will be given a partial physical prompt. If he responds correctly, he will receive no reinforcement for this response.
8. If John hasn't responded in 20 seconds, he will be given a full physical prompt. He will not be reinforced for this response.
9. If the response is correct the researcher will then pull the card off in order to eliminate the possibility of the next response being correct simply due to process of elimination.

10. John will be given another trial with a different individual card.

11. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)

12. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
Instructional Planning Worksheet

**Learner:** John  **Phase:** IV  **Skill:** #1

**Instructional Objective:** Given a card with a picture on it and the command, "John, find (whatever the picture is) and put beside, John will find the corresponding picture and place it beside on the Velcro strip.

**Instructional setting:** Direct Instruction with researcher

**Materials:** individual picture cards/ corresponding cards, "teacher time" schedule card and "play" schedule card

**Reinforcer and schedule:** Reinforcement in the form of a piece of Smartee candy will be given only for independent responses. Reinforcement will be administered on a fixed ratio of 4:1 (four correct responses for one reinforcer)

**Level of prompts that will be reinforced:** independent responses

**Instructional sequence:**
1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with an 8 1/2" x 11" piece of tagboard that has two pictures on it with corresponding empty boxes with Velcro placed beside.
3. John will be given an individual card (2"x2") with one of the pictures on it and asked to "Find (whatever the picture is) and put beside."
4. If John responds correctly, he will not receive reinforcement for every fourth correct response (FR=4:1).
5. If John hasn't responded in 20 seconds, the least level of prompts will be tried- he will be given a verbal prompt. If he responds correctly, he will not be reinforced for this response.
6. If John hasn't responded in 20 seconds, the next level of prompt will be administered. He will be given a model. If he responds correctly, he will not be reinforced.
7. If John hasn't responded in 20 seconds, he will be given a partial physical prompt. If he responds correctly, he will receive no reinforcement for this response.
8. If John hasn't responded in 20 seconds, he will be given a full physical prompt. He will not be reinforced for this response.
9. If the response is correct the researcher will then pull the card off in order to eliminate the possibility of the next response being correct simply due to process of elimination.

10. John will be given another trial with a different individual card.

11. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)

12. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
Instructional Planning Worksheet

Learner: John  Phase: IV  Skill: #1

Instructional Objective: Given a card with a picture on it and the command, "John, find (whatever the picture is) and put beside, John will find the corresponding picture and place it beside on the Velcro strip.

Instructional setting: Direct Instruction with researcher

Materials: individual picture cards/ corresponding cards, "teacher time" schedule card and "play" schedule card

Reinforcer and schedule: Reinforcement in the form of a piece of Smartee candy will be given only for independent responses. Reinforcement will be administered on a fixed ratio of 5:1 (five correct responses for one reinforcer)

Level of prompts that will be reinforced: independent responses

Instructional sequence:

1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with an 8 1/2" x 11" piece of tagboard that has two pictures on it with corresponding empty boxes with Velcro placed beside.
3. John will be given an individual card (2"x2") with one of the pictures on it and asked to "Find (whatever the picture is) and put beside."
4. If John responds correctly, he will not receive reinforcement for every fifth correct response (FR=5:1).
5. If John hasn't responded in 20 seconds, the least level of prompts will be tried- he will be given a verbal prompt. If he responds correctly, he will not be reinforced for this response.
6. If John hasn't responded in 20 seconds, the next level of prompt will be administered. He will be given a model. If he responds correctly, he will not be reinforced.
7. If John hasn't responded in 20 seconds, he will be given a partial physical prompt. If he responds correctly, he will receive no reinforcement for this response.
8. If John hasn't responded in 20 seconds, he will be given a full physical prompt. He will not be reinforced for this response.
9. If the response is correct the researcher will then pull the card off in order to eliminate the possibility of the next response being correct simply due to process of elimination.

10. John will be given another trial with a different individual card.

11. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)

12. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
Instructional Planning Worksheet

**Learner:** John  
**Phase:** Baseline  
**Skill:** #2

**Instructional Objective:** When presented with two jars, each containing a food item and a card with a picture of one of the food items, and the command, "John, find (food item), John will correctly match the picture to the food item.

**Instructional setting:** Direct Instruction with researcher

**Materials:** individual food cards, jars with food items inside, "teacher time" schedule card and "play" schedule card

**Reinforcer and schedule:** There will be no reinforcement given.

**Level of prompts that will be reinforced:** no prompting - baseline

**Instructional sequence:**

1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented two jars, each containing a food item.
3. John will be given an individual card (2"x2") with a picture of one of the food items on it and asked to "Find (whatever the food item is)."
4. If John hasn't responded in 20 seconds, the trial will be recorded as an incorrect answer and another trial will be administered.
5. If John responds correctly, the trial will be recorded as a correct response.
6. If the response is correct the researcher will then take the jars away and prepare to administer another trial with different food items.
7. John will be given another trial with a different food item.
8. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)
9. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
Instructional Planning Worksheet

Learner: John Phase: I Skill: #2

Instructional Objective: When presented with two jars, each containing a food item and a card with a picture of one of the food items, and the command, "John, find (food item), John will correctly match the picture to the food item.

Instructional setting: Direct Instruction with researcher

Materials: individual food cards, jars with food items inside, "teacher time" schedule card and "play" schedule card, pieces of each food item for reinforcement

Reinforcer and schedule: Reinforcement in the form of a small piece of the correctly matched food item will be given for every response including all prompted responses

Level of prompts that will be reinforced: full physical, partial physical, model, verbal and independent prompts

Instructional sequence:

1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with two jars, each containing a food item.
3. John will be given an individual card (2"x2") with a picture of one of the food items on it and asked to "Find (whatever the food item is)."
4. If John hasn't responded in 20 seconds, the least level of prompts will be tried- he will be given a verbal prompt. If he responds correctly, he will be reinforced with a small piece of the food item.
5. If John hasn't responded in 20 seconds, the next level of prompt will be administered. He will be given a model. If he responds correctly, he will be reinforced with a small piece of the food item.
6. If John hasn't responded in 20 seconds, he will be given a partial physical prompt. If he responds correctly, he will be reinforced with a small piece of the food item.
7. If John hasn't responded in 20 seconds, he will be given a full physical prompt. He will be reinforced with a small piece of the food item.
8. If the response is correct the researcher will then pull then take the jars away and prepare to administer another trial with different food items.
9. John will be given another trial with a different food item.
10. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)
11. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
### Instructional Planning Worksheet

**Learner:** John  
**Phase:** II  
**Skill:** #2

**Instructional Objective:** When presented with two jars, each containing a food item and a card with a picture of one of the food items, and the command, "John, find (food item), John will correctly match the picture to the food item.

**Instructional Setting:** Direct Instruction with researcher

**Materials:** individual food cards, jars with food items inside, "teacher time" schedule card and "play" schedule card, pieces of each food item for reinforcement

**Reinforcer and schedule:** Reinforcement in the form of a small piece of the correctly matched food item will be given for responses meeting the phase criteria

**Level of prompts that will be reinforced:** model, verbal and independent prompts

**Instructional Sequence:**

1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with two jars, each containing a food item.
3. John will be given an individual card (2"x2") with a picture of one of the food items on it and asked to "Find (whatever the food item is)."
4. If John hasn't responded in 20 seconds, the least level of prompts will be tried- he will be given a verbal prompt. If he responds correctly, he will be reinforced with a small piece of the food item.
5. If John hasn't responded in 20 seconds, the next level of prompt will be administered. He will be given a model. If he responds correctly, he will be reinforced with a small piece of the food item.
6. If John hasn't responded in 20 seconds, he will be given a partial physical prompt. If he responds correctly, he will not be reinforced for this response.
7. If John hasn't responded in 20 seconds, he will be given a full physical prompt. If he responds correctly, he will not be reinforced for this.
8. If the response is correct the researcher will then pull then take the jars away and prepare to administer another trial with different food items.
9. John will be given another trial with a different food item.
10. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)

11. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
**Instructional Planning Worksheet**

<table>
<thead>
<tr>
<th>Learner:</th>
<th>John</th>
<th>Phase: III</th>
<th>Skill: #2</th>
</tr>
</thead>
</table>

**Instructional Objective:** When presented with two jars, each containing a food item and a card with a picture of one of the food items, and the command, "John, find (food item), John will correctly match the picture to the food item.

**Instructional setting:** Direct Instruction with researcher

**Materials:** individual food cards, jars with food items inside, "teacher time" schedule card and "play" schedule card, pieces of each food item for reinforcement

**Reinforcer and schedule:** Reinforcement in the form of a small piece of the correctly matched food item will be given for responses meeting the phase criteria

**Level of prompts that will be reinforced:** verbal and independent prompts

**Instructional sequence:**

1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with two jars, each containing a food item.
3. John will be given an individual card (2"x2") with a picture of one of the food items on it and asked to "Find (whatever the food item is)."
4. If John hasn't responded in 20 seconds, the least level of prompts will be tried- he will be given a verbal prompt. If he responds correctly, he will be reinforced with a small piece of the food item.
5. If John hasn't responded in 20 seconds, the next level of prompt will be administered. He will be given a model. If he responds correctly, he will not be reinforced.
6. If John hasn't responded in 20 seconds, he will be given a partial physical prompt. If he responds correctly, he will be not be reinforced for this response.
7. If John hasn't responded in 20 seconds, he will be given a full physical prompt. If he responds correctly, he will not be reinforced for this.
8. If the response is correct the researcher will then pull then take the jars away and prepare to administer another trial with different food items.
9. John will be given another trial with a different food item.
10. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)

11. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."
Instructional Planning Worksheet

<table>
<thead>
<tr>
<th>Learner:</th>
<th>John</th>
<th>Phase: IIIa</th>
<th>Skill: #2</th>
</tr>
</thead>
</table>

**Instructional Objective:** When presented with two jars, each containing a food item and a card with a picture of one of the food items, and the command, "John, find (food item), John will correctly match the picture to the food item.

**Instructional setting:** Direct Instruction with researcher

**Materials:** individual food cards, jars with food items inside, "teacher time" schedule card and "play" schedule card, pieces of each food item for reinforcement

**Reinforcer and schedule:** Reinforcement in the form of a small piece of the correctly matched food item will be given for responses meeting the phase criteria. **In addition, John will be reinforced for appropriate behaviors including having quiet feet and having quiet voice (no screaming). For these behaviors, he will be reinforced with a piece of candy (Smartee).**

**Level of prompts that will be reinforced:** verbal and independent prompts **Also reinforcement for appropriate behaviors throughout direct instruction setting.**

**Instructional sequence:**

1. John will be given the "teacher time" schedule card (which consists of a picture of the researcher) and asked to sit down at the table.
2. John will be presented with two jars, each containing a food item.
3. John will be given an individual card (2"x2") with a picture of one of the food items on it and asked to "Find (whatever the food item is)."
4. If John hasn't responded in 20 seconds, the least level of prompts will be tried- he will be given a verbal prompt. If he responds correctly, he will be reinforced with a small piece of the food item.
5. If John hasn't responded in 20 seconds, the next level of prompt will be administered. He will be given a model. If he responds correctly, he will not be reinforced.
6. If John hasn't responded in 20 seconds, he will be given a partial physical prompt. If he responds correctly, he will be not be reinforced for this response.
7. If John hasn't responded in 20 seconds, he will be given a full physical prompt. If he responds correctly, he will not be reinforced for this.
8. If the response is correct the researcher will then pull then take the jars away and prepare to administer another trial with different food items.
9. John will be given another trial with a different food item.
10. The process continues until a pre-determined number of trials have been completed. (This could be anywhere from 10-20 trials.)
11. After the trials have been completed, John will be given his "play" schedule card and the direction "Go to play area."