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<https://doi.org/10.15760/etd.1402>

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AN ABSTRACT OF THE THESIS OF Thomas Whalen Hamilton for the Master of Science in Psychology presented July 30, 1971.

Title: The Effectiveness of Environmental Control in Modifying Problem Behaviors in Mother-Child Interaction.

APPROVED BY MEMBERS OF THE THESIS COMMITTEE:

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An experiment was designed to test the effectiveness of using standard laboratory environments in producing a broad class of problem behaviors which defined Mother-Child (M-C) interaction difficulties. The effects of four environments, free-time (X), child's game and rules (B), mother's game and rules (C), and clean-up (Z), on the frequency of eight criteria behaviors were tested on 12 M-C pairs over three days of baseline data collection. It was predicted that the frequency of problem behaviors would decrease as a function of environment (X) and increase as a function of environments (B), (C), and (Z). A two factor repeated measures design was used for the baseline data analyses. Analysis of the data confirmed the experimental predictions. It was con-

cluded that the use of standard laboratory environments was effective in increasing the frequency of problem behaviors which define M-C interaction difficulties. These conclusions were discussed in view of the contribution made by the use of environmental control in the application of behavior modification techniques to M-C interaction difficulties.

THE EFFECTIVENESS OF ENVIRONMENTAL
CONTROL IN MODIFYING PROBLEM BEHAVIORS IN
MOTHER-CHILD INTERACTION

by

Thomas Whalen Hamilton

Presented to the Department of Psychology
in partial fulfillment of the requirements
for the degree of

Master of Arts

Portland State University

1971

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ACKNOWLEDGMENTS

I am especially indebted to Dr. Constance Hanf whose long hours of personal interest, energy, and professional expertise over the past two years have made this endeavor a rewarding learning experience. The ever present encouragement, consultation, and patience of Dr. Robert Powloski and Dr. Barbara Weiner was appreciated and greatly facilitated the developmental stages of the author. The serious questions, evaluations, and critiques presented by Dr. Vincent Glaudin have greatly improved the quality of this paper and the skills of the author.

The countless hours of typing, statistical computation, and proof reading conducted by my wife Linda were secondary to her characteristics of humor, encouragement, and confidence in the completion of this work.

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENT	III
LIST OF TABLES	VI
INTRODUCTION	1
Theoretical Considerations	4
General Applications	7
Applications to Child Behavior	11
Training Parents in a Therapist Role	18
in the home	19
in the laboratory	23
HANF'S PROCEDURE	28
THE EFFECTIVENESS OF ENVIRONMENTAL CONTROL	32
Statement of the Problem	32
METHOD	34
Subjects	34
Equipment and Laboratory Setting	34
Specific Procedures	35
Initial Interview	35
Baseline Data Collection	36
Reliability	40
RESULTS	42
DISCUSSION	68
SUMMARY AND CONCLUSIONS	72
BIBLIOGRAPHY	74
APPENDIX A	80

TABLE OF CONTENTS

	Page
APPENDIX B	89
APPENDIX C	91
APPENDIX D	93

LIST OF TABLES

Table	Page
I. AB Summary of Observed Data, Analysis of Variance, and Test on Means Using Newman-Keuls Procedure on Gives Up Control	43
II. AB Summary of Observed Data, Analysis of Variance, and Test on Means Using Newman-Keuls Procedure on Independent Play	45
III. AB Summary of Observed Data, Analysis of Variance, and Test on Means Using Newman-Keuls Procedure on Interaction	48
IV. AB Summary of Observed Data, Analysis of Variance, and Test on Means Using Newman-Keuls Procedure on Follows in <u>C</u> 's Play	50
V. AB Summary of Observed Data and Analysis of Variance on Rewards	52
VI. AB Summary of Observed Data, Analysis of Variance, and Test on Means Using Newman-Keuls Procedure on Commands	53
VII. AB Summary of Observed Data, Analysis of Variance, and Test on Means Using Newman-Keuls Procedure on Complies	55
VIII. AB Summary of Observed Data, Analysis of Variance, and Test on Means Using Newman-Keuls Procedure on Asks Questions	58
IX. Comparison of the Mean Frequencies of the Eight Criteria Behaviors between Groups B_1 and B_2	62
X. Comparisons of the Mean Frequencies of the Eight Criteria Behaviors between Groups C_1 and C_2	64
XI. Comparison of the Mean Frequencies of the Eight Criteria Behaviors between Groups Z_1 and Z_2	66

INTRODUCTION

In recent years the development of a body of literature that concentrates on the modification of human social behaviors supports the contention that the employment of operant techniques in Behavior Therapy has a wide range of effective applications. The history of the operational analysis of human behavior, the operant paradigm, and the extension of this paradigm to the modification of human behaviors evolved from the development of "logical positivism" in philosophy dating back to Immanuel Kant (1781) and Behavioristics in psychology. A detailed review of this historical development is contained in Appendix A.

In psychology, behavior principles find their origin in the "School of Behaviorism" founded by John B. Watson in 1913 with a paper entitled Psychology as a Behaviorist Views It. Watson could not tolerate the requirement of the Chicago School to translate positively observed behavior into the vague terms of consciousness. He found it more direct, interesting, and positive to study behavior for its own sake. Watson was the agent of a reaction between consciousness through introspection and objectivity in psychology, the result of which was observation of operations in behavior. Through him, Behaviorism became a psychology of stimulus and response as he proceeded to translate mentalistic concepts

like imagery, feeling and association into such behavioral terms as vocimotor behavior, glandular activity, and Pavlovian conditioned reflexes respectively. Those who followed Watson in the development of behavior principles were Holt, Tolman, Lashley, Weiss, Skinner, and Hull.

Burrhus Frederic Skinner made contact with "logical positivism" and Behaviorism while pursuing a literary career at Greenwich Village in 1927. He became acquainted with Bertrand Russell's articles in the Dial magazine on the epistemology of John B. Watson's Behaviorism. Russell was extrapolating the principles of an objective formulation of behavior to the problem of knowledge. Skinner was interested in human behavior but the literary method had failed him so he turned to science and entered graduate studies in psychology at Harvard. In his search for order in behavior, Russell and Watson had provided him no glimpse of experimental method but Pavlov had: "control the environment and you will see order in behavior." (Skinner 1952) Thus began Skinner's work on "operant behavior" a term he first used in the Behavior of Organisms (1938). He went directly to the observation of operations in behavior for his data in formulating a system of behavior. In studying behavior, he made a strong point of observing only the correlation between stimulus and response. The advantage of this approach was seen as obtaining a system of behavior which has a structure determined by the subject matter itself. Skinner describes two types of behavior,

"respondent" and "operant". Much work had been done on respondent behavior since Pavlov's time and it came to be assumed by many writers that all behavior would be accounted for by properly identifying the appropriate antecedent eliciting stimuli. But Skinner objected to this assumption saying that there is a large amount of behavior that does not seem to be 'elicited', since one can observe no correlation between antecedent events and corresponding responses. To force all behavior into the stimulus-response formula has delayed the treatment of this 'other' behavior. Addressing himself to the problem of this other (operant) behavior, Skinner said that events in behavior can occur without any observable antecedent events (unconditioned stimuli) and thus the behavior is emitted spontaneously rather than elicited. This type of spontaneous behavior he called operant, which refers to a subsequent event, a consequence.

In describing what he meant by operant behavior, Skinner established two laws: 1) The Law of Conditioning of type R: If the occurrence of an operant is followed by the presentation of a reinforcing stimulus, the strength (frequency) of the operant is increased; 2) The Law of Extinction of type R: If the occurrence of an operant already strengthened through conditioning is not followed by the reinforcing stimulus, the strength (frequency) is decreased. (Skinner 1938)

The interaction between an organism and the environment describes operant behavior, behavior that is affected by its

environmental consequences.

In general, the technique of operant conditioning consists of three stages: 1) measuring the operant level or baseline of the response(s) to be observed; 2) presenting a potential reinforcer following the occurrence of the response until an increase in strength (frequency) is demonstrated; 3) withholding the reinforcer and allowing the response to extinguish. The response is then reconditioned to increase the experimenter's confidence that he has isolated the relevant variables. Environmental control meant to Skinner the manipulation of response-reinforcement contingencies, or the control of the consequential events (reinforcements) occurring with operant behavior. In this context, environmental control is synonymous with operant techniques. For the purpose of clarification, environmental control in this paper will refer to control of the setting in which operant techniques are employed and not to the manipulation of reinforcement contingencies.

Theoretical Considerations

There have been objections to Behavior Therapy employing Skinner's operant techniques in which the symptom removal alone is criticized as being a "band-aid" approach. For example, when used in dealing with neurosis, it leaves the "basic causes" for neurosis uncured. Breger and McGaugh (1965) state that the current arguments for a learning

theory approach to psychotherapy are deficient on a number of grounds, one of which is the conceptualization of neuroses. In its essence, the conception of neuroses put forth by behavior therapists, is that neuroses are conditioned responses or habits (including conditioned anxiety) and nothing else. Breger and McGaugh state as background for their argument that behavior therapists stress the point that inferences about underlying factors such as unconscious conflicts, impulses, defenses, etc., made by psychodynamicists are unnecessary and misleading, and that equating neurosis with symptoms, and symptoms in turn with habits (conditioned responses), they are able to bring modern learning theory, with its "well established laws", to bear on the treatment of neurosis. The co-authors say that this view of neurosis has led behavior therapists into the precarious position where they must posit a learning experience for each symptom. This issue they have conveniently avoided by focusing on those neuroses which can be described in terms of specific symptoms (bed wetting, tics, phobias, etc.) and have ignored conditions such as neurotic depressions, interpersonal entanglements, etc.

On the other side of the controversy, Bandura (1961) says that psychotherapy rests on a very simple but fundamental assumption that human behavior is changeable through psychological procedure. Further he states that in the case of most behavior disorders, it is not the underlying motiva-

tions that need to be altered, but rather the ways in which the person has learned to gratify his needs. For example, for a person displaying deviant sexual behavior, the goal is not removal of the underlying causes, i.e., sexual motivation but the substitution of more socially approved, instrumental, and goal responses. Mowrer (1965) states that there is nothing diseased or abnormal about the emotional reactions of so called neurotic or psychotic individuals. On the contrary, in relation to the conduct and character (life style) of such individuals, their emotional reactions are quite appropriate. Thus there is a growing interest in psychotherapy as "behavior modification" in which it is held that the behavior of the individual causes emotional reactions, not vice versa. Mowrer takes issue with the Freudian assumption that the way to change abnormal behavior is for another person (therapist) through treatment to change the "underlying emotions". He says that "exactly the opposite assumption now appears to be more valid; namely, the way to change disturbed (and disturbing) emotions is for the person himself to change his behavior."

Despite this controversy of theoretical positions, the plethora of reports on the successful modification of human behavior involving a variety of contexts indicates that behavior modification techniques are presently enjoying an era of popularity and promise. One can observe the beginnings of a science, the main concern of which focuses upon social

and complex behaviors; and it is beginning to establish lawful relations between behavior and the variables that control it. The evolution of this science has forced it to move into such diverse areas as education, counseling, rehabilitation, and psychotherapy.

General Applications

In education, programmed instruction plays an integral role in the modification of academic and social behaviors. Holland and Skinner (1961) and Geiss and Stebbins (1965) have published programs for learning introductory psychology. Retarded children at the Ranier School in Washington learn such skills as reading, writing, and arithmetic in a Programmed Learning Classroom (Birnbrauer et.al., 1965). Cohen et.al., (1966) combined programmed instruction with a point system in a group situation designed to develop and maintain educational behavior in juvenile delinquents. Upon completing a unit of a program with a score of at least 90 per cent, the student was eligible for taking an examination which earned him a generalized reinforcer in the form of points. The points were worth one cent each and could be used to buy snacks, materials from a Sears and Roebuck catalogue, or access to a lounge where his friends were. The points could also be used to register for another program, or to rent books, library time, or an office with a telephone. The results show a marked increase in educational behaviors over relaxation be-

haviors. Although the program was designed to focus on educational behavior, the authors report that in four and one half months the social behaviors of these delinquents seemed to match the standards set up by society.

Krasner (1964) comments that he is struck by the behaviorist's willingness to tackle the "way out" groups, such as psychotics, retardates, and delinquents whose behavior is often considered unmodifiable. Probably the first report on the deliberate use of operant conditioning procedures in a clinical situation was that of Fuller (1949). His subject was a "vegetative idiot", an inmate of a feebleminded institution, whose behavior repertoire consisted of opening his mouth, blinking his eyes, and slight movements of his arms, head, and shoulders. Fuller shaped raising of the right arm to a vertical position by using a sugar milk solution reinforcer injected into the subject's mouth. The rate of the arm raising increased to three times a minute which allowed just enough time for the injection and swallowing to occur. Recently, Fairweather, Sanders, Maynard, and Cressler (1969) have shown that chronic schizophrenics can successfully participate in the selection of personal goals provided that alternatives are defined in comprehensible terms of performance and the clients are given responsibility for decision-making that affects their daily lives.

Counseling or interview approaches generally consider the structuring of a non-threatening or permissive situation

to be an important condition for behavioral change. It is expected that when a client repeatedly relates thoughts and feelings about events which, as a result of a previous history of associated aversive stimulation, elicit anxiety and guilt, but which the counselor does not disapprove or criticize, the client's maladaptive emotional responses will be extinguished through non-reinforcement. It is also assumed that extinguished emotional responses will generalize to thoughts and feelings concerning related topics. In one investigation involving analyses of specific client-therapist interaction, Dittes (1957) found that permissive responses on the part of the therapist toward sexual statements, which were initially accompanied by strong emotional arousal, were followed by decreases in the client's autonomic (GSR) responses, resistive or avoidant remarks, and interruptions in speech. Abreactive procedures in which the clients are induced by hypnosis, drugs, and various other forms of anesthetics to relieve traumatic experiences, may also be explained in terms of social learning and the extinction process. Success with this program is reported by Little and James (1964) in reducing chronic anxiety, guilt, and avoidance responses in a client suffering traumatic war experiences. From a learning point of view, the critical factor in interview approaches is the repeated eliciting of emotional responses which do not obtain reinforcement.

In rehabilitation programs, the procedure of systematic

desensitization or counterconditioning has been applied to a wide range of maladaptive behaviors. In this method, the therapist analyzes the stimulus determinants of emotional responsiveness and rank orders a list of situations to which the client reacts with increasing degrees of anxiety or avoidance. Then the therapist selects an anxiety neutralizing stimulus capable of inducing a competing condition of sufficient strength to overcome the emotional reactions conditioned by the stimulus determinants. The arousal stimuli are presented in increasing order so that emotional responses are relatively weak and can be readily extinguished. The arousal potential of stronger stimulation is supposedly reduced by generalization of anxiety extinction from previous weaker stimulation. (Wolpe 1958) Recently, success with this methodology in combination with vicarious reinforcement, symbolic transfer, self direction, and group programs is reported in such diverse disorders as: academic anxieties, alcoholism, chronic frigidity, exhibitionism, hyperesthesia, impotence, phobic disorders, psychosomatic disorders, and psychoses. (Bandura 1969)

What the future demands of Behavior Modification techniques in clinical settings is the provision of unconfounded and reproducible data regarding criteria measures of success, generality, and durability of behavior changes effected by various treatment procedures. Since 1938 operant techniques have moved from the animal laboratory (E. F. Skinner 1938)

into the schools, psychotherapeutic settings with individuals and hospital wards with groups. The methodology has been flexible enough to move from stimulus-response to cognitive psychology. (Bandura 1969) The next frontier appears to be social psychology. The following research is aimed at that frontier, beginning with the deceptively simplest social structure, the mother-child dyad.

Applications to Child Behavior

In a cogently written review, Brown (1969) relates that of the approximately 70 million children and youth under 18 years of age in this country, some 7 to 15 million, depending on the criteria of psychological-psychiatric classifications, have emotional or behavioral problems that require assistance. Among children and adolescents, application of behavior modification techniques have been made in the following problem areas: 1) autistic, psychotic, schizophrenic behavior; 2) tantrums, destructive, anti-social, predelinquent behaviors; 3) school problems, learning deficits, failures, disruptive and maladjustive behaviors in the classroom setting; 4) phobias, anxieties, and fears; 5) psychosomatic disturbances; 6) speech development and disturbances; 7) hyperactivity, and 8) development of social skills, cooperative play, and other socially adaptive behaviors. Gelfand and Hartmann (1968) state that behavior modification studies with children can conveniently be classified in terms of: 1) deceleration of

maladaptive behaviors, 2) the acceleration of prosocial behaviors, and 3) multiple treatment techniques. This system serves the purpose of establishing an outline with which one can review the literature. The focus of the following research will be to cover the range of techniques presently reported as opposed to the range of problem behaviors treated.

From the Central Midwestern Regional Educational Laboratories there is a report of striking results in the behavior and learning progress of hyperaggressive pre-school children. (Hamblin et.al., 1969) Employing a token exchange system in which desirable behavior of the subject earns a token "pay off" with which "good" things can be bought, and undesirable behavior earns inattention, isolation or the removal of tokens already earned. The authors report: 1) Extraordinarily aggressive boys who had not previously responded to therapy have been tamed; 2) Two year olds have learned to read about as fast and as well as their five year old classmates; 3) Children, too withdrawn to talk, have become better than average talkers; 4) Autistic children have developed functional speech, lost their bizarre and disruptive behavior patterns, and improved their relationships with parents and other children. More specifically, the token exchange system with hyperaggressive four year old boys increased attention during lesson time in a classroom to 95 per cent from the baseline rate of 8 per cent without the token exchange system over a 48 day period. Aggression sequences decreased from a

baseline average of 150 to an average 7 sequences on the last day. Cooperative sequences increased from a baseline average of 56 to an average of about 181 sequences. The authors explain that to make tokens meaningful, they were paired with a verbal "thank you", and an M & M candy. Increasingly, the E "forgets" the M & M's and after a few days, the children get no M & M's, just the approval. The authors explain the logistics in maintaining an effective token exchange system by varying the "goods" that can be purchased and maintaining the reinforcing potentials of these goods.

A number of studies have reported the use of extinction principles aimed at maladaptive behaviors in children. In general, the principle of extinction states that removal of positive reinforcement, previously made contingent on a particular behavior, will decrease the strength or frequency of that behavior. One extinction technique that has been effectively applied to a wide range of behavior problems in a number of settings is the Time-Out procedure. This procedure refers to an arrangement in which the occurrence of a particular behavior is followed by a period of time in which a variety of potential reinforcers are no longer available. This procedure is also referred to as isolation because the subject is usually removed from the environment where the particular behavior occurred and placed in a basically non-stimulating (non-reinforcing) situation for a period of time. One of the first systematic applications of this technique

to the control of maladaptive behaviors in children was made by Wolf, Risley, and Mees (1964). The authors extinguished temper tantrums in a pre-school child who had serious behavioral and physical handicaps by placing him in his room contingent upon each tantrum. The door remained closed until the tantrum ceased. This procedure eliminated the possibility of continuous social reinforcement during tantrum episodes, and also provided for the reinforcement of non-tantrum behaviors by the door being opened to social contacts and play, contingent upon such behavior. Byrd (1969) points out the importance of clear communication by parents to children exhibiting undesirable behavior regarding the reasoning for using time-outs; namely, that the child knows his bad behavior causes time-out. The author also emphasizes that parents should astutely observe, comment on, and reinforce good behavior that is incompatible with the undesired behavior. Patterson and White (1969) have reviewed the literature concerned with time-out techniques and concluded that:

- 1) In a variety of situations, especially the classroom, TO has been more efficient and effective than what might be termed "passive ignoring."
- 2) Although TO of long duration has been used, short periods have the added advantage of allowing for an increase in the time available for positive reinforcement of acts representative of social skills.
- 3) Size of TO rooms needn't be restricted to cramped quarters. Studies reporting effective use of TO have used rooms about the size of a small bedroom.
- 4) Maintaining supervision of TO while in use is desirable. It is necessary in studies where the child is to be returned to class immediately following cessation of tantrum behavior.

There is considerable evidence that the onset of ex-

inction procedures coincides with a temporary increase in frequency of the target behavior. (Bandura 1969) In some behavior disorders (self-destructiveness) even a slight increase becomes potentially dangerous. In these cases, certain punishment or aversive techniques have been effectively applied. Bucher and Lovaas (1968) treated a seven year old schizophrenic boy who delivered approximately 3,000 self-destructive blows during a 90 minute period when his restraints were removed. This behavior was almost totally eliminated in four sessions employing a total of twelve shocks made contingent on self injurious behavior. Tate and Baroff (1966), using a similar electric shock contingency in combination with a time-out procedure, effectively controlled a variety of self-destructive responses in a nine year old psychotic boy who had exhibited the behaviors for five years. The major criticisms directed at punishment techniques consider the duration of effects, possible production of less desirable side effects, and actually increasing the target behavior. These criticisms generally view punishment in isolation from other variables, and in as much as they do so, they are correct. However, the reports cited above make special emphasis on providing consistent administration of punishment and powerful rewards for incompatible alternative responses. Risley (1968) reports that brief programs of electric shock and reinforcement withdrawal are not only effective in removing self injurious behavior of long standing, but they generally improve prosocial behaviors

as well. It appears that once having focused a child's attention on relevant social stimuli, then appropriate behaviors can be more effectively positively reinforced. Recently, some pioneers in the behavior modification movement have developed a program for the child with multiple problem behaviors. (Patterson and Brodsky 1966)

The procedure generally applied for accelerating prosocial behaviors is shaping closer and closer behavioral approximations to the desired goal. This procedure involves: 1) selecting reinforcers that are sufficiently powerful and durable to increase and maintain the desired behavior; 2) making these reinforcements consistently contingent on the desired behavior, and 3) providing a situation for inducing the desired behavior. This procedure has been employed by Staats and his colleagues (Staats, Staats, Schutz, and Wolf 1962) using candy treats, trinkets, and tokens for buying toys as reinforcers to increase attention span on reading tasks with preschool children. The supposedly short attention span of brain-damaged and retarded children has also been markedly increased by developing proper contingencies of positive reinforcement. (Martin and Powers 1967) The use of positive techniques often eliminates undesirable behavior by focusing positive reinforcement on competing desirable behavior. For example, Harris Johnston, Kelley, and Wolf (1964) eliminated regressed crawling in a three year old girl through differential reinforcement of her walking instead of crawling. Allen,

Hart, Buell, Harris, and Wolf (1964) increased the frequency of peer as opposed to teacher interaction in a socially isolated nursery school girl by making the teacher's interests and attention contingent upon interaction with her peers.

An important objective of behavior modification programs applied to children is to endow social and symbolic stimuli with reinforcing properties. The development of these reinforcers is critical to the maintenance and generalization of behavioral changes affected in more restricted settings to natural environments. One methodology which shows considerable promise is that of vicarious reinforcement through modeling techniques. Bandura (1969) states that "virtually all learning phenomena resulting from direct experiences can occur on a vicarious basis through observation of other person's behavior and its consequences for them." Jones (1924) successfully used the "method of social imitation" to eliminate children's fears. Children lost their fear of a white rabbit while watching other children play with it. Bandura (1965) describes a series of experiments in which children were shown films wherein adults, serving as models, displayed verbal and physical aggression. In one film, the model's aggressive behavior was punished, in another it was reinforced, and in a third, there were no particular consequences. After the film, children were tested for imitation, and those who observed the model's punishment made significantly fewer imitations than those who observed the model rewarded and those who observed

no consequences. When offered an incentive to imitate the modeled aggression, however, all children performed the same.

Bijou and Baer (1961) point out that the child is continuously reacting to and continuously being changed by environmental stimuli, and furthermore, the stimuli are always being changed by the reaction of the child. (One basic assumption that has received considerable support from the behavior modification approach is that behavior, adaptive or maladaptive, is learned. In the case of parent-child interaction, there is strong evidence that much of the child's behavior or misbehavior is maintained by the reinforcing properties of the parent. (Bijou 1965; Patterson and Gullion 1968) Consequently, a number of programs and modifiers have focused on training mothers to deal with their children more effectively. The following research will concentrate on the various training programs for parents with child management difficulties.

Training Parents In A Therapist Role

Fortunately, in the light of the low ratio of child psychologists and psychiatrists to the increasing number of children with behavioral and emotional problems, parents and teachers with proper training can learn and efficiently apply behavior modification techniques. The movement of behavior modifiers, working with children, to train parents in a therapist's role is in contrast to the traditional view in psychotherapy in which it was thought that only professional people with years of education and experience were qualified to

assume the role of change agents for children with behavioral problems. Recently, a number of professionals have developed and applied training programs for parents to assume a therapist role in laboratories and in private homes.

In The Home. It is assumed by those professionals working in the home that the most effective way to reduce the rate of maladaptive and/or deviant behavior and accelerate the rate of adaptive or prosocial behavior is to change the reinforcing contingencies of the "socially significant" people living with the child. The presumptions for focusing on the home environment include: 1) accelerating the changes in deviant behavior, 2) maximizing the generalization of behavioral change across settings, and 3) increasing the durability of the behavior changes. (Patterson, Ray, and Shaw 1969)

Patterson, Ray, and Shaw (1969) began a training program for parents who were referred on the basis of having children with deviant behavior patterns. Following an initial interview in the laboratory and the collection of baseline data during ten sessions in the home, parents were trained to: 1) use the language and concepts of social learning by reading a programmed textbook designed for this purpose (Patterson and Gullion 1968), 2) observe and count child behaviors, 3) imitate intervention programs with the child modeled by the experimenter, and 4) practice these specific programs with the experimenter absent. During the intervention programs, the experimenters use various reinforcing

techniques for desirable behavior and various extinguishing techniques for undesirable behavior. The authors report that the results of this pilot study seem very promising. However, they discuss that economically it might be more beneficial to work with groups of parents in the laboratory and intervene in the home only when group training proves inadequate.

Hirsch and Walden (1969) employed a group technique with training 30 mothers with the principles and practices of behavior modification procedures. The training essentially involved: 1) group meetings consisting of highly organized lectures on reinforcement theory and informal discussions, 2) individual discussion and management advice for specific behavior problems, 3) individual application of learned principles to interaction in the home, and 4) keeping daily records of child behaviors. The authors report that the frequency of the child's deviant behavior, as scored by daily record keeping and self reports, improved in the direction specified before treatment in 96 % of the subjects. There was no objective observation of the child, however, to verify the subjective reports. Shah (1967) instructed a mother whose child demonstrated severe tantrum behavior to keep daily records. Upon one weeks completion, the mother's notes were used in defining the problematic contingencies that were maintaining the maladaptive behavior. These contingencies and basic operant principles were explained to the mother. Then a step-by-step outline was formulated in which the moth-

er was instructed to use a combination of time-out for tantrums and reinforcement for almost any acceptable behavior. The mother was seen twice a week for two months until a "warm and positive relationship between mother and child was stabilized." Lindsley (1966) used a similar technique with fathers in a group and discusses the utilization of procedures including the "Sunday Box" and the "Point Store". In supporting the contention that parents can be trained, the complete experimental procedure of behavior modification with specific behaviors in the experimental office, Johnson (1969) developed a set of parental instructions for the recording and managing of disturbing behaviors in two children. The instructions including applied extinction avoidance and fading techniques, were successfully carried out by the parents in 20 sessions. There have been a few manuals published which include the application of behavioral techniques in the home. (Patterson and Gullion 1968; Valett 1969; Wagner 1968)

In contrast to leaving the mother on her own in the home, relying on self reports and remote instructions, Peine (1969) makes a case for having a skilled therapist work with the parents in their home to train them in defining behaviors, recording and graphing behaviors, and building in reinforcers for the entire family. Zeilberber, Sampen, and Sloane (1968) developed a list of instructions for a mother to follow which included systematic reinforcement and time-out procedures for her hyperaggressive four year old son. In this program, ex-

perimenters went into the home and recorded the occurrence of target behaviors and reinforced the mother for following the instructions correctly (via social approval) and corrected the mother for not following the instructions correctly. The aggressive and disobedient behaviors of the child were clearly decreased by manipulating the parent consequences. Hawkins, Peterson, Schweid, and Bijou (1966) incorporated three observers for some 16 sessions of baseline data collection in the home. Following this baseline period, when an adequate rate of objectionable behaviors could be estimated, the mother was informed of nine objectionable behaviors that would be treated. She was shown three gestural signals that indicated how she was to behave toward her hyperaggressive, non-compliant four year old son, Peter: 1) Signal A meant that she was to command Peter to stop whatever objectionable behavior he was emitting, 2) Signal B meant that she was to give him attention, praise, and/or affectionate physical contact, 3) Signal C meant that she was to place Peter in his room and lock the door. A total of six experimental sessions were employed. Following the experimental sessions and a 24 day interval, three recheck sessions revealed that the nine objectionable behaviors were effectively modified. The authors note that Peter obtained much more affection from his mother by an increased rate of desirable behaviors.

Peterson (1967) discusses the advantages and problems of carrying out behavior modification programs with the therapist

in the home. [Among the advantages he discusses are: 1) behaviors of concern to therapist and parent alike are more likely to occur in the home; in some cases, this is the only setting where the problem behavior occurs; 2) the therapist can accurately assess the contingencies of reinforcement between parent and child only with first hand observation; 3) generalization of treatment effects across setting and across persons; 4) the therapist can be sure that the mother emits the correct response at the correct time for the correct behavior, and 5) relevant uncontrolled variables may be observed in the home. Among some of the problems reviewed were: 1) the presence of an observer changes the home environment; 2) relevant signaling devices force the parent to be at a certain vantage point, and 3) recording techniques do not allow observation usually of serious behaviors that occur seldomly. The point this author makes is well taken but on the other side of the coin, many therapists have been very successful in employing behavior modification techniques with parents in the laboratory.

In the Laboratory. Bell (1964) noted that by controlling the environment in which children's problem behaviors occur, reliable observation can determine the relevant parent behaviors that maintain them. Findley (1966) has pointed out that there is very limited experimental analysis of human behavior. He cites as reason for this state of affairs the constraint of using standardized environments in which

reliable observations can be made, contaminating variables controlled and relevant variables discovered.

A few investigators report the use of laboratory environments in modifying mother-child interaction difficulties. Russo (1964) reports using a treatment which involved simple reinforcement of desired behavior (cooperation, sociability, and friendly conduct) and extinction of undesired behavior (outbursts, rudeness, loudness, etc.) by withdrawal of reinforcement. Although he reports success in the sense that undesirable behavior decreased in frequency, it is impossible to analyze the relevant variables maintaining the deviant behavior and those responsible for changing it. Straughan (1963) reports success with a method of desensitization combined with encouragement of appropriate behavior in a case where the mother had become an anxiety arousing stimulus to her child. By her regimental and domineering influence, the mother had come to elicit anxiety in the child by her simple presence. Using a desensitizing technique as described by Wolpe (1958), Straughan induced relaxation in the child playing independently in a playroom and then slowly introduced the mother with closer and closer physical approximations. The mother was instructed to encourage the child's appropriate behavior. Again the report does not permit analysis of the relevant variables leading to the mother's anxiety arousing potential or those variables related to desensitizing this potential.

Bijou (1965) used a playroom connected to an observation

room by a one-way glass mirror and a microphone. Two observers recorded all of the child's verbal and non-verbal behavior and all of the mother's verbal and non-verbal behavior immediately following the child's behavior. Behaviors related to the mother's complaint (he is always commanding me to do things) were considered deviant. Cooperative behaviors, verbal and non-verbal, were considered incompatible with the deviant behaviors and very desirable. Two sessions provided enough information for the identification of the problem behaviors. Two further sessions provided baseline measures on the frequency of occurrence of the child's commanding and cooperative behaviors and the mother's responses to them. In the next two sessions, the mother was instructed by way of a light signal to ignore commanding behavior and attend in any way she thought natural to cooperative behavior. Commanding behavior decreased over baseline sessions while cooperative behavior increased. In order to further establish the maintaining effects of the mother's consequential behavior, the next two sessions contained the instructions to behave as she did in the baseline sessions and no instructions via the signal were given. Again the child's commanding behavior increased and cooperative behavior decreased over the rates obtained in the instructional session. The next sessions which were still in progress at the time of the writing would revert to having the mother ignore commanding and reinforce cooperation. In this stage, they help the mother form accurate discriminations of commanding and cooperating by flashing a light when she makes

the correct decisions. The light is assumed to have a reinforcing function in shaping up discrimination. One question raised by this study concerns the extent to which laboratory acquired behavior generalizes into the home.

Bernal, Duryee, Pruett, and Burns (1967) report the use of a clinic situation similar to that employed by Bijou in shaping a mother to ignore, express anger, order to stop, and punish abusive behavior of her 8 1/2 year old "brat". These conditioned aversive stimuli assumed a control function in reducing undesirable behavior. It is interesting to note that these aversive stimuli assumed the function of negative reinforcers when their withdrawal was made contingent on "good" behavior. Along with teaching the mother to follow through with these control measures, the authors shaped up maternal reinforcements made contingent on only good behavior. The results show an increase in the "brat's" complying behavior with a decrease in self abuse, mother abuse, and a host of undesirable behaviors. Video taping of the sessions provided observer reliability ratings, observational learning sessions in which the mother was reinforced while observing her appropriate behavior and not reinforced while observing her inappropriate behavior.

Wahler, Winkel, Peterson, and Morrison (1965) used a similar procedure to that of Bernal et.al., (1967) in changing the mother's reinforcement contingencies that maintained problem behaviors in their children. The technique involves five stages: 1) Establishing baselines on child and mother

behavior; 2) Helping the mothers to discriminate deviant behaviors from their incompatible counterparts in their children; 3) Shaping mothers to make social reinforcement contingent on the compatible behavior while ignoring the deviant behavior; 4) Changing these contingencies to establish their maintaining function, and 5) Returning them to their desirable properties. The authors report success in three cases.

The above studies concentrate on the methodology of shaping mothers to shape their children's behavior. However, the question arises concerning how "functionally equivalent the laboratory exemplars are to the natural environment." (Ullman and Krasner 1965) Instructions to the mother before entering the playroom generally consisted of, "Just play with _____ as you might at home." The laboratory restrictions imposed are not reported as contributing variables to treatment effects. Because the natural environments of children are far less complex than those of adolescents and adults, they should produce fewer difficulties for systematic laboratory control and reproduction. Hanf (1968), at the Crippled Children's Division of the University of Oregon Medical School, has developed a two stage program to control mother-child interactions in a variety of standard laboratory environments.

HANF'S PROCEDURE

Initially, Hanf (1968) conducted detailed interviews, behavior oriented in focus, with a pilot group of eight mother-child (M-C) pairs who were referred to the behavior modification program for severe management difficulties. During this interview, mothers reported those situations in which management difficulties occurred most regularly, the child's behavior on those occasions, and their own behavior on those occasions. From these reports a set of laboratory standard environments were empirically derived which were considered to be enalogs of those daily environments in which M-C interaction difficulties occurred. The set of standard laboratory environments included: mother occupied, child to play alone (A), child's game and rules (B), mother's game and rules (C), visitor in the room (F), mother leaves the room (G), and clean-up (Z). A complete list of the construction of these and other standard laboratory environments based on Ms' description of their problems is reproduced in Appendix B. No complaints of the pilot group were omitted from this list and Hanf (1968) reported that complaints of some 24 subsequent mothers fell neatly into these categories.

It was assumed that use of the standard laboratory environments would: 1) increase the reliability of observation, 2) provide the necessary conditions for valid within and be-

tween dyad comparisons, 3) standardize conditions for replication and study of behavioral sequences and their development over time, 4) expedite the behavior modification process by providing the environmental stimuli that produce the reported problem behaviors, and 5) increase the probability of generalization of acquired behaviors to natural environments.

Hanf's procedure involved collection of baseline data by a team of trained observers assigned to each M-C pair. Data were collected on operationally defined behaviors for the mothers and their children in the standard laboratory environments that matched their specific complaints, (disclosed in an initial interview). Three to four baseline sessions were conducted until the data reached consistency and the specific problems could be defined. Only those laboratory environments in which the problem behaviors occurred provided the setting in which behavior modification was carried out. Following the baseline period, the team shared with the mothers their observations, hypotheses, tabulated data, and audio-video tapes in a treatment interview. The goal of this interview was to train mothers to observe, think, and speak about specific behaviors that occurred in the baseline sessions.

Following the treatment interview, the two-stage treatment program commenced. The goals of the first stage were to increase mothers' attending and following behaviors contingent on their children's desirable behaviors, and to increase the mothers' repertoires of contingent verbal and physical rewar-

ding behaviors. The goals of the second stage were: 1) shape mothers in giving simple, explicit, and direct commands, 2) get mothers to use rewarding behavior, learned in stage 1, contingently on their children's compliance with commands, and 3) increase the effective use of aversive consequences (i.e., warning, time-out, spanking sequence), contingent on children's non-compliance to commands. During the treatment sessions, a mother received instructions, rewards, and criticisms via a wireless communication system while interacting with her child in the standard laboratory environments. When it was deemed appropriate by the team, modeling techniques were employed to develop the mother's repertoire of particular behaviors.

Because of the procedure of this two-stage program, (i.e., teaching Ms to become dispensers of positive social reinforcement and then teaching them to use control techniques effectively) standard laboratory environments, child's game and rules (B) and mother's game and rules (C) were used primarily in the application of behavior modification techniques. It can be seen from the goals that broad response classes were the focal point of this program as opposed to single target behaviors. The duration of this program involved an average of 15 sessions. Sessions occurred twice weekly and were extended over a 2 to 3 month period.

The findings of this program concluded that the use of standardized laboratory environments facilitated the analysis

and modification of relevant variables that function to maintain problem behaviors in M-C interaction. The use of these environments has also provided the potential for more accurate observations of the acquisition and generalization of behaviors in one or more different but related environments. At the time of this writing, Hanf was conducting research in the computation of ratios of mother and child behaviors which, it was thought, would enhance definitions of problem behaviors in dyad interaction, facilitate the development of criteria across pairs for optimal contingencies, and provide for ready analysis of the data. One goal of this research was the provision of a prediction system which would have the potential of identifying specific behaviors and behavioral deficits in mothers with management problems. (Hanf 1970)

THE EFFECTIVENESS OF ENVIRONMENTAL CONTROL

Statement Of The Problem

One aspect of Hanf's procedure which received considerable attention in the following experiment was the effectiveness of using standard laboratory environments in a behavior modification setting. Throughout the preceding research, it was noted that for behavior to be modified it must first be observed. However, behavior modifiers have not addressed themselves to the development of a reliable procedure designed to produce on the overt level, problem behaviors of focus for modification techniques. In the reported clinical settings, therapists dealing with parent-child interaction difficulties have provided for the parents vague instructions. These instructions were not specifically designed for the elicitation of problem behaviors that became the target of modification techniques. Other therapists have intervened in the home environment where the necessary stimulating conditions for parent-child interaction difficulties are frequently present, but not controlled. When Hanf (1968) developed standard laboratory environments for the employment of behavior modification techniques, the assumption was that these environments would reliably increase the probability and frequency of occurrence of a broad class of problem behaviors across M-C pairs. The present research was designed to test this

assumption.

The purpose of this experiment was to discover whether or not standard laboratory environments constructed primarily by specific instructions to the parents were effective in increasing the probability and frequency of occurrence of a broad class of problem behaviors across M-C pairs. Utilizing the baseline procedure developed by Hanf (1969) the present experiment attempted to design a control technique for examining the effects of standard laboratory environments on increasing the frequency of M-C interaction difficulties. The development of a control technique involved the designing of a free-time environment (X) which would include all constant variables present in the standard laboratory environments except for specific instructions which cued M to behave in a particular way. In general, it was hypothesized that those behaviors which constitute interaction difficulties would occur with less frequency in the free-time (no specific instructions) environment (X) than in the standard laboratory environments which were constructed by specific instructions to M. Interaction difficulties were defined as an increase or decrease in the frequency of specific behaviors that were to be the focus of extinction or shaping techniques respectively. For example, it was hypothesized that fewer commands, gives up control, and complies would occur in free-time environment (X) than in standard laboratory environments, mother's game and rules (C), and clean up (Z).

METHOD

Subjects

The Ss were 12 M-C pairs who were referred to the behavior modification program from various clinics in the Crippled Children's Division of the University of Oregon Medical School for management problems so severe that parents in the home and staff specialists could not manage C. In general, Cs were classified as "futile to manage ~~or~~ take care of, severely hyperactive, unreachable, or retarded." All Cs had one or more of the following chronic, handicapping, physical disabilities: 1) hyperactivity, 2) deafness, 3) absence of useful speech, and 4) mental retardation. All Cs ranged between 2 and 6 years of age. All Ms in the study were white and ranged in socio-economic and educational categories from welfare to high income levels, ghetto to suburban residents, and grade school to college graduates.

Equipment and Laboratory Setting

Volunteer assistants consisting of psychology interns, graduate and undergraduate psychology majors, and a volunteer mother with a college degree constituted the various four man teams assigned to work with each M-C pair. They were trained to carry out tasks involving the use of laboratory equipment, and the transformation of data from machine output. Their

participation in the program ranged from one month to four years.

An Esterline-Angus 20-channel event recorder (Esterline-Angus Instrument Company, Indianapolis, Indiana), a Bug-in-the-Ear one-way wireless communication system (Farral Instrument Company, Grand Island, Nebraska), and an Ampex Video Tape Recorder constituted the equipment necessary for reliable observation and recording.

Two rooms connected by a one-way mirror provided the setting for observing and recording activities. A standard supply of toys provided the milieu for both active and quiet individuals and were available for each session; however, each pair received no more or less than five different kinds of toys throughout their program.

Specific Procedures

Initial Interview. All Ms appeared for initial interviews where information was obtained concerning specific behaviors, conditions, and occasions which led to M-C interaction difficulties (Hanf 1969). Following this interview, all Ms were: 1) acquainted with the program procedures - this included telling Ms that reproduction of those daily situations in which their problems occurred would be attempted in the laboratory via a set of instructions, (standard laboratory environments), 2) shown the observation room and equipment, and 3) introduced to the members of the team who would be working with them.

Baseline Data Collection. After introduction to the program, all M-C pairs appeared in three sessions on three separate days for baseline data collection. Upon entering the clinic, a secretary presented Ms a list of instructions which described the sequence of, and standard laboratory environments planned for the particular M-C pair on the particular day. The standard laboratory environments were constructed by specific instructions to Ms via this list, and later in the laboratory by a wireless communication system to avoid any confusion. For example, a list of instructions might include the following: "Hello, Mrs. Doe. Today let us proceed as follows: When we talk with you (via the wireless communication system) get John to play in a game(s) you choose and keep him at this. You can change games but keep him at whatever you choose. Do not choose games that he likes especially, (standard laboratory environment, mother's game, C). When we talk with you again, you play whatever game or activity John chooses. It is his choice of games and his rules, (standard laboratory environment, Child's game, B). Then, when we talk with you again, clean up. Get John to put toys wherever you choose, we do not care. The idea is to get him to do things you ask him to do, (standard laboratory environment, clean-up, Z). That is all for today. We will see you next Wednesday, April 8th, at nine o'clock in the morning. Thank you."

A table of all laboratory environments and their corresponding instructions is included in Appendix C. Since the pre-

vious work by Hanf (1969) manifested that almost without exception, standard laboratory environments, child's game and rules (B), mother's game and rules (C), and clean-up (Z), provided the major occasions across pairs during which problem behaviors occurred, these were incorporated in the present study.

Prior to the baseline data collection in these standard laboratory environments, a free-time environment (X) was constructed in the following manner: After M had a chance to read the list of instructions presented by the secretary, she was greeted by E who introduced himself ~~as~~ a member of the team that would be working with her. He then said, "If you will come with me to the playroom, we will be able to get started shortly...(on the way to the playroom)...We prefer to have you and your child stay down here while we are getting set up with the equipment...(at the playroom door)...It will take us a few minutes and when we are ready, we will let you know via the wireless communication system." E then gave her the Bug-in-the-Ear device and closed the door. The construction of a free-time environment (X) was designed to produce a situation where no specific instructions were presented which would cue a mother to behave in a particular way. All other extrinsic variables held constant in standard laboratory environments, child's game and rules (B), mother's game and rules (C), and clean-up (Z), were also constant in free-time environment (X). The purpose of free-time environment (X) was to produce a situation not subject to specific instruc-

tions where M-C behaviors could be reliably observed and recorded.

It was considered by the team of observers that free-time environment (X) should logically occur first in the sequence of standard laboratory environments. The rationale for this structuring was that a free-time environment could be established only by avoiding as much as possible any specific instructions which would clue the Ms to behave in a particular way. It was assumed that the free-time environment (X) would produce as close as possible waiting room behaviors not influenced by specific instructions and should therefore occur first in the sequence of presentation. Also team consideration concluded that standard laboratory environment, clean-up (Z), should logically occur last in the sequence because it would not make sense to the child to clean up the toys in the room and then begin playing with them again.

Following these considerations, it was the design of this experiment to hold all extrinsic variables constant in the standard laboratory environments and free-time environment (X) and vary only those instructions which constituted each environment. The specific instructions which established standard laboratory environments, child's game and rules (B), mother's game and rules (C), clean-up (Z), and no specific instructions which established free-time environment (X) were the independent variables of this study.

Except for the logical order of free-time environment (X) occurring first and clean-up environment (Z) occurring last

in the sequence of presentation, the design attempted to counterbalance and randomize the sequence of child's game and rules (B) and mother's game and rules (C). This was done so that if order effects were present, they would be spread over all treatment effects and would balance out. The counterbalancing involved a BC, CB, BC order for four M-C pairs and a CB, BC, CB order for four other M-C pairs over the three baseline sessions. The randomizing involved a flip of the coin where heads decided BC order and tails decided CB order for four M-C pairs over three baseline sessions. Then a comparison of data was conducted to determine whether or not order effects were present in this experiment. (See Results)

Eight behaviors which had been operationally defined were selected from Hanf's previous work (1969) with 30 M-C pairs on the basis of their common occurrence across M-C pairs and their ability to delineate interaction difficulties. These behaviors were observed and recorded for each M-C pair in each environment: free-time (X), child's game and rules (B), mother's game and rules (C), and clean-up (Z). Appendix D contains a list of these behaviors and their operational definitions. Each behavior was observed and recorded in rate-per-minute values in each of the environments. Each environment was programmed for a duration of five minutes since it was found in a pilot study by Hanf (1969) that longer periods of time, i.e., 15-20 minutes per environment produced rate-per-minute values similar to those obtained in the 5 minute period.

Reliability. A reliability training session was conducted over a two week period involving some 18 hours of recording behaviors observed on audio-video tapes. The tapes were previously recorded during baseline sessions with M-C pairs. The final reliability check on a four member team of observers included data on eight behaviors in the four different laboratory environments, X, B, C, and Z. All behaviors were observed and recorded by two observers. Data was compiled and transformed from the 20-channel event recorder tapes by two independent observers who later collaborated on differences. Inter-observer reliability coefficients were computed and yielded the following results for the eight behaviors: 1) Commands, .90, 2) Follows in C's play, .88, 3) Gives up control, .946, 4) Asks Questions, .914, 5) Rewards, .975, 6) Independent Play, .76, 7) Interaction, .941, and 8) Complies, .89. It was concluded that inter-observer reliability was obtained. None of the observers were informed about the hypotheses of this study.

Hypotheses

The purpose of this experiment was to determine whether or not standard laboratory environments constructed by specific instructions to M functioned to increase the probability and frequency of occurrence of a broad class of problem behaviors across M-C pairs. Problem behaviors were considered to be those behaviors of focus in the analysis of interaction difficulties. The eight behaviors defined in Appendix D were

used as the criteria in this experiment. Hypotheses concerning the effects of standard laboratory environments, child's game (B), mother's game and rules (C), clean-up (Z), and free-time environment (X) on the eight criteria behaviors were formulated and tested. Specifically, the major hypotheses included:

- 1) There would be a decrease in the frequency of Gives Up Control as a function of environment (X) and an increase in this frequency as a function of environments (C) and (Z).
- 2) There would be an increase in the frequency of Independent Play as a function of environment (X) and a decrease in this frequency as a function of environments (B), (C), and (Z).
- 3) There would be an increase in the frequency of Interaction as a function of environment (B) and a decrease in this frequency as a function of environment (X), (C), and (Z).
- 4) There would be an increase in the frequency of Follows in C's Play as a function of environment (B) and a decrease in this frequency as a function of environment (X).
- 5) There would be no difference in the frequency of Rewards as a function of the environments (X), (B), (C), and (Z).

In conjunction with these major hypotheses the following supplementary hypotheses were formulated and tested:

- 1) There would be an increase in the frequency of Commands as a function of environments (C) and (Z) and a decrease in this frequency as a function of environments (X) and (B).
- 2) There would be an increase in the frequency of Complies as a function of environments (C) and (Z) and a decrease in this frequency as a function of environments (X) and (B).
- 3) There would be an increase in the frequency of Asks Questions as a function of environment (B) and a decrease in this frequency as a function of environments (X), (C), and (Z).

RESULTS

A two factor repeated measures design was employed for analysis of the data. (Winer 1962) There were four levels of the treatment factor and three levels of the day factor. All mothers and children were observed under the four treatment conditions on three separate days. The rationale underlying this design was that free-time environment (X) and standard laboratory environments (B), (C), and (Z) were viewed as separate treatments given to all M-C pairs, and all M-C pairs were measured on the same criteria. The criteria measured in each of these environments included all of the eight behaviors defined in Appendix D. An analysis of variance was conducted on each of these criterion measures. The day by environment interaction was considered important in order to determine whether the frequency of behaviors changed across environments as a function of the three different days on which they were observed and recorded. Post-hoc comparisons were conducted to determine the effects of each environment on the frequency of each behavior. All hypotheses were tested at the .01 level of significance and/or the .05 level of significance.

The first major hypothesis may be stated as follows:

- H_0 : There would be no difference in the frequency of Gives Up Control as a function of the environments (X), (B), (C), and (Z).
- H_1 : There would be a decrease in the frequency of Gives

Up Control as a function of environment (X) and an increase in this frequency as a function of environments (C) and (Z).

Table I includes an AB Summary of Observed Data, Analysis of Variance, and a Test on Means Using Newman-Keuls Procedure on Gives Up Control.

TABLE I

AB SUMMARY OF OBSERVED DATA, ANALYSIS OF VARIANCE,
AND TEST ON MEANS USING NEWMAN-KEULS
PROCEDURE ON GIVES UP CONTROL

AB SUMMARY TABLE OF OBSERVED DATA:

Environments

		b_X	b_B	b_C	b_Z	Total	
(1)	Days	a_1	9.6	37.8	196.9	261.6	505.9
		a_2	5.2	0.0	186.8	178.8	370.8
		a_3	13.3	5.6	212.2	155.5	386.6
			28.1	43.4	595.9	595.9	1263.3

ANALYSIS OF VARIANCE OF GIVES UP CONTROL:

Source of Variation		SS	df	MS	F
Between <u>M-C</u> pairs		3568.844	11	324.440	
Within <u>M-C</u> pairs		19888.201	132	150.668	
(11)	A (Days)	227.321	2	113.660	1.30
	B (Environments)	8719.030	3	2906.343	33.33**
	AXB (Days X Environments)	390.220	6	65.036	.75
	Residual (Error)	10551.591	121	87.203	
	Total	23229.724	143	162.445	

TABLE I--Continued

TEST ON MEANS USING NEWMAN-KEULS PROCEDURE:

Environments		X	B	C	Z
Ordered Means		.78	1.20	16.55	16.55
Differences between pairs		X	B	C	Z
	X		.42	15.77	15.77
	B			15.35	15.35
	C				--
$S_{\bar{B}} = 1.56$		r=	2	3	4
(iii) $q_{.99}(r, 120):$			3.70	4.20	4.50
$S_{\bar{B}} q_{.99}(r, 120):$			5.77	6.55	8.02
		X	B	C	Z
	X		-	**	**
	B			**	**
	C				-

In view of the analysis of variance results in part ii of Table I, the null hypothesis is rejected at the .01 level of significance since $F_{.99}(3, 120) = 3.95$. There were no significant interaction effects between days and environments on this criterion. The test on means in part iii of Table I shows that the mean frequency of Gives Up Control in environment (Z) is statistically different from the mean frequency in environments (X) and (B). The mean frequency of Gives Up Control in environment (C) is statistically different from the mean frequency in environments (X) and (B). No other differences between means were statistically significant at the .01 level for the Newman-Keuls test. The alternative hypothesis that there would be a decrease in the frequency of Gives Up Control as a function of environment (X) and an increase in this frequency as a function of environments (C) and (Z), is accepted at the .01 level of significance since $S_{\bar{B}} q_{.99}$

$(4,120)=8.02$ and $S_{E^2.99}(3,120)=6.55$ respectively.

The second major hypothesis may be stated as follows:

H_0 : There would be no difference in the frequency of Independent Play as a function of environment (X), (B), (C), and (Z).

H_1 : There would be an increase in the frequency of Independent Play as a function of environment (X) and a decrease in this frequency as a function of environments (B), (C), and (Z).

Table II includes an AB Summary of Observed Data, Analysis of Variance, and a Test on Means Using Newman-Keuls Procedure on Independent Play.

TABLE II

AB SUMMARY OF OBSERVED DATA, ANALYSIS OF VARIANCE,
AND TEST ON MEANS USING NEWMAN-KEULS
PROCEDURE ON INDEPENDENT PLAY

AB SUMMARY OF OBSERVED DATA:

		Environments				
(1)	Days	b_X	b_B	b_C	b_Z	Total
	a_1	186.9	154.2	75.4	72.7	489.20
	a_2	184.9	131.8	129.8	91.7	538.20
	a_3	249.0	103.0	52.3	37.3	441.60
		620.8	389.0	257.5	201.7	1469.0

TABLE II--Continued

ANALYSIS OF VARIANCE OF INDEPENDENT PLAY:

Source of Variation	SS	df	MS	F
Between <u>M-C</u> pairs	7486.116	11	680.556	
Within M-C pairs	17910.004	132	135.681	
A (Days)	97.21	2	48.605	.38
B (Environ- ments)	2894.792	3	964.930	7.45**
(ii) AXB(Days X Environments)	624.863	6	104.143	.80
Residual (Error)	692.701	121	129.558	
Total	25396.12	143	177.595	

TEST ON MEANS USING NEWMAN-KEULS PROCEDURE:

Environments	Z	C	B	X
Ordered Means	5.60	7.15	10.81	17.24
	Z	C	B	X
Differences	Z	1.55	5.21	11.64
between pairs	C		3.66	10.09
	B			6.43
$S_{\bar{B}} = 1.82$	r=	2	3	4
(iii) $q_{.99}^B(r, 120):$		3.70	4.20	4.50
$S_{\bar{B}} q_{.99}^B(r, 120):$		6.66	7.64	8.19
$q_{.95}^B(r, 120):$		2.80	3.28	3.69
$S_{\bar{B}} q_{.95}^B(r, 120):$		5.10	5.97	6.71
	Z	C	B	X
	Z	-	*	**
	C		-	**
	B			*

The results of the analysis of variance in part ii of Table II lead to the rejection of the null hypothesis at the .01 level of significance since $F_{.99}(3, 120) = 3.95$. There were no significant day by environment interaction effects since $F_{.99}(6, 120) = 2.96$. The test on means in part iii of Table II shows that the mean frequency of Independent Play in environment (X) is statistically different from the mean frequency in

environments (B), (C), and (Z) since $S_{\bar{B}} q_{.95}(2,120)=5.10$, $S_{\bar{B}} q_{.99}(3,120)=7.64$, and $S_{\bar{B}} q_{.99}(4,120)=8.19$ respectively. It was noted that the difference in the mean frequency of Independent Play between environments (X) and (B) was statistically significant at the .05 level, and the difference in this frequency between environments (X) and (C), and (X) and (Z), was statistically significant at the .01 level. Thus, the alternative hypothesis that the frequency of Independent Play would increase as a function of environment (X) and decrease as a function of environments (B), (C), and (Z), was accepted.

The third major hypothesis was stated as follows:

- H_0 : There would be no difference in the frequency of Interaction as a function of environments (X), (B), (C), and (Z).
- H_1 : There would be an increase in the frequency of Interaction as a function of environment (B) and a decrease in this frequency as a function of environments (X), (C), and (Z).

Table III includes an AB Summary of the Observed Data, Analysis of Variance, and a Test on Means Using Newman-Keuls Procedure on Interaction.

TABLE III

AB SUMMARY OF OBSERVED DATA, ANALYSIS OF VARIANCE,
AND TEST ON MEANS USING NEWMAN-KEULS
PROCEDURE ON INTERACTION

TABLE III--Continued

AB SUMMARY OF OBSERVED DATA:

		Environments					
(1)	Days	b_X	b_B	b_C	b_Z	Total	
		a_1	271.9	312.9	209.7	111.1	905.6
		a_2	226.8	345.0	204.0	192.0	967.8
		a_3	168.8	250.5	126.1	134.6	680.0
			667.5	908.4	539.8	437.7	2553.4

ANALYSIS OF VARIANCE OF INTERACTION:

Source of Variation		SS	df	MS	F
Between <u>M-C</u> pairs		6210.614	11	564.601	
Within <u>M-C</u> pairs		25570.950	132	193.719	
(11)	A (Days)	955.508	2	477.754	2.80
	B (Environ- ments)	3508.035	3	1169.345	6.85**
	AXB (Days X Environments)	446.262	6	74.377	.44
	Residual (Error)	20651.145	121	170.670	
	Total	31781.564	143	222.248	

TEST ON MEANS USING NEWMAN-KEULS PROCEDURE:

Environments		Z	C	X	B
Ordered Means		12.16	14.99	18.54	25.23
Differences between pairs	Z		2.83	6.38	13.07
	C			3.55	10.24
	X				6.69
(111)	$S_B = 2.17$	r=	2	3	4
	$q_{.99}(r, 120):$		3.70	4.20	4.50
	$S_B q_{.99}(r, 120):$		8.03	9.11	9.77
	$q_{.95}(r, 120):$		2.80	3.28	3.69
	$S_B q_{.95}(r, 120):$		6.08	7.12	8.01
		Z	C	X	B
		Z	-	-	**
		C		-	**
		X			*

The results of the analysis of variance in part ii of Table III lead to the rejection of the null hypothesis at the .01 level of significance since $F_{.99}(3,120)=3.95$. There were no significant interaction effects between days and environments on this criterion at the .01 level since $F_{.99}(6,120)=2.96$. The test on means in part iii of Table III shows that the mean frequency of Interaction in environment (B) is statistically different from the mean frequency in environments (X), (C), and (Z) since $S_B q_{.95}(2,120)=6.08$, $S_B q_{.99}(3,120)=9.11$, and $S_B q_{.99}(4,120)=9.77$ respectively. It was noted that the difference in the mean frequency of Interaction between environments (B) and (X) was statistically significant at the .05 level, and the difference in this frequency between environments (B) and (C), and (B) and (Z), was statistically significant at the .01 level. Thus, the alternative hypothesis that the frequency of Interaction would increase as a function of environment (B) and decrease as a function of environments (X), (C), and (Z), was accepted. No other differences were statistically significant.

The fourth major hypothesis was stated as follows:

- H_0 : There would be no difference in the frequency of Follows in C's Play as a function of environments (X), (B), (C), and (Z).
- H_1 : There would be an increase in the frequency of Follows in C's Play as a function of environment (B) and a decrease in this frequency as a function of environment (X).

Table IV includes an AB Summary of the Observed Data, Analysis of Variance, and a Test on Means Using Newman-Keuls Procedure

on Follows in C's Play.

TABLE IV

AB SUMMARY OF OBSERVED DATA, ANALYSIS OF VARIANCE,
AND TEST ON MEANS USING NEWMAN-KEULS
PROCEDURE ON FOLLOWS IN C's PLAY

AB SUMMARY OF OBSERVED DATA:

		Environments					
(1)	Days	b_X	b_B	b_C	b_Z	Total	
		a_1	113.4	260.6	18.5	15.7	408.2
		a_2	155.5	218.0	7.6	0.0	381.1
		a_3	134.4	224.5	7.1	12.2	378.2
			403.3	703.1	33.2	27.9	1167.5

ANALYSIS OF VARIANCE OF FOLLOWS IN C's PLAY:

Source of Variation		SS	df	MS	F
Between <u>M-C</u> pairs		2698.784	11	245.344	
Within <u>M-C</u> pairs		15839.388	132	119.995	
(11)	A (Days)	11.408	2	5.704	.10
	B (Environ- ments)	8836.586	3	2945.528	52.24**
	AXB (Days X Environments)	168.382	6	28.063	.50
	Residual (Error)	6823.012	121	56.388	
Total		18538.172	143	129.637	

TABLE IV--Continued

TEST ON MEANS USING NEWMAN-KEULS PROCEDURE:

Environments		Z	C	X	B
Ordered Means		.76	.92	11.20	19.53
		Z	C	X	B
Differences between pairs	Z		.16	10.44	18.77
	C			10.28	18.61
	X				8.33
(iii) $S_B = 1.57$		r=	2	3	4
$q_{.99}(r,120):$			3.70	4.20	4.50
$S_B q_{.99}(r,120):$			5.61	6.59	8.07
		Z	C	X	B
		Z		**	**
		C		**	**
		X			**

The results of the analysis of variance in part ii of Table IV lead to the rejection of the null hypothesis since $F_{.99}(3,120)=3.95$. There were no significant interaction effects between days and environments on this criterion since $F_{.99}(6,120)=2.96$. The test on means in part iii of Table IV shows that the mean frequency of Follows in C's Play in environment (B) was statistically different from environments (X), (C), and (Z). The alternative hypothesis that there would be an increase in the frequency of Follows in C's Play as a function of environment (B), and a decrease in this frequency as a function of environment (X) was accepted at the .01 level of significance.

The fifth major hypothesis was stated as follows:

- H_0 : There would be no difference in the frequency of Rewards as a function of the environments (X), (B), (C), and (Z).
- H_1 : There would be a difference in the frequency of Rewards as a function of environments (X), (B), (C), and Z.

Table V includes an AB Summary of the Data Observed and an Analysis of Variance of Rewards.

TABLE V

AB SUMMARY OF OBSERVED DATA
ANALYSIS OF VARIANCE
ON REWARDS

AB SUMMARY OF OBSERVED DATA:

		Environments					
(1)	Days	b_X	b_B	b_C	b_Z	Total	
		a_1	5.2	4.6	3.1	6.1	19.0
		a_2	5.7	3.8	5.7	8.6	23.8
		a_3	6.8	4.7	7.4	8.7	27.6
			17.7	13.1	16.2	23.4	70.4

ANALYSIS OF VARIANCE OF REWARDS:

Source of Variation		SS	dF	MS	F
Between <u>M-C</u> pairs		9.826	11	.893	
Within <u>M-C</u> pairs		43.097	132	.326	
(11)	A (Days)	.774	2	.387	1.13
	B (Environ- ments)	1.553	3	.517	1.52
	AXB (Days X Environments)	.521	6	.086	.25
	Residual (Error)	41.259	121	.340	
	Total	53.17	143	.371	

The results of the analysis of variance in part ii of Table V show that there is no significant difference in the frequency of Rewards as a function of the environments (X), (B), (C), and (Z) since $F_{.99}(3,120)=3.95$. There were no significant day by environment interaction effects on the frequency of Re-

wards since $F_{.99}(6,120)=2.96$. The conclusion was that there was no difference in the frequency of Rewards as a function of the environments (X), (B), (C), and (Z), and the null hypothesis was accepted at the .01 level of significance.

The first supplementary hypothesis was stated as follows:

H_0 : There would be no difference in the frequency of Commands as a function of the environments (X), (B), (C), and (Z).

H_1 : There would be an increase in the frequency of Commands as a function of environments (C) and (Z), and a decrease in this frequency as a function of environments (X) and (B).

Table VI includes an AB Summary of the Observed Data, Analysis of Variance, and a Test on Means Using the Newman-Keuls Procedure on Commands.

TABLE VI

AB SUMMARY OF OBSERVED DATA, ANALYSIS OF VARIANCE,
AND TEST ON MEANS USING NEWMAN-KEULS
PROCEDURE ON COMMANDS

AB SUMMARY OF OBSERVED DATA:

		Environments				
(1)	Days	b_X	b_B	b_C	b_Z	Total
	a_1	31.0	20.4	70.0	81.7	203.1
	a_2	22.6	20.6	84.1	68.0	195.3
	a_3	17.8	19.1	75.4	73.4	185.7
		71.4	60.1	229.5	223.1	584.1

TABLE VI--Continued

ANALYSIS OF VARIANCE OF COMMANDS:

Source of Variation	SS	dF	MS	F
Between <u>M-C</u> pairs	235.439	11	21.403	
Within <u>M-C</u> pairs	1281.136	132	9.705	
A (Days)	3.165	2	1.582	.36
(11) B (Environ- ments)	718.351	3	239.450	53.77**
AXB (Days X Environments)	20.758	6	3.459	.78
Residual (Error)	538.862	121	4.453	
Total	1516.575	143	10.605	

TEST ON MEANS USING NEWMAN-KEULS PROCEDURE:

Environments	B	X	Z	C
Ordered Means	1.67	1.98	6.20	6.38
	B	X	Z	C
Differences	B	.31	4.53	4.71
between pairs	X		4.22	4.40
	Z			.18
$S_{\bar{B}} = .12$	r=	2	3	4
(111) $q_{.99}(r,120):$		3.70	4.20	4.50
$S_{\bar{B}} q_{.99}(r,120):$		.44	.50	.54
	B	X	Z	C
	B	-	**	**
	X		**	**
	Z			-

The results of the analysis of variance in part ii of Table VI lead to the rejection of the null hypothesis since $F_{.99}(3,120)=3.95$. There were no significant interaction effects between days and environments on this criterion since $F_{.99}(6,120)=2.96$. The test on means in part iii of Table VI shows that the mean frequency of Commands in environment (C) was significantly different from the mean frequency in environments (B) and (X). The mean frequency of Commands in environment

(Z) was statistically different from the mean frequency in environments (X) and (B). Thus, the alternative hypothesis that there would be an increase in the frequency of Commands as a function of environments (C) and (Z), and a decrease in this frequency as a function of environments (X) and (B), was accepted at the .01 level of significance.

The second supplementary hypothesis was stated as follows:

H_0 : There would be no difference in the frequency of Complies as a function of environments (X), (B), (C), and (Z).

H_1 : There would be an increase in the frequency of Complies as a function of environments (C) and (Z), and a decrease in this frequency as a function of environments (X) and (B).

Table VII includes an AB Summary of Observed Data, Analysis of Variance, and a Test on Means Using Newman-Keuls Procedure on Complies.

TABLE VII

AB SUMMARY OF OBSERVED DATA, ANALYSIS OF VARIANCE,
AND TEST ON MEANS USING NEWMAN-KEULS
PROCEDURE ON COMPLIES

AB SUMMARY OF OBSERVED DATA:

		Environments				
(1)	Days	b_X	b_B	b_C	b_Z	Total
	a_1	10.4	3.7	16.8	19.9	50.8
	a_2	7.4	7.4	19.2	23.0	37.0
	a_3	7.6	3.7	21.7	28.7	61.7
		25.4	14.8	57.7	71.6	169.5

TABLE VII--Continued

ANALYSIS OF VARIANCE OF COMPLIES:

Source of Variation	SS	dF	MS	F
Between M-C pairs	37.097	11	3.372	
Within M-C pairs	178.378	132	1.351	
A (Days)	1.246	2	.623	.66
B (Environ- (ii) ments)	59.375	3	19.791	21.12**
AXB (Days X Environments)	4.304	6	.717	.76
Residual (Error)	113.453	121	.937	
Total	215.475	143	1.506	

TEST ON MEANS USING NEWMAN-KEULS PROCEDURE:

Environments	B	X	C	Z
Ordered Means	.38	.71	1.60	1.99
	B	X	C	Z
Differences	B	.33	1.22	1.61
between pairs	X		.89	1.28
	C			.39
$S_B = .03$	r=	2	3	4
(iii) $q_{.99}(r, 120):$		3.70	4.20	4.50
$S_B q_{.99}(r, 120):$		.11	.12	.35
	B	X	C	Z
	B	**	**	**
	X		**	**
	C			**

The results of the analysis of variance in part ii of Table VII lead to the rejection of the null hypothesis since $F_{.99}(3, 120) = 3.95$. There were no significant day by environment interaction effects since $F_{.99}(6, 120) = 2.95$. The test on means shows that the mean frequency of Complies in environment (Z) was statistically different from the mean frequency in environments (B), (X), and (C) at the .01 levels since $S_B q_{.99}^{(4, 120)} = .35$, $S_B q_{.99}^{(3, 120)} = .12$, and $S_B q_{.99}^{(2, 120)} = .11$ respec-

tively. The mean frequency of Complies in Environment (C) was statistically different from the mean frequency in environments (B) and (X) at the .01 level since $S_{B-C}^{q.99}(3,120)=.12$ and $S_{B-X}^{q.99}(2,120)=.11$ respectively. The mean frequency of Complies in environment (X) was statistically different from the mean frequency in environment (B) at the .01 level since $S_{B-X}^{q.99}(2,120)=.11$. Thus, the alternative hypothesis that there would be an increase in the frequency of Complies as a function of environments (C) and (Z), and a decrease in this frequency as a function of environments (X) and (B), was accepted at the .01 level of significance.

The third supplementary hypothesis was stated as follows:

- H_0 : There would be no difference in the frequency of Asks Questions as a function of environments (X), (B), (C), and (Z).
- H_1 : There would be an increase in the frequency of Asks Questions as a function of environment (B), and a decrease in this frequency as a function of environments (X), (C), and (Z).

Table VIII includes an AB Summary of Observed Data, Analysis of Variance, and a Test on Means Using Newman-Keuls Procedure on Asks Questions.

TABLE VIII

AB SUMMARY OF OBSERVED DATA, ANALYSIS OF VARIANCE,
AND TEST ON MEANS USING NEWMAN-KEULS
PROCEDURE ON ASKS QUESTIONS

TABLE VIII--Continued

AB SUMMARY OF OBSERVED DATA:

		Environments					
(1)	Days	b_X	b_B	b_C	b_Z	Total	
		a_1	24.6	36.5	25.6	16.5	103.2
		a_2	14.5	29.4	18.5	7.2	69.6
		a_3	16.2	21.5	18.3	13.4	69.4
			55.3	87.4	62.4	37.1	

ANALYSIS OF VARIANCE OF ASKS QUESTIONS:

Source of Variation		SS	df	MS	F
Between M-C pairs		103.087	11	9.371	
Within M-C pairs		220.227	132	1.668	
(ii)	A (Days)	15.774	2	7.887	5.86**
	B (Environ- ments)	36.162	3	12.054	8.94**
	AXB (Days X Environments)	5.088	6	.848	.63
	Residual (Error)	163.188	121	1.348	
	Total	323.314	143	2.260	

TEST ON MEANS USING NEWMAN-KEULS PROCEDURE:

Environments		Z	X	C	B
Ordered Means		1.03	1.51	1.73	2.43
		Z	X	C	B
Differences between pairs	Z		.48	.70	1.40
	X			.22	.92
	C				.70
(iii) $S_B = .04$ $q_{.99}(r, 120):$ $S_B q_{.99}(r, 120):$	r=	2	3	4	
			3.70	4.20	4.50
			.15	.17	.18
		Z	X	C	B
	Z		**	**	**
	X			**	**
	C				**

The results of the analysis of variance in part ii of Table VIII lead to the rejection of the null hypothesis at the .01 level of significance since $F_{.99}(3,120)=3.95$. There were no significant day by environment interaction effects on this criterion since $F_{.99}(6,120)=2.96$. However, the variance due to days was significant at the .01 level since $F_{.99}(2,120)=4.79$. A close look at the data in the AB Summary in part i of Table VIII shows that the frequency of Asks Questions was higher on day (1) than on days (2) and (3). The test on means in part iii of Table VIII shows that the mean frequency of Asks Questions in environment (B) was statistically different than the mean frequency in environments (C), (X), and (Z) at the .01 level since $S_{Bq}^{q.99}(2,120)=.15$, $S_{Bq}^{q.99}(3,120)=.17$, and $S_{Bq}^{q.99}(4,120)=.18$ respectively. The mean frequency of Asks Questions in environment (C) was statistically different from the mean frequency in environments (X) and (Z) at the .01 level since $S_{Bq}^{q.99}(2,120)=.15$ and $S_{Bq}^{q.99}(3,120)=.17$ respectively. The mean frequency of Asks Questions in environment (X) was statistically different from the mean frequency in environment (Z) at the .01 level since $S_{Bq}^{q.99}(2,120)=.15$. Thus, the alternative hypothesis that there would be an increase in the frequency of Asks Questions as a function of environment (B), and a decrease in this frequency as a function of environments (X), (C), and (Z) was accepted at the .01 level of significance.

One question not answered by the foregoing research and

statistical analysis was whether the order of presentation of environments had a significant effect on the frequency of criteria measures. It was mentioned previously that the design of this experiment and the restraints of the clinical situation dictated that the logical order of free-time environment (X) and clean-up environment (Z) were first and last respectively. However, the design attempted to counterbalance and randomize the sequential order of child's game and rules, environment (B), and mother's game and rules, environment (C). The counterbalancing involved an XBCZ, XCBZ, XBCZ sequential order for four M-C pairs and an XCBZ, XBCZ, XCBZ sequential order for four other M-C pairs over the three days of baseline sessions. Groups were organized for the comparison of frequencies of criteria measures in the same environments placed differently in the sequential order of presentation. Specifically, group B₁ included data in environment (B) presented after environment (X) and before environments (C) and (Z). Group B₂ included data in environment (B) presented after environments (X) and (C) and before environment (Z). Group C₁ included data in environment (C) presented after environment (X) and before environments (B) and (Z). Group Z₁ included data in environment (Z) following the XBC order of presentation. Group Z₂ included data in environment (Z) following the XCB order of presentation. There were four M-C pairs presented each of the counterbalanced sequential orders over three days of data collection which provided 12

observations on each of the eight criteria behaviors in each of the groups described above. Since there were no significant day by environment interaction effects at the .01 level of significance on any of the eight criteria behaviors, a t-test statistic was used to compare the mean frequencies of criteria measures between the groups.

Table IX includes Comparisons of the Mean Frequencies of the Eight Criteria Measures between Groups B_1 and B_2 . The null hypothesis that there would be no difference in the frequency of criteria measures between Groups B_1 and B_2 was tested at the .05 level of significance. The .05 level of significance was used since the probability of rejecting the null hypothesis when it was true was considered a more costly error than accepting it when it was false. The decision rules for rejecting the null hypothesis were stated as follows: Reject the null hypothesis when $t_{OBS} < t_{.025}(22) = -2.07$ or $> t_{.975}(22) = 2.07$. Do not reject the null hypothesis otherwise.

TABLE IX

COMPARISON OF THE MEAN FREQUENCIES OF
THE EIGHT CRITERIA BEHAVIORS
BETWEEN GROUPS B_1 AND B_2

Criteria	Environments	Means	Variances	t_{OBS}	Decision
Rewards	B_1	.19	.47	1.50	Do not reject H_0
	B_2	.04	.20		
Commands	B_1	1.42	1.45	-.92	Do not reject H_0
	B_2	1.75	2.90		
Follows in C's Play	B_1	25.70	288.20	.30	Do not reject H_0
	B_2	20.78	242.26		
Gives Up Control	B_1	.37	1.80	-.87	Do not reject H_0
	B_2	3.12	119.25		
Asks Questions	B_1	1.75	4.91	-.39	Do not reject H_0
	B_2	2.12	6.22		
Interaction	B_1	25.80	239.75	.54	Do not reject H_0
	B_2	22.33	231.53		
Independent Play	B_1	9.20	97.64	.85	Do not reject H_0
	B_2	6.35	38.65		
Complies	B_1	.37	.60	-1.07	Do not reject H_0
	B_2	.40	.39		

The data analysis in Table IX shows that there was no significant difference in the mean frequencies of any of the eight criteria behaviors between Groups B_1 and B_2 at the .05 level of significance. The conclusion was that the order of presentation had no significant effect on the frequency of criteria measures in environment (B).

Table X includes Comparisons of Mean Frequencies of the Eight Criteria Measures between Groups C_1 and C_2 . A two-tailed t-test was used to test the null hypothesis that there would be no difference in the mean frequency of the eight criteria measures between Groups C_1 and C_2 at the .05 level of significance. The decision rules concerning the null hypothesis were stated as follows: Reject the null hypothesis when $t_{OBS} < t_{.025}(22) = -2.07$ or $> t_{.975}(22) = 2.07$. Do not reject the null hypothesis otherwise.

TABLE X

COMPARISONS OF THE MEAN FREQUENCIES OF
THE EIGHT CRITERIA BEHAVIORS
BETWEEN GROUPS C_1 AND C_2

Criteria	Environments	Means	Variances	t_{OBS}	Decision
Rewards	C_1	.53	.15	1.29	Do not reject H_0
	C_2	.35	.10		
Commands	C_1	6.11	4.51	-1.49	Do not reject H_0
	C_2	7.05	3.88		
Follows in <u>C's</u> Play	C_1	1.90	23.54	1.21	Do not reject H_0
	C_2	.21	.51		
Gives Up Control	C_1	11.90	127.33	-1.55	Do not reject H_0
	C_2	18.31	186.90		
Asks Questions	C_1	1.28	1.43	-1.14	Do not reject H_0
	C_2	1.86	1.71		
Interaction	C_1	13.03	201.68	.92	Do not reject H_0
	C_2	8.05	63.20		
Independent Play	C_1	5.40	125.85	.51	Do not reject H_0
	C_2	3.62	17.59		
Complies	C_1	2.17	.96	1.34	Do not reject H_0
	C_2	1.62	1.10		

The data analysis in Table X shows that there were no significant differences in the mean frequencies of the eight criteria behaviors between Groups C_1 and C_2 at the .05 level of significance. The conclusion was that the order of presentation of environments had no significant effect on the frequency of criteria behaviors in environment (C).

Table XI includes Comparisons of Mean Frequencies of the Eight Criteria Behaviors between Groups Z_1 and Z_2 . A two-tailed t-test was used to test the null hypothesis that there would be no difference in the mean frequency of the eight criteria measures between Groups Z_1 and Z_2 at the .05 level of significance. The decision rules concerning the null hypothesis were stated as follows: Reject the null hypothesis when $t_{OBS} \leq t_{.025}(22) = -2.07$ or $t_{.975}(22) = 2.07$. Do not reject the null hypothesis otherwise.

TABLE XI

COMPARISON OF THE MEAN FREQUENCIES OF
THE EIGHT CRITERIA BEHAVIORS
BETWEEN GROUPS Z_1 AND Z_2

Criteria	Environments	Means	Variances	t_{OBS}	Decision
Rewards	Z_1	.60	.94	.73	Do not reject H_0
	Z_2	.52	.40		
Commands	Z_1	6.81	17.21	.43	Do not reject H_0
	Z_2	6.06	10.60		
Follows in C's Play	Z_1	.63	4.69	.38	Do not reject H_0
	Z_2	.39	.17		
Gives Up Control	Z_1	16.57	227.89	.07	Do not reject H_0
	Z_2	16.05	386.35		
Asks Questions	Z_1	.77	.57	.33	Do not reject H_0
	Z_2	.50	7.67		
Interaction	Z_1	3.57	112.51	-1.34	Do not reject H_0
	Z_2	11.65	320.01		
Independent Play	Z_1	4.97	48.59	-.03	Do not reject H_0
	Z_2	5.09	143.31		
Complies	Z_1	1.97	2.12	-1.03	Do not reject H_0
	Z_2	2.69	3.70		

The data analysis in Table XI shows that there were no significant differences in the mean frequencies of the eight criteria behaviors between Groups Z_1 and Z_2 at the .05 level of significance. The conclusion was that the order of presentation of environments had no significant effect on the frequency of criteria behaviors in environment (Z).

In view of the overall results, it was concluded that standard laboratory environments have a differential effect on the frequency of a broad class of behaviors which were selected for their facility to delineate interaction difficulties. More specifically, it was concluded that: 1) The frequency of Interaction, Follows in C's Play and Asks Questions increased as a function of environment (B) and decreased as a function of environments (X), (C), and (Z); 2) The frequency of Gives Up Control, Commands, and Complies increased as a function of environments (C) and (Z) and decreased as a function of environments (X) and (B); 3) The frequency of Independent Play increased as a function of environment (X) and decreased as a function of environments (B), (C), and (Z); 4) There was no difference in the frequency of Rewards as a function of the environments (X), (B), (C), and (Z). The results indicate that all behaviors excluding Independent Play and Rewards, decreased as a function of environment (X) and increased in the functional way noted above. In general, it was concluded that the use of environmental control is effective in increasing the probability and occurrence of a broad class of

problem behaviors in M-C interaction.

DISCUSSION

This research investigated the effectiveness of using standard laboratory environments in the application of behavior modification techniques to M-C interaction difficulties. In the Introduction, it was noted that the disadvantages of carrying out behavior modification programs in the home included: 1) the presence of an observer changes the home environment, 2) relevant signaling devices force the parent to be at a certain vantage point, and 3) the restraints of recording techniques do not allow observation usually of serious behaviors that occur rarely. It was also noted that the disadvantages of employing behavior modification techniques in the clinical laboratory included: 1) reduction of the generalization of treatment effects across settings, 2) removal of relevant uncontrolled variables present in the home environment, 3) lack of a reliable methodology for reproducing those situations which stimulate behaviors of concern to therapist and parent alike. When Hanf (1968) empirically derived a set of standard laboratory environments (considered to be analogs of those natural environments in which M-C interaction difficulties occurred), the contention was that the use of these environments would expedite the behavior modification process by providing the environmental stimuli that produce problem behaviors.

The conclusions of this experiment supported the contention that the use of standard laboratory environments increases the probability and frequency of occurrence of a broad class of problem behaviors across M-C pairs, and facilitates the baseline data collection process. These findings imply that the advantages of using behavior modification programs in the home and in the laboratory could be capitalized by the employment of laboratory analogs of those natural environments that produce problem behaviors. These advantages include: 1) generalization of treatment effects across settings, 2) accurate and reliable observation, 3) necessary conditions for within and between dyad comparisons, 4) standardized conditions for replication and study of behavioral sequences and their development over time, 5) expedition of the behavior modification process by providing the environmental stimuli that produce the problem behaviors, 6) experimental analysis of human behavior by use of standardized environments, and 7) control of irrelevant contaminating variables.

The limitations of the experimental findings were pronounced by the restraints of the clinical situation. The logical order of free-time environment (X) and clean-up environment (Z) occurring first and last respectively in the sequential order of presentation prohibited a completely randomized or totally counterbalanced design. However, the data analysis did not support the consideration that order effects were significant in increasing or decreasing the frequency of

criteria behaviors in a particular environment. Since the logistics of environments mother's game and rules (C) and clean-up (Z) implied that they were similar in respects to providing a mother-control situation, environment (Z) could possibly have been omitted from the data analysis. Then a restructuring of free-time environment (X), in order to allow variable placement in the sequential order, would have facilitated randomizing or counterbalancing order.

One aspect of the standard laboratory environments which limited their meeting the criteria of functionally equivalent exemplars of the natural environments of focus was the omission of stimuli frequently present in the latter that may function to affect the frequency of problem behaviors. For example, these stimuli would include telephone interruptions, television, radio, and other distractions. However, the characteristics of the standard laboratory environments appeared to reproduce those situations which stimulated behavior responses that defined M-C interaction difficulties and would become the focus of future behavior modification techniques.

SUMMARY AND CONCLUSIONS

This experiment was designed to test the effectiveness of using standard laboratory environments in producing a broad class of problem behaviors which defined interaction difficulties across M-C pairs. The effects of four environments, free-time (X), child's game and rules (B), mother's game and rules (C), and clean-up (Z), on the frequency of eight criteria behaviors were tested on 12 M-C pairs over three days of baseline data collection. It was predicted that the frequency of problem behaviors would increase as a function of environments (B), (C), and (Z), and decrease as a function of environment (X). In general, the data analyses confirmed the prediction. Specifically, it was concluded that the frequency of Interaction, Follows in C's Play, and Asks Questions increased as a function of environment (B) and decreased as a function of environments (X), (C), and (Z) since the Newman-Keuls test showed statistical difference at the .01 level of significance. The frequency of Gives Up Control, Commands, and Complies increased as a function of environments (C) and (Z) and decreased as a function of environments (X) and (B) since the Newman-Keuls test showed statistical difference at the .01 level of significance. The frequency of Independent Play increased as a function of environment (X) and decreased as a function of environments (B), (C), and (Z). There was no statistical dif-

ference in the frequency of Rewards as a function of environments (B), (C), and (Z). These results indicate that all behaviors excluding Independent Play and Rewards decreased as a function of environment (X) and increased in the other environments in the functional way noted. It was also noted that the frequency of Rewards was very low since they occurred on the average of less than once every two minutes. The low frequency of this behavior is generally expected in baseline data of M-C interaction difficulties. It was interesting to observe that the low frequency of Rewards was consistent in all environments. This was also expected since the lack of rewarding behavior appeared to be predictive of interaction difficulties. Also noted was the fact that Independent Play, the frequency of which increased as a function of environment (X), is by definition mutually exclusive of Interaction. It was concluded that environments (B), (C), and (Z) functioned to increase the probability and frequency of occurrence of a broad class of problem behaviors whereas environment (X) did not.

In general, it was concluded that the use of environmental control was effective in increasing the frequency of problem behaviors and that this methodology is effective in the expedition of the behavior modification process since it provides the environmental stimuli that produces the problem behaviors of focus for modification techniques.

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APPENDIX A

HISTORICAL REVIEW

Throughout the history of thought, metaphysics had meant an attempt to discover the ultimate nature of reality. With the introduction of Kantian philosophy in Immanuel Kant's Critique of Pure Reason (1781), a book which made its author the leading philosopher of the day, men learned on most respectable authority that "reality could never be experienced; that it was a 'noumenon' conceivable but not knowable; and that even the subtlest human intelligence could never pass beyond phenomena, could never pierce the veil of Maya." (Durant 1933) Kantian philosophy was a devastating explosion in the traditional modes of speculation and a crippling blast to all metaphysics. By the eighteen thirties, after a generation of metaphysical exuberance expressed by such philosophers as Fichte, Hegel, and Shelling, with their various readings of the ancient riddle, their "Ego", "Idea", and "Will", the mind of Europe recovered from "absolute intoxication" and vomited metaphysics. (Durant 1933)

In France, Auguste Comte began the positivist movement publishing five volumes of Positive Philosophy between 1830 and 1842, and four volumes of Positive Polity between 1851 and 1854. For Comte, philosophy was the coordination of all the

sciences with a social view to improvement of human life. Comte's positivism meant "not speculative nor inferential, but the immediately observeable, the immutable basis of fact which compels agreement because it is given prior to inference based upon it." (Boring 1950) Comte refuted introspection as valid observation, pointing out that "in order to observe your intellect you must pause from activity, and yet, it is this activity you want to observe." (Boring 1950) The positivist movement caught on in England with such well known philosophers as John Stuart Mill, Frederick Harrison, G. H. Lewes, and Henry Maudsley. Ernst Mach (1838-1916), also a positivist, disagreed with Comte and upheld introspection, claiming that sensations or immediate experience provides all the basic data for science. Mach's positivism was the "reduction of all the phenomena of physics and psychology to the immediate data of their observations, to sensations." (Boring 1950)

In 1927, another form of positivism arrived via the Vienna circle, a group of philosophers among whom were Schlick, Carnap, Frank, and Feigl. The purpose of this group was the replacement of philosophy by a systematic investigation of the logic of science. Feigl later named this movement "logical positivism" because it reduced all scientific languages to the communal language of physics, and which in psychology, became "behavioristics" because the psychological operations are all observations of behavior. (Boring 1950) At the same time the Vienna circle formed, P. W. Bridgman, a Harvard phy-

sicist, wrote The Logic of Modern Physics (1927), a book which attempted to forego the possibility of any major revolution in the attitude of scientists toward nature (such as that generated by Einstein's theories of relativity) by exploiting thoroughly the character of our permanent relations to nature. He tried to clarify physical thinking by stating that concepts in science were to be defined in terms of the operations by which they were observed. "In general," he wrote, "We mean by any concept nothing more than a set of operations; the concept is synonymous with the corresponding set of operations." (Bridgman 1927)

In 1930, Herbert Feigl, a member of the Vienna circle, came to Harvard on a fellowship to work in the philosophy of science. He was knowledgeable of Bridgman's book and quite involved with positivism. Through Feigl, Harvard psychologists became acquainted with the work of Bridgman, The Vienna circle, and operational procedures in general. B. F. Skinner, then working on his Ph.D. in psychology, got to know the Logic of Modern Physics and read Poincare and Mach. In 1930, he wrote a thesis on the concept of the reflex adopting the semihistorical method from Mach's Science of Mechanics. (Skinner 1952)

BEHAVIORISM

It is important to see what events led to the development of Behaviorism in psychology. It can be seen that the

evolution of positivism in physics and philosophy played a leading role in the development of Zeitgeist, and eventually operationism in psychology, but only indirectly. Operationism in psychology finds its origin in animal psychology. In Darwin's theory of evolution, the minds of men and animals were placed on a continuum, and animal psychology began in England with the publication of "Exoression of Emotions in Man and Animals". (Darwin 1872) Romanes, who followed Darwin coining the term comparative psychology, exhibited instances of animal intelligence and purposive action or "consciousness." Lloyd Morgan squelched the anthropomorphic tendency of Romanes' interpretation of animal mind by an appeal to the law of parsimony. "In no case may we interpret an action as the outcome of the exercise of a high psychical faculty if it can be interpreted as the outcome of an exercise that stands lower on the psychological scale." (Boring 1952) Jacques Loeb supported Lloyd Morgan, stating his faith in the physico-chemical methods for scientific study of physiology and behavior by advancing the theory of the tropism (1890). He held that associative memory was the only criterion for consciousness and only the lower animals were therefore "automata" in the Cartesian sense. Herbert Spencer Jennings took Loeb to the simplest organisms and established modification of responses in protozoa. Functional psychology at that time (1900) thought of consciousness as an "organ of man's adaptation and modifiable behavior made possible by many varieties of adaptive re-

sponses." (Boring 1950) Jennings then came to be known as the man who exhibited consciousness in protozoa.

Functional psychology, referred to as the Chicago School, was America's first organized stand against the structural school of Wundt and Titchener. It must be noted that Titchener and Kulpe were adherents to Machian Positivism, and to them Mach had established the validity of introspection as a scientific method. American functionalism had taken its cue from Darwin and regarded mental processes as useful to the organism adapting to its environment. (Heidbreder, 1933) The functionalists were concerned with the pragmatics of consciousness and opposed the subject matter of psychology set by Wundt and Titchener as being the description of "experience dependent on an experiencing person." (Heidbreder 1933)

Behaviorism was the second phase of departure from the structural approach, but in a sense, it was an extrapolation of the Zeitgeist in America. In 1913, John B. Watson founded Behaviorism with a paper entitled, Psychology as a Behaviorist Views It. Watson had taken his Ph.D. at Chicago in the era of functionalism. He could not tolerate the requirement of the Chicago School to translate positively observed behavior into the vague terms of consciousness. Watson found it more directly interesting and positive to study behavior for its own sake. He adopted Lloyd Morgan's canon of parsimony and amputated consciousness from psychology much in the same way that positivism had exiled metaphysics from philosophy. Watson was the

agent of a reaction between consciousness through introspection and objectivity in psychology, the result of which was observation of operations in behavior:

Any experimenter who knows fully what went on in his introspective experiment, can transform the data of behavior, a practice that has been called operational reduction, since it substitutes for the purported object of observation the observational operations themselves. Could that piece of logic come into knowledge a century earlier, it would have saved a great deal of unnecessary talk. (Boring 1950)

Through Watson, Behaviorism became a psychology of stimulus and response as he proceeded to translate mentalistic concepts like imagery, feeling, and association into such behavioral terms as vocimotor behavior, glandular activity, and Pavlovian conditioned reflexes, respectively. Those who followed Watson in the development of behavior principles were Holt, Tolman, Lashley, Weiss, Skinner, and Hull.

B. F. Skinner

As an undergraduate at Hamilton College, Skinner majored in English and took a lot of biology. His biology professor introduced him to Jacques Loeb's Physiology of the Brain and Comparative Psychology and later to Pavlov's Conditioned Reflexes. Two years after he graduated, Skinner was pursuing a literary career at Greenwich Village where he became acquainted with Bertrand Russell's articles in the Dial magazine on the epistemology of John B. Watson's Behaviorism. Here Skinner made contact with positivism, as Russell was extrapolating the principles of an objective formulation of be-

havior to the problem of knowledge. Skinner was interested in human behavior but the literary method had failed him so he turned to science and entered graduate studies in psychology at Harvard. He soon came into contact with W. J. Crozier who had studied under Jacques Loeb and was then professor of physiology at Harvard. As far as Skinner was concerned, the fact that Crozier and Loeb talked about animal behavior without mentioning the nervous system "cancelled out the physiological theorizing of Pavlov and Sherrington and thus clarified what remained of these two men as the beginnings of an independent science of behavior." (Skinner 1956) As has been mentioned, Skinner became familiar with P. W. Bridgman's Logic of Modern Physics and read Poincare and Mach. In 1931, he received his Ph.D. following which Crozier gave him a two year fellowship at the subterranean laboratory. He worked in the laboratory for five years, the last three as a Junior Fellow in the Harvard Society of Fellows. In his search for order in behavior, Russell and Watson had provided him no glimpse of experimental method but Pavlov had: "control the environment and you will see order in behavior." (Skinner 1952) Thus began Skinner's work on "operant behavior", a term he first used in the Behavior of Organisms (1938).

Skinner went directly to observation of operations in behavior for his data in formulating a system of behavior. He considered research without commitment to theories as possibly more conducive to study in new areas and new orders of

magnitude, and stated that theories which move from the observation of operations in behavior are misleading and imply another dimensional system not contained in the observed behavior. (Skinner 1950) For his terminology, he rejected much of popular vocabulary on the sole criterion that popular terms carry the implication of a system or a formulation which goes beyond immediate observations. By behavior, he simply meant "the movement of an organism or of its parts in a frame of reference provided by the organism itself or by various external objects or fields of force ... the functioning of an organism which is acting on or having commerce with the outside world." (Skinner 1938) In studying behavior, he made a strong point of observing only the correlation between stimulus and response (reflex). The advantage of this approach was seen as obtaining a system of behavior which has a structure determined by the subject matter itself. Skinner describes two types of behavior, "respondent" and "operant". Much work had been done on respondent behavior since Pavlov's time and it came to be assumed by many writers that all behavior would be accounted for by properly identifying the appropriate antecedent eliciting stimuli. But Skinner objected to this assumption saying that there is a large amount of behavior that does not seem to be 'elicited', since one can observe no correlation between antecedent events and corresponding responses. To force all behavior into the stimulus response formula has delayed the treatment of this 'other' beha-

vior. Addressing himself to this other (operant) behavior, Skinner said that events in behavior can occur without any observable antecedent events (unconditioned stimuli) and thus the behavior is emitted spontaneously rather than elicited. This type of spontaneous behavior he called operant, which refers to a subsequent event, a consequence.

In describing what he meant by operant behavior, Skinner established two laws: 1) The Law of Conditioning of type R: If the occurrence of an operant is followed by presentation of a reinforcing stimulus, the strength (frequency) of the operant is increased; 2) The Law of Extinction of type R: If the occurrence of an operant already strengthened through conditioning is not followed by the reinforcing stimulus, the strength (frequency) is decreased. (Skinner, 1938) The interaction between an organism and the environment describes operant behavior or behavior that is affected by its environmental consequences.

APPENDIX B

Recurrent Situations in Which Mothers' Management of Their Children Reportedly Breaks Down and the Laboratory Analogs that Reflect Each Situation (M=Mother, C=Child, O=Other, S=Specialist)
(Reproduced with permission, Hanf, 1969)

Expected Problem Situations Reported by Mothers	Standard Situation	Code
1. I can't read a book, watch TV or sew but what he interferes, wants my attention, or hangs on me.	M occupied, C to play alone	A
2. I can't get through to him; he won't mind me. He never does what I ask.	M & C play together a) C's game rules b) M's game rules Clean-up	B C Z
3. a) When we are both together, he won't let anyone else come near us. When they do, he screams. b) She always hangs on me when someone comes - she even rips my clothes, she hangs on so tightly	O enters room, or O approaches C while M is occupied in room	D
4. a) I can't talk with a neighbor over a cup of coffee. b) We never have company anymore, he's such a nuisance. c) He nags and persists so much whenever someone else is around.	M & O visit, C is to play alone	F
5. a) I'm going to put him into a day nursery for a few days so I can paint a room in the house; he gets into things when I don't watch him. b) I can't let him go out of my sight; he runs away, he destroys things.	M leaves C alone	G

APPENDIX B

Expected Problem Situations Reported by Mothers	Standard Situation	Code
6. He wouldn't let the doctor look into his eyes (mouth, etc.) and it is necessary that we know whether he's not seeing, is retarded or whether he just won't mind.	S examines C - M in room, or M leaves	S
7. a) If someone just rings the doorbell she cries and cries. b) He won't let me leave him even for a minute, even to get a cup of coffee, so, I carry him with me.	M increases physical distance from C while in room M moves C from lap to floor.	P

APPENDIX C

Codes, Description, and Instructions to M for construction of standard laboratory environments and free-time environment X.

Code	Description	Instructions
B	<u>M</u> and <u>C</u> play <u>C</u> 's game and rules	You play in whatever game or activity _____ chooses. It is his choice of games and his rules.
C	<u>M</u> and <u>C</u> play <u>M</u> 's game and rules	Get _____ to play in a game you choose and keep him at this. You can change games but keep him at this. Don't choose games he likes especially.
Z	Clean up	Get _____ to put toys wherever you want them (we don't care). The idea is to get him to do things you ask him to do.
X	Free-time	After <u>M</u> had a chance to read the list of instructions presented by the secretary, she would be greeted by <u>E</u> , who would introduce himself as a member of the team that would be working with her. He would then say, "If you will come with me to the playroom we will be able to get started shortly...(on the way to the playroom)...We prefer to have you stay down here while we are getting set up with the equipment...(at the playroom door)...It will take us a few minutes and when we are ready we will let you know via the

APPENDIX C

<u>Code</u>	<u>Description</u>	<u>Instructions</u>
X	Free-time	wireless communication system. <u>E</u> then gives her the <u>Bug-in-the-Ear</u> device and closes the door. All <u>M-C</u> criteria behaviors are recorded for five minutes before the instructions for the next standard laboratory are announced.

APPENDIX D

Eight Criteria Behaviors and Their Operational Definitions Observed and Recorded in all Laboratory Environments for all M-C pairs.

BEHAVIORS OF MOTHERS	DEFINITIONS
1. Rewards	<p>A) <u>Physical Rewards</u>: Any positive physical contact administered after a particular behavior has occurred. Examples: pats, kisses, hugs, roughs up hair, lifts up in air, takes <u>C</u>'s face in hands</p> <p>B) <u>Unlabeled Rewards</u>: Nonspecific comments or gestures of liking and approving <u>C</u>'s behavior. Examples: "Atta boy," "That's my big boy," "Mommy likes that," "Oh my!" "Wow!" Clapping hands, smiling (when <u>C</u> looks at <u>M</u>) in response to <u>C</u>'s behavior.</p> <p>C) <u>Labeled Rewards</u>: <u>M</u>'s verbal or physical specification of the exact desirable act or event just performed by <u>C</u>. Examples: "What a good boy for picking up those blocks." "You sure help momma draw pictures nice." "I like it when you do ..." Gestures, plus pointing directly to what <u>C</u> did that was liked.</p>
2. Commands	<p>A) <u>Direct Commands</u>: Any specific order, demand, or direction during play or activity that is not in question form. Examples: "Let momma see this!" "Roll it to momma." "No! Do not do ..." "Stop that!" Gestures in the form of a command, i.e., points and glowers (<u>C</u> must be able to see this).</p>

APPENDIX D

BEHAVIORS OF MOTHERS	DEFINITIONS
2. Commands - continued	B) <u>Indirect Commands</u> : Any suggestion which cues <u>C</u> to do something or stop doing something in question and/or conditional form. Examples: "Why don't we erase this?" "Maybe we could pick these up." "Wouldn't it be nice if we left the room neat?" "How about stopping that?" "Suppose we do that later."
3. Follows in <u>C</u> 's play	<u>M</u> attends to <u>C</u> during his play or activity. Examples: <u>M</u> describes or imitates what <u>C</u> is doing; <u>M</u> watches what <u>C</u> is doing and emits verbal or physical cues that she is observing with apparent interest; <u>M</u> introduces nothing new which would cue <u>C</u> to change his activity.
4. Gives up Control	<u>M</u> changes activity or does nothing in response to <u>C</u> 's noncompliance to her command or suggestion. Examples: <u>M</u> complies to her own command intended for <u>C</u> . <u>M</u> does what <u>C</u> suggests as an alternative. <u>M</u> pleads or begs <u>C</u> after his noncompliance. <u>M</u> states, "Okay, if you don't want to, you don't have to." <u>M</u> does something else after command and does not attend to <u>C</u> 's noncompliance.
5. Asks Questions	Any interrogation or suggestion in question form. Examples: "Where did you put it?" "Can't you do it?" "What is this?" "Why did you do that?"

APPENDIX D

BEHAVIORS OF CHILDREN	DEFINITIONS
6. Interaction	<u>C</u> initiates and plays continuously with <u>M</u> , i.e., verbal and/or physical cooperation in task or play. Examples: physical participation and/or verbalization related to common activity. <u>C</u> attends to <u>M</u> and invites her to participate in his game.
7. Independent Play	<u>C</u> occupies himself in play or activity. <u>C</u> does not respond to <u>M</u> or others who may comment, describe, command, warn, etc.
8. Complies	<u>C</u> 's behavior in response to commands or suggestions in task or play. <u>C</u> carries out direction of command or suggestions.