

THE DEVELOPMENT OF A RESEARCH INSTRUMENT FOR THE
MEASUREMENT OF A PRESCHOOL CHILD'S FREEDOM
TO EXPRESS HIMSELF IN EXPLORING AND
MANIPULATING HIS ENVIRONMENT

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By

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To

Lady Plushbottom

When I was three years old, she told me that dandelions were gorgeous.

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CHAPTER I

INTRODUCTION

Purpose

The purpose of this research is to develop an instrument for the measurement of a child's freedom to express himself in exploring and manipulating his environment. This freedom has been postulated as one essential characteristic of creative ability.

Definition of Creativity

Carl Rogers (20) has defined the creative process as "the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his life on the other"; and he has defined the motivation for creativity as "man's tendency to actualize himself, to become his potentialities". (20, pp. 71-72).

Here it is implied that the individual will become or achieve his potentialities by using his own means rather than those forced upon him. To do this, he must be relatively free from inhibition, free to view accepted routines from new approaches, free to make novel combinations of ideas and objects, and free to express his curiosity and imagination in exploring and manipulating his environment. His need for approval, succorance, and affiliation must be secondary to his willing-

ness to be different, to accept a challenge or take a risk.

Problem

There is currently a widespread interest in the development of creative ability. This interest is being expressed by people from many disciplines and professions. American educators and psychologists have been disturbed by the indication that the nation's children seem to become less creative as they grow older. Maslow (14) has stated that the older our children grow, the less they retain their fresh, free, and spontaneous approach to life. These statements raise the question of whether or not everyone has some creative potential. Maslow (14), Rogers (20), and Fromm (8) refer to the child-like response to life in the creative experience and suggest that all young children have a creative potential. Thus, the problem becomes one of discovering how this potential can be encouraged to full fruition.

Basically, the problem is one of identifying the factors comprising creativity in order that potentially creative individuals be recognized.

For the purpose of the present research and in line with the definition of creativity, a child's freedom to express himself in exploring and manipulating his environment is accepted as one essential characteristic of creativity.

Procedure

It should be recalled that the purpose of this study was to develop

an instrument for the measurement of a child's freedom to express himself in exploring and manipulating his environment.

Two important phases of general procedure ^{will} ~~are~~ involved in this research: (a) the development of an instrument for the measurement of freedom to express, and (b) the determination of the reliability of the instrument.

The first phase of this research, the development of the instrument for the measurement of freedom to express, involves (a) a survey of the literature for an understanding of psychological freedom and its relationship to creative ability, (b) a series of trial observations of nursery school children for the purpose of determining the necessary criteria, procedure, and scoring for the instrument, and (c) the actual use of the instrument with a group of nursery school children.

The second phase of this research concerns the establishment of the reliability of the instrument for the measurement of freedom to express. (a) The reliability of the instrument itself ^{will} ~~will be~~ studied by using the split-half method of correlation. (b) The reliability of the scoring method ~~will be~~ determined by comparing the scoring of several judges and one research worker. (c) In order to determine whether the instrument ^{was} ~~is~~ actually measuring a nonintellectual variable, the relationship of the children's scores on the instrument to their scores on an intelligence test ~~will be~~ studied.

CHAPTER II

REVIEW OF LITERATURE

Theory and research have contributed to the list of personality characteristics considered necessary for the expression of creative ability. On the one hand, theoretical discussions have included definitions of creative ability, descriptions of relevant personality characteristics, and considerations of conditions which foster the development and expression of creative ability. On the other hand, considerable research has been focused on the study of the personality characteristics which so-called creative adults have in common. Despite a variety of approaches to the problem, certain personality characteristics have received consideration repeatedly.

Psychological Freedom

One personality characteristic which appears to be essential for the expression of creative ability is the psychological freedom of the individual. The supposition here is that unless a person is free to express himself in exploring the objects and ideas in his environment, he cannot demonstrate creative ability. This freedom is implied or specifically mentioned in much of the theoretical and research literature. Guilford (10) implied freedom to express in his discussion of the traits of creativity, among which he included fluency and flexibility, freedom from inertia and perseveration, and sensitivity to problems.

Barron (4) studied independence of judgment and in relation to this discussed the objective freedom of the individual.

Carl Rogers (20) referred to freedom to express in his discussion of an individual's openness to experience and internal locus of evaluation. Rogers used the term openness to experience as the opposite of defensiveness, in which the individual either blocks out or distorts stimuli that conflict with his self organization. An internal locus of evaluation means that an individual's evaluation of himself and his environment is based on what he believes to be true and feels to be right, rather than being based on external standards and evaluations.

In a similar way Anderson (1) referred to the psychological freedom of the individual in his discussion of an "open system" of human relating versus a "closed system". The individual with an open system is in harmony with his environment, is task oriented, and is relatively unconcerned about personal status and security; he confronts life rather than being in conflict with it. On the other hand, the individual with a closed system feels personally threatened and is concerned about his personal security, protection, and defense; as a consequence of this, his perceptions become more restricted and even distorted. The individual with an open system has psychological freedom while the one with a closed system lacks this freedom.

Psychological freedom means freedom to be one's self, freedom of the individual to respond truthfully with his whole person as he perceives and understands the truth. It means freedom to perceive without distortions and prejudices, and freedom to respond without the

coercion of external forces. Freedom to perceive implies the ability to look at old concepts and problems from a new perspective and to see new relationships; and freedom to respond implies the ability to make decisions and judgments based on what is personally known and believed to be true, rather than attempting to conform to external standards and evaluations.

Barron (4) defined objective freedom in his study of disposition toward originality. He stated:

. . . The objective freedom of an organism . . . is defined as the range of possible adaptive responses available in all situations. As the response repertoire of any given organism increases, the number of statistically infrequent responses, considered relative to the population of like organisms, will also increase. Thus the ability to respond in an unusual or original manner will be greatest when freedom is greatest . . . The disposition toward originality may thus be seen as a highly organized mode of responding to experience including other persons, society, and one's self. (4, pp. 484).

Psychological freedom, the freedom to perceive and respond to one's environment, implies self-confidence, spontaneity, inventiveness, curiosity, flexibility, and a tolerance for ambiguity and disorder.

Conformity and Rigidity

The lack of freedom to perceive and respond has been implied in theoretical and research discussions of various other personality characteristics. The discussion here will be focused on conformity and rigidity, characteristics which imply a lack of freedom to respond and therefore are assumed to interfere with the expression of creative ability.

Persons who are highly motivated to secure social approval conform more frequently than those with high self approval motivation. (15).

For persons with compulsive conformity or nonconformity needs the acts of conforming or not conforming function as defense mechanisms. (1). Such persons are not free to perceive and respond to stimuli; their energy is diverted to the use of defense mechanisms to protect the self-structure from outside attack. Extreme conformists, as compared with highly independent persons, show that they lack freedom to be themselves and that they need to be "safe" and to do the right thing. They are accepting of authority, anxious, inhibited, and intolerant of ambiguity.

Conformity implies rigidity. The rigid individual is not psychologically free to take a chance or depart from a set pattern. Therefore rigidity interferes with problem solving when restructuring is necessary. This rigidity implies defensiveness, a lack of openness to experience which prevents the individual from exploring and toying spontaneously with ideas.

Studies of Personality Characteristics
Related to Creative Ability

A variety of approaches have been employed in identifying and studying creative individuals, and most of the research has been focused on adults.

Myden (17) selected creative and noncreative subjects on the basis of their occupations and studied the personality characteristics of both groups by using certain personality and projective tests. Persons who were successful in professions requiring creative behavior, e.g., painting, writing, and choreography, were compared with those who were successful in industry and other professions. The

so-called creative group differed from the noncreative group in that they had fewer signs of repression and anxiety. The creative group also showed more evidence of functioning close to their potential and of having an internal locus of evaluation. Translating these findings into the terms of the present study, one can hypothesize that greater psychological freedom may be associated with creativity.

Barron (4) also identified personality characteristics associated with creativity; however, he used a different approach from that of Myden. Barron selected his creative and noncreative groups in terms of uncommonness of response to eight tests; and then in an experimental situation he studied the characteristics which are supposed to be related to creativity. He found originality to be related to independence of judgment and to the rejection of suppression as a way of achieving unity. Translating these findings into the terms of the present study, one can hypothesize that the more free an individual is the more likely he is to be creative or original.

Among the studies that have been done with children of school age, there are a number that have been focused on characteristics now considered to be related to creativity. Among these are the level of aspiration studies which are essentially concerned with a child's willingness to take a risk, and there are the independence of judgment studies which are concerned with nonconformity or the individual's willingness to be different. Both of these characteristics, willingness to take a risk and willingness to be different, are considered essential for the expression of creative ability. (22, 23).

While the majority of the research studies concerning creativity have used adults or school age children as subjects, a few studies of young children have been focused on characteristics that are now

assumed to be related to creative ability. Of particular relevance for the present research are the studies of Northway and McCallum (19), and Dryer and Haupt (7).

Northway and McCallum (19) studied the relationship between creativity and sociometric status in preschool age children and found that the more creative children were those with the higher sociometric status. In their research the measure of creativity was actually a measure of nonconformity. A simple form board task was devised in which the child was free to follow a model or to use his own ingenuity. Those who chose to follow a model were termed copiers, and were considered to be noncreative. Those who used their own ingenuity were termed noncopiers and were considered to be creative. The importance of this study lies in the fact that a task for the measurement of conformity was devised and a positive relationship was found between this characteristic and sociometric status, both of which are assumed to be related to creative ability.

Dryer and Haupt (7) measured children's willingness to take a risk by using a level of aspiration task developed by Sears and Levin (23). They found that a child's evaluation of the risk involved in a task and his willingness to take that risk were affected by previous experiences in which he had received rewards for attempting more difficult tasks. Translating these findings into the terms of the present study, one can hypothesize that the children with low levels of aspiration did not have psychological freedom. Their self-confidence was poor and refusal to take a risk was one means of protecting the self.

Intelligence

Another point to be considered here is the relationship of intelligence to creativity. Creative ability has been defined as a nonintellectual variable. (26) Getzels and Jackson (9) in studying career aspirations of adolescents were able to discriminate between the highly intelligent and the highly creative subjects, the latter group showing greater freedom, imagination, and humor. Another study which lends support to the definition of creativity as a nonintellectual variable is that of Northway and McCallum (19). In their study of coping behavior in preschool children, they found no clear relationship between conforming behavior and intelligence.

Summary

The present research is an attempt to develop an instrument for the measurement of a child's freedom to express himself in exploring and manipulating his environment. If such an instrument can be developed, it should be helpful in studying other characteristics related to creativity. In the theoretical literature freedom of the individual to respond truthfully with his whole person as he perceives and understands the truth is discussed as necessary for the expression of creative ability. This writer has found no published research focused specifically on this characteristic. However, the lack of freedom to perceive and respond has been implied in discussions of conformity and rigidity; these characteristics are assumed to interfere with the expression of creative ability

Results of research studies support the suggestions in the theo-

retical literature that certain other personality characteristics are related to creativity. The bulk of the research studies on creativity are studies of adults. The findings of these studies show that creative individuals differ from the noncreative in the following ways:

(a) they have fewer signs of repression and anxiety; (b) they function closer to their potential; (c) they show greater independence of judgment; and (d) they reject suppression as a means of achieving unity.

Translating these findings into the terms of the present research, one can hypothesize that the more free an individual is the more likely he is to be creative or original.

A few studies of young children have been focused on characteristics that are now assumed to be related to creativity. The specific studies of conformity and willingness to take a risk are of particular importance here. In order to have psychological freedom which is a necessary characteristic one must be able to be a nonconformist and must be willing to take a risk. Creative children seem free to use their own ingenuity and thus are nonconformists. (21). A child's willingness to take a risk seems to be affected by previous experiences in which he has received rewards for attempting more difficult tasks. (8).

The literature indicates the following points which must be kept in mind in the development of an instrument to measure a child's freedom to express himself in exploring and manipulating his environment. In order that a child feel free, he should find himself in an atmosphere in which he is not being evaluated or measured. This suggests that he be alone; however, in order that this aloneness not threaten him or make him feel insecure, an opportunity to become

familiar with both the research laboratory and the experimenter should precede the use of the instrument. Since creativity has been defined as a nonintellectual variable, a task measuring freedom to express must not be dependent on intellectual ability or acquired skills.

If an instrument can be developed to measure a child's freedom to express himself in exploring and manipulating his environment, it should have real value in research studies of the many characteristics which are purported to be related to creativity.

CHAPTER III

DEVELOPMENT OF THE INSTRUMENT

This chapter will include a description of the subjects and the intelligence test, a detailed discussion of the development of the research instrument, a description of the final research instrument, and recommendations for data analysis.

Subjects

The subjects used in this research were children attending one nursery school group at Oklahoma State University. All American born white children in this group, who were four years old at the time the research was initiated, were used as subjects. This was done in an attempt to eliminate the possible influence of cultural differences and age differences. Specifically, the subjects used in the study of the final research instrument were four boys and eight girls ranging in age from four years eight months to five years five months. All subjects who were used in the study of the final research instrument had one experience in the research laboratory during the trial observations; this gave each child some familiarity with the laboratory and with the experimenter.

The Intelligence Test

In the literature creativity is defined as a nonintellectual variable. If this is a valid assumption, it follows that a child's freedom to express himself should not be dependent on his intellectual ability. Therefore, in the present research the relationship between the child's intellectual ability and his performance on the research instrument must be considered. In order that this relationship be studied each child was given an intelligence test, specifically the 1960 Revised Stanford-Binet Intelligence Scale. For intelligence test scores of individual children see Appendix A, Table VII.

Development of the Research Instrument

The purpose of this research was to develop an instrument for the measurement of a child's freedom to express himself in exploring and manipulating his environment. The first step toward accomplishing this goal was a series of trial observations during which the necessary refinements of the criteria, procedure, and scoring for the instrument could be determined.

Criteria for the Tasks

The development of this research instrument was approached with certain assumptions about the necessary criteria. (a) The presence of another person may influence an individual's freedom to express. Therefore, the children should be observed in a situation in which social influences are at a minimum. (b) The situation itself may influence an individual's freedom to express. For example, a barrier

would suggest a restriction of movement; and a child's response to this restriction could be an indication of the freedom he experienced in the situation. Also, a familiar toy might limit the child to the type of play in which he had previously used that toy. Therefore, the factors in the situation which could influence a child's freedom should be determined and then utilized as necessary in the development of the research instrument. (c) A simple toy suggests fewer responses than does a more complex toy, and play with a simple toy is less dependent on intelligence than play with a more complex toy. Therefore, simple toys should be used in the research instrument. (d) The combination of two toys in play could be a simple measure of a child's freedom, particularly if the toys were separated by a psychological barrier. Therefore, the toys used in the research instrument should be toys which could be combined or played with individually.

Throughout all of these trial observations the experimenter tried different types of toys and varied other aspects of the situation as the child's behavior suggested needed revisions. Among the toys with which the child played were stereof foam balls, a pan of water, wax pellets, toothpicks, blocks of different shapes and sizes, a dump truck, a train set, dolls, pipecleaners, and a simple Playskool toy. Various combinations of these toys were presented to the children.

Procedure

The experimenter took the child into the research laboratory, showed him the toys, and told him that he could do whatever he wanted to with the toys. At this point the experimenter excused herself from the room, ostensibly to get other toys; she entered the observation

booth and observed the child through a one-way vision mirror. The experimenter made a written record of the child's behavior while he played by himself in the research laboratory. When the child showed signs of being through playing with the toys, the experimenter returned to the research laboratory, removed the toys that were there, gave the child a different set of toys, and again excused herself from the room. This procedure was repeated and in this way the child played with a series of different toys.

In order to determine whether or not the child was free to combine the toys in play, each toy was placed on a separate table in the research laboratory. However, upon entering the room each child sat at the first table and did not move from there to play with the other toy. It was as though the toys were perceptually isolated. This suggested the use of one table with a toy and a chair at each end. A strip of black masking tape was placed across the center of the table as a sort of visual barrier which might suggest the toys were not to be played with together. From this point on some children combined the toys and others did not.

Scoring

Originally it was planned that each child be scored on whether or not he combined the two toys. However, the variety of ways in which the children played with the toys suggested a possible change in scoring. Several distinct ways of playing with the toys were apparent. The children examined some of the toys by tasting and feeling of them; they played active games with the toys; and they constructed a variety of objects. All of this was in addition to the child's combining or

or not combining the toys as he played. This suggested a more detailed method of scoring.

The categories which might be used in judging the children's behavior were defined as follows: (a) sensory experience and manipulation, i.e., learning about the toys by tasting, feeling, listening, etc.; (b) action, i.e., playing an active game with one or both toys; (c) construction, i.e., building something with one or both toys; and (d) combination, i.e., using the toys together in play.

For presentation to the judges the play of each child with each set of toys was described in detail on a separate sheet of paper and space was provided for scoring. The description of the child's play was written in paragraphs which described separate units of behavior. Scoring was done as follows: (a) one point for each different type of sensory experience, (b) one point for each different action or game, (c) one point for each different construction, and (d) one point for combining the toys in play at any time. If the same behavior occurred in more than one paragraph, credit was given for this behavior only once. The score for combination of toys was determined by considering the description of the total behavior with that set of toys*.

Using these directions for scoring the children's behavior, two judges (the experimenter and another research worker) scored the

*This scoring method can be illustrated by the following example: Child T, playing with the dump truck and blocks, first stacked the blocks in three piles; for this she received one point for construction. She then put all the blocks into the truck; for this she received one point for active play. She then rolled the truck on the table; for this she then received one point for another type of active play. In her play with these toys, she used the truck and blocks together; therefore she received one additional point for combination of toys. Her total score for this was four.

behavior of five children on four sets of toys (Table I). These raw scores for each task were then transformed into rank scores (Table II).

TABLE I
RAW SCORES OF INDIVIDUAL CHILDREN ON FOUR TRIAL TASKS
DESIGNED TO MEASURE FREEDOM TO EXPRESS

Task	Raw Scores of Individual Children				
	V	W	X	Y	Z
Stereofoam balls and a pan of water	3	5	3	2	2
Stereofoam balls and pipe cleaners	1	2	2	2	1
Dump truck and blocks	1	3	1	3	2
Three peg Playskool toy	4	5	1	2	3
Total	9	15	7	9	8

The totals of the rank scores, taken at face value, show that Child W was the most free in his play and that Child Z was the least free. In the judgment of the research workers this was an accurate evaluation of these children. Therefore this method of scoring seemed worthy of further study.

The next step was to determine whether persons trained to use this method of scoring could show reliable agreement. Four judges were selected, each of whom had graduate training in child development. These judges scored the children's behavior as it had been recorded during the trial observations, 26 in all. Each judge was given written directions for scoring and written descriptions of the children's behavior with the toys.

TABLE II
RANK SCORES OF INDIVIDUAL CHILDREN ON FOUR TRIAL TASKS
DESIGNED TO MEASURE FREEDOM TO EXPRESS

Task	Rank Scores of Individual Children				
	V	W	X	Y	Z
Stereofoam balls and a pan of water	3.5	5.0	3.5	1.5	1.5
Stereofoam balls and pipe cleaners	1.5	4.0	4.0	4.0	1.5
Dump truck and blocks	1.5	4.5	1.5	4.5	3.0
Three peg Playskool toy	4.0	5.0	1.0	2.0	3.0
Total	10.5	18.5	10.5	12.0	9.0

A comparison of the raw scores assigned by these judges to the 26 observations, showed acceptable agreement (Table III). In 85 per cent of the observations (22 of the 26) the judges' scores were identical or differed by only one point. For the remaining four observations, the raw score differences were only two points.

TABLE III
AGREEMENT AMONG FOUR JUDGES ON THE SCORES OF 26
TRIAL OBSERVATIONS OF CHILDREN IN
THE EXPERIMENTAL SITUATION

	Point Difference in Raw Score		
	0	1	2
Number of observations	12	10	4
Per cent of observations	46	38	15

Recommendations for Revisions

Following the trial observations, it was possible to make certain decisions concerning the tasks.

Simplicity of toys.- The toys which had been assumed to be simple were not sufficiently simple. For example, the blocks of various shapes and sizes presented so many possible opportunities for play that none of the children combined them with another toy. Therefore, insofar as possible, variables such as size, shape, and color should be controlled in the selection of toys.

Time limit for each task.- Originally, a question had been raised as to whether a time limit should be set for a child's play with each task. Once the toys were simplified so that the variety of ways of playing with them was decreased, this was no longer a problem. Every child showed clearly by his behavior when he was through playing. Some went to the window and stood looking out; some hid under a counter in the laboratory; some went to the door and waited; some stopped playing, sat at the table, and did nothing; some repeated in a mechanical way what they had already done and looked about the room as they did so. Therefore, no time limit was set for each task; rather the child was permitted to play as long as he remained interested in the toys.

Tape recording.- During the trial observations, a description of the child's play was written in long hand. This was laborious, and it was next to impossible to record everything the child did. Therefore, it was decided that more accurate and more detailed records could be made by using a tape recorder.

Edited record.- In the initial evaluation of the scoring method,

descriptions of the children's behavior with the toys were presented to four judges. These descriptions were written in paragraphs, presumably indicating single units of play. It is possible that these paragraphs may have forced the judges to score units which might otherwise not have been scored. For this reason it was decided that the written record of each child's behavior with each set of toys should be in one descriptive paragraph.

Scoring by one judge.- During the trial observations, four judges were trained to use the scoring method. A comparison of the raw scores assigned by these judges showed an acceptable agreement. Therefore, for the study of the final research instrument one of these judges could be selected to score the edited descriptions of the children's behavior. An additional check of the reliability of one judge's scoring could be obtained by comparing her scoring with that of the research worker who had helped in developing the scoring method and in training the original four judges.

Two sessions.- During the trial observations, some of the children remained interested in the toys for a much longer period of time than did other children. This could have been due to a child's physical and emotional well being or the lack of it on that particular day. Also some of the children played with one set of toys for as long as 30 minutes, which meant that playing with a series of tasks would have taken two hours or more. For these reasons it seemed advisable to present the tasks in two sessions on different days.

Age of subjects.- The children in the trial observations ranged in age from three years one month to five years one month. The younger children seemed much more free in their play than did the older children.

In order to eliminate the possible influence of age it was decided that the subjects used with the final research instrument should be approximately the same age.

The Research Instrument

Criteria

Following the trial observations, it was possible to define the criteria for the tasks in the research instrument and the criteria for the experimental situation. (a) The toys should be simple; play with them should be independent of intelligence and acquired ability. (b) The toys should be ones which could be put to a number of uses. (c) The toys should be ones which could be played with singly or in combination with another toy. (d) The toys should be ones with which the children had little or no previous experience. (e) The child should be familiar with the room and with the experimenter. (f) Social influences should be eliminated insofar as possible; therefore the experimenter should observe the child without remaining in the room with him. (g) The room should present no known opportunities for play other than play with the toys.

Description of the Toys

The following toys fulfilled the necessary criteria for the research instrument measuring a child's freedom to express himself in exploring and manipulating his environment.

(1) Bottles filled with blue play dots.- Four clear glass prescription bottles two-and-one-half inches high and three-fourths of an inch in diameter with white plastic lids which could be snapped

on and off easily. The play dots were pieces of blue rubber one-half inch in diameter and one-fourth inch thick.

(2) Cork cubes.- Twelve one inch solid cork cubes.

(3) A pan of water.- Three inches of water in a clear plastic pan 13" x 9½" x 5".

(4) Yellow wax discs.- 16 yellow wax discs two inches in diameter and three-fourths of an inch thick.

(5) Red play dots.- 50 pieces of red rubber one-half inch in diameter and one-fourth inch thick.

(6) Train sections.- Six flat interlocking train sections of natural wood six inches long and two-and-a-half inches wide.

(7) Wooden blocks.- 20 one-and-three-eighths inch natural wooden cubes.

(8) School bus.- Toy school bus, made of natural wood, 15 inches long. It had wheels that rolled, a removable toy, and a door that could be opened and closed. It had four round holes for windows on each side and a spare tire on the rear which was not movable.

(9) Cork balls.- 24 natural cork balls one inch in diameter with a hole through the center of each.

(10) Pipe cleaners.- 24 pipe cleaners of the same color 12 inches long.

(11) Round Block Stack, Playskool Educational Toy No. 150.- This toy had a square base with a nonremovable peg in the center. Four different colored wooden rings three inches in diameter and three-fourths of an inch thick fitted on this peg.

Two Sessions

The toys were presented to the children in two sessions. During each session, a child played with five separate tasks. Each task consisted of two toys with the exception of the Playskool toy, which was presented by itself. The tasks were presented in the following sequence:

Session A

- (1) Bottles filled with blue play dots
- (2) Cork cubes and a pan of water
- (3) Yellow wax discs and a pan of water
- (4) Yellow wax discs and red play dots
- (5) Train sections and red play dots

Session B

- (1) Train sections and wooden blocks
- (2) School bus and wooden blocks
- (3) School bus and cork balls
- (4) Pipe cleaners and cork balls
- (5) Round Block Stack

By presenting the tasks in this order it was possible for the experimenter to remove one toy as she added a new toy.

During the trial observations, a few of the children seemed to show an increase in freedom of expression toward the end of their play period in the research laboratory. This suggested that due to increased familiarity with the situation, the children might be more free with the tasks presented in the second session. For this reason the sessions were presented to half of the children with Session A

first and to the other half with Session B first. For this purpose the children were divided into two groups which had similar age distributions. The age of each child and the sequence of sessions for each child are given in Appendix A, Table VII.

Research Laboratory

The research laboratory was a room approximately 25 feet long and 15 feet wide. The room was empty with the exception of a permanent counter, a small table, and two chairs. The counter which was eight feet in length extended into the center of the room from one wall. This counter is of particular importance because some children hid under it when they were through playing with each task. The table on which the toys were placed for the child was approximately two-and-a-half feet wide, five feet long, and two feet high. A strip of black masking tape was placed across the center of the table and a chair was placed at each end. One wall of this room contained one-way vision mirrors through which the child could be observed. Entrance to this observation booth was gained through a door outside the research laboratory.

Procedure

Each child was given two opportunities to play in the research laboratory by himself.

First session.- The experimenter took a child into the research laboratory, showed him the toys (Task 1) and said, "My! this isn't very much to play with, is it? I'll tell you what, you play with these while I go find something else for you to play with. You

may do anything you want with these toys." At this point the experimenter left the room, ostensibly to get other toys; she entered the observation booth and observed the child through a one-way vision mirror. In the observation booth there was a second research worker who observed the child and dictated a description of his behavior on a tape recorder. When the child showed indications of being through playing with the toys, the experimenter returned to the research laboratory, removed one of the toys that was there, gave the child a different toy, and again excused herself from the room. This procedure was repeated and in this way the child played with the series of different toys in his first session. The child was then returned to the nursery school.

Second session.- The procedure that was used in the first session was also used in the second session. These sessions were never presented to a child on the same day. The time lapse between the first session and the second session ranged from one day to twenty days (Appendix A, Table VII).

Recording

While each child played with each set of toys, a description of his behavior was dictated on a tape recorder. This was a most detailed description of everything the child did while in the research laboratory; for example, if a child built a column of eight blocks, the addition of each block to the column was described in the record. The next step was the transcription of these recordings. Editing the transcriptions was then necessary. Editing involved the condensation of elaborate descriptions and the elimination of irrelevant material while the

description of the child's play with the toys was retained. An example of an unabridged record and the same record in edited form, as it was presented to the judge for scoring, is presented in Appendix C; and the complete edited record of one child's play with all the tasks is presented in Appendix D.

Scoring

One of the judges trained during the trial observations was given the edited descriptions of the children's behavior and directions for scoring them. These same edited descriptions were scored by one of the research workers as an additional check on the judge's reliability. The directions for scoring each child's play were as follows: (a) Sensory experience.- One point for each different sensory experience in which the child may have learned something about the toy. This includes tasting, smelling, visually examining the toy, and manipulating or experimenting with it. (b) Active play.- One point for each different unit of active play with the toy or toys. This includes dramatic play and games the child may invent. Merely moving the toy from one place to another is not considered active play. (c) Construction.- One point for each different type of construction that is made with the toy or toys. (d) Combination.- One point for combining the two toys in play at any time during the task. Following these directions for scoring, the judge obtained a raw score for each child's play on that task.

Recommended Analysis

The raw scores obtained for each child should be transformed into

rank scores. This will indicate the child's position relative to the other children insofar as each task is concerned and will avoid the possibility of any one task's being weighted heavily in the child's total score. The child's total score, i.e., the sum of his rank scores on the ten tasks, will be referred to as his freedom score.

The judge's scoring of the children's behavior should be checked for reliability by comparing it statistically with the research worker's scoring. The reliability of the instrument should be checked with a split-half correlation.

The relationship of the children's freedom scores should be compared to their intelligence test scores in order to determine whether the instrument is measuring a nonintellectual variable.

A comparison should be made of the children's behavior in the two sessions in order to determine whether increased familiarity with the situation influenced their behavior.

The value of the separate tasks in the instrument should be studied statistically in order that recommendations be made for their future use as a part of the instrument.

CHAPTER IV

RESULTS

This chapter will include a discussion of the validity of the research instrument, the relation of intelligence test scores to freedom scores, the reliability of the judge's scoring, the reliability of the research instrument, a comparison of the two sessions of play, a study of the value of the separate tasks, and recommendations for the future use of the instrument.

Validity of the Instrument

The research instrument ^{was} is assumed to have "face validity"; that is, the behavior which appears to be demonstrated in a child's play with the tasks is the behavior that the tasks were designed to measure. Therefore the relevance of the instrument to the child's freedom to express himself in exploring and manipulating his environment is apparent. Selltiz (24) states that in the assumption of "face validity" there are two questions to be considered. The first question is concerned with whether or not the instrument is actually measuring the type of behavior the experimenter assumes it is. The second question to be considered is whether the instrument provides an adequate sample of that behavior. In this research a child was given opportunities to play freely and his freedom in play was then measured. In order to

obtain an adequate sample of the child's freedom in play, he was observed in ten different situations.

Relation of IQ's to Freedom Scores

By definition creativity is a nonintellectual variable; therefore, the freedom scores determined by the research instrument must not be measures of intelligence. In order to ascertain whether or not the research instrument was measuring intelligence, a comparison of the freedom scores and intelligence test scores was made. Scores for each child are presented in Appendix A, Table VII. The coefficient of correlation between the freedom scores and the intelligence test scores indicates a negative relationship significant at the .05 level ($r = -.663$). It ~~can~~ therefore ~~be~~ assumed that the research instrument was not merely measuring intelligence. This negative correlation suggests implications for future research which will be discussed later.

Reliability of Scoring

During the trial observations, four judges were trained to use the scoring method. A comparison of the raw scores assigned by these judges showed acceptable agreement. For the study of the final research instrument one of these judges was chosen to score the edited descriptions of the children's behavior. These same edited descriptions were scored by one of the research workers as an additional check on the judge's reliability. The research worker had observed the play of the children, dictated the descriptions of the children's behavior and assisted with the editing. The trained judge had not observed the children, but rather merely read the edited records of the children's

behavior and scored them according to the written directions for scoring. The coefficient of correlation between the judge's scoring and that of the research worker indicates a positive relationship significant at the .01 level ($r = .929$).

For the individual tasks a comparison of the judge's scoring and that of the research worker yielded coefficients of correlation which ranged from .779 to .961 (Table IV).

Reliability of the Instrument

The Spearman-Brown formula for a split-half correlation was used to determine the reliability of the research instrument. The coefficient of reliability was .895, which is significant at the .01 level. The research instrument is accepted as statistically reliable.

Comparison of the Two Sessions

The tasks were presented to the children in two sessions, Session A and Session B. There was the possibility that increased familiarity would make some children more free with the tasks in the second session. For this reason the sessions were presented to half of the children with Session A first and to the other half with Session B first. Table V shows the scores for the individual children in Sessions A and B, and also shows the direction of change in score from the first to the second session. The indication is that the children were not more free in the second session than they were in the first session. Eight of the 12 children had higher scores during Session A, regardless of whether it was first or second in the sequence.

TABLE IV
 COEFFICIENTS OF CORRELATION BETWEEN THE SCORES OF
 TWO JUDGES BY INDIVIDUAL TASKS DESIGNED
 TO MEASURE FREEDOM TO EXPRESS

Tasks	r
1. Bottles filled with blue play dots	.779
2. Cork cubes and a pan of water	.824
3. Yellow wax discs and a pan of water	.947
4. Yellow wax discs and red play dots	.880
5. Red play dots and train sections	.959
6. Train sections and wooden blocks	.940
7. School bus and wooden blocks	.961
8. School bus and cork balls	.940
9. Cork balls and pipe cleaners	.938
10. Round Block Stack	.934

TABLE V
 FREEDOM SCORES OBTAINED BY INDIVIDUAL CHILDREN IN SESSIONS A AND B
 DURING PLAY WITH TASKS DESIGNED TO MEASURE FREEDOM TO EXPRESS
 AND THE DIRECTION OF CHANGE IN SCORE FROM THE
 FIRST TO THE SECOND SESSION

Child	Session A	Session B	Sequence of Sessions	Direction of Change from First to Second Session
A	24.5	39.5	AB	+
C	12.0	8.5	AB	-
E	24.0	23.0	AB	-
H	29.0	20.0	AB	-
J	40.0	49.0	AB	+
M	41.0	38.5	AB	-
B	50.5	41.0	BA	+
D	38.0	33.5	BA	+
F	18.5	33.5	BA	-
G	15.0	22.5	BA	-
K	47.0	34.5	BA	+
L	50.5	46.5	BA	+

The Value of the Separate Tasks

The value of the separate tasks in the research instrument was studied statistically in order to determine which toys were best for future use as a part of the research instrument. Therefore, the coefficients of correlation among the various tasks and the judge's reliability in scoring each task were studied.

The coefficients of correlation among the various tasks (Table VI) are needed in order to determine the relative value of each task to every other task. A study of these correlations shows which tasks have the least relative value and which have the greatest relative value as compared with the other tasks. For example, arbitrarily taking a coefficient of correlation of .40 as acceptable, one can count the number of tasks to which any one task shows an acceptable relationship. Task B-1 (Train sections and wooden blocks) is acceptably related to only one other task and therefore has the least relative value of all the tasks; whereas Task B-5 (Round Block Stack) is acceptably related to eight other tasks and therefore has the greatest relative value of all the tasks.

Another factor to be considered in making recommendations for the future use of specific tasks in the research instrument is the reliability of the judge's scoring on each task (Table IV). Any task on which the judges showed low agreement in scoring was regarded as a poor task for use in the research instrument. For example, Task A-1 (Bottles filled with blue play dots) is the task on which the judges showed least acceptable agreement ($r = .779$) and probably should be eliminated from the research instrument.

TABLE VI

CORRELATIONS* BETWEEN THE INDIVIDUAL TASKS OF THE RESEARCH INSTRUMENT
DESIGNED TO MEASURE FREEDOM TO EXPRESS

Task	A-1	A-2	A-3	A-4	A-5	B-1	B-2	B-3	B-4	B-5
A-1 Bottles filled with blue play dots		.368	.616	.266	.86	.228	.549	.333	.404	.794
A-2 Cork cubes and a pan of water			.345	.750	.471	.354	.161	.516	.618	.633
A-3 Yellow wax discs and a pan of water				.572	.728	.345	.312	.284	.284	.735
A-4 Yellow wax discs and red play dots					.319	.401	.191	.308	.520	.495
A-5 Red play dots and train sections						.210	.473	.417	.383	.834
B-1 Train sections and wooden blocks							.371	-.078	.098	.313
B-2 School bus and wooden blocks								.380	.411	.609
B-3 School bus and cork balls									.799	.448
B-4 Cork balls and pipe cleaners										.478
B-5 Round Block Stack										

*Spearman Rank Order Coefficient of Correlation

Recommendations for Future Use
of the Research Instrument

At this point it is possible to make certain recommendations for the future use of the research instrument.

Familiarity with experimental situation.- In order for the experimental situation to be one in which the child feel as free as possible, rather than insecure and frightened, it is essential that an opportunity to become familiar with both the research laboratory and the experimenter precede the use of the instrument.

New toys.- It is possible that the presentation of only one new toy rather than two in each task limited the child's opportunity for freedom of expression. Therefore, it is recommended that no toy be presented in two tasks.

Single session.- Since there was not an indication that the children were more free in the second session than they were in the first session, it is recommended that the tasks be presented in a single session.

Fewer tasks.- When the tasks are presented in a single session, it will be necessary to use fewer tasks. In this way the experimental situation will not be so long that it be tiring for the child.

Type of tasks.- A study of the results of the trial observations and the final research observations suggests certain types of toys which are best suited for the measurement of a child's freedom to express himself in exploring and manipulating his environment.

Therefore, the following tasks are recommended for any future use of the research instrument: (a) a pan of water and stereofoam balls, (b) a dump truck and wax discs, (c) cork balls and pipe cleaners,

(d) red play dots and train sections, and (e) Three peg Playskool toy or Round Block Stack. The criteria for these tasks are the same as the criteria for tasks used in the present research (see p. 22).

Scoring.- The written directions for scoring were adequate for the training of individual judges and the method of scoring itself was statistically reliable. Therefore, this method of scoring ^{found} ~~is~~ ^{was} recommended for future use with the research instrument. /

Recording.- The use of a tape recorder proved to be most practical by providing a detailed record which could be studied by more than one person. Needless to say, it is essential that the descriptions of the children's behavior be objective. This objectivity can be measured in several ways. In the present research the person who dictated the descriptions of the children's behavior was experienced in recording. Also, the transcriptions of the tape recording were edited by the experimenter and the research worker, both of whom had observed the children and who served as a double check in an attempt to eliminate any possible subjective statements in the initial dictation. This method of recording is recommended for future use with the research instrument.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this research was to develop an instrument for the measurement of a child's freedom to express himself in exploring and manipulating his environment. Such an instrument was developed and proved successful in discriminating among the children who were used as subjects. These subjects were 12 nursery school children, four and five years of age. In order that maximum freedom of expression be encouraged, each child was given an opportunity to become familiar with both the laboratory and the experimenter before he took part in the development of the research instrument. Then each child played by himself with the series of tasks which comprised the research instrument. The tasks consisted of simple toys which could be put to a number of uses and with which the children had had little or no previous experience. Each child's freedom score was a measure of the various ways in which he played with the toys by examining, manipulating, and constructing with them, and it indicated his relative position in this group of subjects.

Inasmuch as creative ability has been defined as a nonintellectual variable and freedom of expression has been accepted as a necessary characteristic for creativity, the relationship of the children's freedom scores to their intelligence test scores was studied. A significant negative correlation indicated that this freedom as measured

by the research instrument is not dependent on intellectual ability or acquired skill.

The research instrument was accepted as having face validity; and statistical analysis showed it to be reliable. The research instrument differentiated among the children who were used as subjects, some of them being quite free in expressing themselves and others being rather inhibited. On the basis of the present findings it ~~has~~ ^{has} been possible to make recommendations for a more simplified version of the instrument to be used in future research. ~~It must be kept in mind that~~ a child's freedom score as designed in this investigation will never indicate more than his relative position in the group with which he is compared.

Implications of the Study

The children used as subjects in this study differed markedly in their freedom to express themselves in exploring and manipulating their environment. There could be several explanations for this. If it is assumed that every child is born with the potential for expressing himself freely, then it must be assumed that something has encouraged this freedom in some children and something has stifled it in other children. The findings of this research suggest that the encouragement of freedom or the stifling of it occurs by the time children are five years old, and possibly sooner. These findings do not indicate that a child with a high freedom score on the research instrument is a child who is free in all situations. Fortunately the important thing insofar as life and education are concerned is that a child be able to conform to certain standards or requirements of his society; and

when this is not necessary, that he be and feel free to follow his own bent by using his own means and ingenuity.

The significantly high negative correlation between freedom scores and intelligence test scores suggests that further research be done in order to determine the causes of this relationship. At this time a hazarded guess about this relationship is that the demands made on children for achievement may in some way inhibit their freedom of expression.

Recommendations for Future Research

It is hoped that this research instrument can be of real value in the future study of the factors related to the development of creative ability in young children. This would include the study of certain variables which may be related to freedom to express and certain variables which are assumed to be related to creativity.

This instrument may be used to study the relationship of age, sex, and socioeconomic status to a child's freedom to express. It is possible that older children may be less free than younger children, that sex differences in freedom to express may appear as children grow older, and that children of higher socioeconomic status may be less free than those of lower socioeconomic status. Studies of these relationships could help to indicate factors which have a direct bearing on the development of freedom to express.

In the present research a significant negative correlation was found between intelligence and freedom to express. This cannot be interpreted as meaning that all highly intelligent children lack freedom to express themselves, but it does indicate the advisability of

further study of this relationship. A study in which the variable of intellectual ability is controlled could yield information about possible factors which influence the development of freedom to express.

Grounded
This instrument may also be used to study certain variables which are assumed to be related to creativity. Among these are social conformity and willingness to take a risk. These particular characteristics are suggested in the theoretical literature. If it is true that freedom to express is an essential part of creative ability, then there should be a relationship between these suggested characteristics and freedom to express. It is postulated that such a relationship would be curvilinear.

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APPENDIX A

TABLE VII

DESCRIPTIVE DATA FOR INDIVIDUAL CHILDREN PARTICIPATING IN THE DEVELOPMENT
OF AN INSTRUMENT DESIGNED TO MEASURE FREEDOM TO EXPRESS: AGE, SEX,
IQ'S, SEQUENCE OF SESSIONS, NUMBER OF DAYS BETWEEN
SESSIONS, TOTAL RAW SCORE, TOTAL RANK SCORE

(Ages are expressed in years and months)

Child	Sex	Age	IQ	Sequence of Sessions	Number of Days Between Sessions	Total of Raw Scores	Total of Rank Scores
A	F	4-11	134	AB	19	42	64.0
B	M	4-10	98	BA	1	58	91.5
C	F	5-3	142	AB	18	21	20.5
D	F	5-1	112	BA	3	49	71.5
E	M	5-3	117	AB	18	34	47.0
F	F	5-0	145	BA	2	37	52.0
G	M	4-11	142	BA	1	29	37.5
H	F	5-5	115	AB	18	37	49.0
J	M	4-11	110	AB	1	55	89.0
K	F	5-2	128	BA	1	51	81.5
L	F	5-2	93	BA	2	59	97.0
M	F	4-8	139	AB	20	54	79.5

APPENDIX B

TABLE VIII

RAW SCORES OF INDIVIDUAL CHILDREN FOR EACH TASK DESIGNED
TO MEASURE FREEDOM TO EXPRESS

Task	Raw Scores of Individual Children											
	A	B	C	D	E	F	G	H	J	K	L	M
Bottles filled with blue play dots	6	6	3	5	3	3	4	5	4	6	7	6
Cork cubes and a pan of water	5	6	5	6	6	5	3	4	7	7	7	5
Yellow wax discs and a pan of water	3	10	1	7	4	5	3	7	6	6	7	8
Yellow wax discs and red play dots	1	5	1	3	4	2	2	3	5	4	4	2
Red play dots and train sections	4	6	2	5	1	2	2	3	4	8	6	9
Train sections and wooden blocks	2	3	1	2	5	4	3	2	3	3	5	5
School bus and wooden blocks	7	5	2	4	4	4	5	4	7	4	5	7
School bus and cork balls	8	6	3	9	4	7	4	5	9	7	6	5
Cork balls and pipe cleaners	4	4	2	3	2	4	2	3	7	4	4	2
Round Block Stack	2	7	1	5	1	1	1	1	3	2	8	5
Total	42	58	21	49	34	37	29	37	55	51	59	54

TABLE IX

RANK SCORES OF INDIVIDUAL CHILDREN FOR EACH TASK DESIGNED
TO MEASURE FREEDOM TO EXPRESS

Task	Rank Scores of Individual Children											
	A	B	C	D	E	F	G	H	J	K	L	M
Bottles filled with blue play dots	9.5	9.5	2.0	6.5	2.0	2.0	4.5	6.5	4.5	9.5	12.0	9.5
Cork cubes and a pan of water	4.5	8.0	4.5	8.0	8.0	4.5	1.0	2.0	11.0	11.0	11.0	4.5
Yellow wax discs and a pan of water	2.5	12.0	1.0	9.0	4.0	5.0	2.5	9.0	6.5	6.5	9.0	11.0
Yellow wax discs and red play dots	1.5	11.5	1.5	6.5	9.0	4.0	4.0	6.5	11.5	9.0	9.0	4.0
Red play dots and train sections	6.5	9.5	3.0	8.0	1.0	3.0	3.0	5.0	6.5	11.0	9.5	12.0
Train sections and wooden blocks	3.0	6.5	1.0	3.0	11.0	9.0	6.5	3.0	6.5	6.5	11.0	11.0
School bus and wooden blocks	11.0	8.0	1.0	4.0	4.0	4.0	8.0	4.0	11.0	4.0	8.0	11.0
School bus and cork balls	10.0	6.5	1.0	11.5	2.5	8.5	2.5	4.5	11.5	8.5	6.5	4.5
Cork balls and pipe cleaners	9.0	9.0	2.5	5.5	2.5	9.0	2.5	5.5	12.0	9.0	9.0	2.5
Round Block Stack	6.5	11.0	3.0	9.5	3.0	3.0	3.0	3.0	8.0	6.5	12.0	9.5
Total	64.0	91.5	20.5	71.5	47.0	52.0	37.5	49.0	89.0	81.5	97.0	79.5

APPENDIX C

Unedited and Edited Record for Child H with Task A-3Unedited Record, Task A-3

Yellow wax discs and a pan of water.- She asked, "What are they?" and was told that they are yellow wax discs; she placed one wax disc in the pan of water, saw that it floated, went back to the other end of the table and got the remainder of the wax discs and placed them in the water, two at a time, one in each hand. When E went back into the room between this task and the one preceding it, H asked if she might stay as long as J had stayed, and was told that she might play with all the things that J had played with, she continues to move the yellow wax discs around and continues stirring the water. And as she stirs the wax discs around the discs are making a noise, she looks in the mirror while she stirs, she picks up one in her hand, squeezes it, pinches it, scratches it with her fingernail, she picks up the third one, she is building columns of three, of four; she holds them in her right hand and stacks them with her left. She places this column of four on the table, places a fifth one on it, a sixth one, a seventh one; after having a column of eight she picked up the column with both hands and dumped it back into the pan of water. She lifts up the discs with both hands, and then lets them fall through; she is now picking up handfuls of the discs and placing them on the table, in front of her, behind the pan of water; she now has all the wax discs on the table, she watches herself in the mirror as she does so. She put her hands back into the pan of water, walked to the paper towel rack, got a towel, dried her hands, watched herself in the mirror as she did so. This is the end of this task for H.

Edited Record, Task A-3

Yellow wax discs and a pan of water.- H placed one wax disc in the water and watched it float. She put all the remaining wax discs in the water, and stirred them back and forth with her hand. She picked up one wax disc, squeezed it, pinched it, and scratched it with her fingernail. She then picked up another wax disc and tapped the two together making a noise. She built a column of eight wax discs on the table, and then lifted the column and dumped it into the water. She then scooped several wax discs out of the water with both hands and then let them fall through her hands back into the water. She then took the wax discs out of the water and placed them all over the table.

APPENDIX D

Complete Edited Record for Child BA-1 Bottles Filled with Blue Play Dots

He dumped the dots out of one bottle and made a column with them. He dumped the dots from another bottle and added these dots to the top of the first column. He then emptied the dots from the two remaining bottles. He placed some dots into each of the empty bottles and replaced the lids. He stacked the four bottles one on top of the other and ran his finger up the side of the column. He then placed the bottles in a row on the table. He gently tapped two of the bottles against each other.

A-2 Cork Cubes and a Pan of Water

He built a column of the cork cubes. He wet the cubes, one or two at a time, pressed the wet cubes together and gradually built a wall out of them. He put his hands in the water and touched the bottom of the pan several times. He put all the cubes in the water and immediately took them out again. He then put the cubes in the water one by one, doing it gently at first and ending by doing it with force. He then put his hands down in the water on the bottom of the pan, raised them and lifted out whatever cubes he happened to catch in the process; he did this several times. He then walked his fingers back and forth in the water on the bottom of the pan. He took one cube, pushed it down to the bottom of the pan, and released it so that it rose to the top of the water; he did this several times.

A-3 Yellow Wax Discs and a Pan of Water

He wet a wax disc and pushed it against his nose; he dipped it into the water again and rubbed the table surface with it; he then bit into it. He put all the wax discs in the water one at a time. He turned one disc over, let it float on that side, then turned it over again and let it float with the other side up. He put his arms down under the water and raised them lifting wax discs as he did so. In this way he removed all the wax discs from the water. He put one wax disc against the side of the pan and looked through the pan at it; he then placed this same wax disc against the pan on the outside and looked through the pan at it; he then placed this same wax disc against the pan on the outside and looked through the pan at it from the opposite angle. He made a column of the wax discs. He then took the discs two or three at a time, and dropped them from a height into the water; they splashed and made a lot of noise. He rubbed one disc against the side of the pan, then he tapped it against the bottom of the pan.

A-4 Yellow Wax Discs and Red Play Dots

He made a long row of the dots standing on their sides so they were like little wheels and could roll. He messed up this row and lifted a fistful of dots high in the air and dropped them. He placed individual play dots on top of seven discs. He then made a column of the wax discs and he lifted one red dot on top of the column. He then took the column apart, one at a time.

A-5 Train Sections and Red Play Dots

He linked train sections together and moved the train around the table, making a train sound as he did so. He then put one red play dot on the front end of the first section, then moved the train again. He put a play dot on each train section. He took the train apart and stacked the sections in a column. At the rear of the stack of train sections was a hollow shaft; he ran his finger up and down this shaft saying, "Up the elevator!" His finger hit the top train section and knocked it off; he then moved his finger down the shaft and up again, knocking off each train section in turn until he had destroyed the column. He lay the train sections on their sides and linked them together. He bent forward and rested his head on the train. He then stood one train section on end so that it was standing erect. He said, "A rocketship", made a whooshing sound and raised it into the air.

B-1 Train Sections and Wooden blocks

He built columns out of the wooden blocks. He linked two train sections together and pulled them down the table between the columns he had built.

B-2 School Bus and Wooden Blocks

He held his face close to the bus and looked in the windows. He opened and closed the door of the bus. He rolled the bus to the middle of the table, lifted the lid off and looked inside. He put the blocks into the bus fitting them squarly and neatly into the bottom of the bus. He put the lid back on the bus and rolled the bus back and forth on the table. He looked in the windows of the bus, again rolled the bus back and forth a few inches and then patted the top of the bus with his head.

B-3 School Bus and Cork Balls

He poked cork balls through the windows into the bus, put his face close to the bus, and looked into the windows. He opened and closed the bus door. He took the lid off the bus and then replaced it. He then put all the rest of the cork balls into the bus through the windows. He removed the lid of the bus, looked in, and replaced the lid. He rolled the bus a short distance on the table. He put his hand on the lid of the bus and wiggled it. He moved the bus back and forth on the table.

B-4 Pipe Cleaners and Cork Balls

He put one ball on a pipe cleaner, twisted the pipe cleaner into a circle and fastened the ends together. He made a second pipe cleaner circle with a ball on it. He then used a third pipe cleaner to fasten these two circles together, thereby making a chain of three loops. Two of the loops came apart and he fastened them together again. He looked at himself in the mirror while he twisted on the pipe cleaners and straightened out one of them (one which had a ball on it). He then took another pipe cleaner and wound it around the ball. He raised these in the air and the pipe cleaner with the ball on it fell off. He picked up the ball, held it to his eye, and looked through the hole.

B-5 Round Block Stack

He took the toy apart and put it together again. He took the toy apart, banging each ring on the table as he did so. He placed the rings in a pattern around the base. He then put the toy together again. He lifted the rings up off the peg all together and then slipped them over the peg again. He did this several times. He put the rings in a column on the table and poked his finger down the hole in the center. He put a different finger down the hole and moved it around causing the rings to move. He replaced the rings on the peg. He tilted the toy, then turned it upside down in the air and the rings fell off. He took one ring over to the mirror and pressed it against the mirror.

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Master of Science

Thesis: THE DEVELOPMENT OF A RESEARCH INSTRUMENT FOR THE MEASUREMENT OF A PRESCHOOL CHILD'S FREEDOM TO EXPRESS HIMSELF IN EXPLORING AND MANIPULATING HIS ENVIRONMENT

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